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COMMISSION STAFF WORKING PAPER

The EU Economy : 2003 Review

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[2] Communication from the Commission to the Council and the European Parliament "EU Economy: 2003 Review", COM(2003)729, adopted on 26 November 2003.

INTRODUCTION

Lesson from 2003: More vigour needed to pursue the economic reforms agreed in the Lisbon strategy and the Broad Economic Policy Guidelines.

The economic performance of the EU economy in 2003 has underlined the need to pursue the Lisbon strategy with more vigour. The recovery that started in 2002 proved short-lived and did not initiate the dynamics necessary to bring economic activity back to potential. Although economic growth failed to rebound, employment withstood the slowdown better than in the early 1990's, suggesting a stronger resilience in the labour market after reforms implemented in the second half of the 1990s. However, employment growth has stalled in 2003 and the rate of unemployment has slightly risen. Moreover, public finances deteriorated. Investment has been a major drag on economic activity and was held back by the required adjustment in corporate balance-sheets and depressed profit margins. At the same time, the euro appreciation weighed on exports, while the sluggish decline in inflation did not stimulate private consumption. These developments have urged policy makers to intensify efforts to design and implement structural reforms in line with the Lisbon targets, the Broad Economic Policy Guidelines and the Employment Guidelines.

Reason for EU's disappointing economic record can be mainly found in domestic conditions.

The reasons for the subdued economic record are mainly to be found in domestic conditions. True, a series of global economic shocks have initiated the slowdown from 2000 onwards and 2003 was not free from further disturbances at the global scale. Oil prices were high and volatile, the global conflicts added to economic uncertainty and world trade did not rebound to former strength. Growth nevertheless picked up in some economic regions, most prominently in the USA and Japan. Among the possible domestic reasons for the European Union's tepid economic performance, structural rigidities figure prominently. Despite progress in recent years, activity rates and labour force utilisation are still too low. Key macroeconomic price variables such as real unit labour costs and consumer price inflation, adjusted only sluggishly to weak growth and deteriorating labour market conditions.

The EU Economy 2003 Review provides analytical support to key issues of the EU economic policy agenda.

The 2003 edition of the EU Economy Review analyses four specific topics that have been chosen for this year in the context of current economic policy challenges. Two chapters elaborate on key determinants of economic growth. The review starts with a chapter on recent macroeconomic and policy developments in the euro area and provides an in-depth discussion of possible reasons behind slow growth in the euro area. Chapter 2 deals with the drivers of productivity growth and analyses this from both an economy-wide and a sectoral perspective. It tries to identify the reason behind the gap between accelerating labour productivity growth in the USA and decelerating labour productivity growth in the EU. Despite widespread attention in policy circles devoted to education and human capital in the recent past, little is known about the contribution of education to economic growth. Chapter 3 provides a detailed analysis of education and growth. The experience from the early years of EMU as regards wage flexibility and wage interdependencies are analysed in Chapter 4. Finally, Chapter 5 deals with important aspects of the process of international capital flows.

1. MACROECONOMIC DEVELOPMENTS IN THE EURO AREA

The euro area is to record economic growth below potential for three years in a row, being off course from 2001 to 2003.

Despite signs of a pick-up in economic activity in the second half of 2003, the euro area is set to record economic growth significantly below potential for the third year in a row. Sluggish economic activity can be associated with two main factors at work in 2003. Firstly, global economic uncertainty persisted throughout the spring of 2003. The Iraq conflict dominated headlines, stock markets nose-dived and the euro continued to appreciate rapidly, especially against the US dollar. These events hit an economy that was already coping with the aftermath of past major shocks. Secondly, there is some evidence that adjustment to these past economic disturbances has been more anaemic than analysts and forecasters had assumed. Market forces that usually initiate recovery seem to have worked less efficiently or strongly, implying that the economy, which recovered in early 2002, was not resilient to further adverse events.

Prolonged period of slow growth rather than a sharp fall in growth.

In a broader perspective, 2001-03 can best be described as a period of sustained growth slowdown rather than mild recession. A comparison of the last three major downturns in the region that now forms the euro area shows that they all started from a similar level of a positive output gap between 2 and 2 ½ per cent. The current change of the output gap is broadly comparable to that observed in the early 1980s and early 1990s. In international comparison, the deterioration of the euro-area output gap has not been particularly large. Moreover, the cross-country perspective points to a consistent relationship between the size of the output gap in 2000 and its subsequent deterioration. Those countries that witnessed the strongest deterioration in the output gap 2002-2003 were also those where actual GDP was higher than potential in 2000, and vice versa. This suggests that the recent slowdown should not be analysed in isolation but with reference to the events during the previous boom period.

Market adjustment was sluggish, suggesting an economy not resilient to shocks.

The fact that the slowdown has persisted for three years suggests that supply-side dynamics has been important and the growth weakness cannot solely be attributed to demand shocks. Against the background of both receding inflation and a considerable weakening of labour productivity growth at the early stage of the slowdown, steady nominal wage growth contributed to a marked increase in nominal unit labour costs. Both employment and private consumption growth decelerated broadly in line with the weakening of overall economic activity. Compared to historical experience, the fact that employment growth remained slightly positive despite a considerable weakening of economic activity is indicative of improved labour market resilience, and reflects a different path in job creation and destruction than in previous slowdowns as a result of labour market deregulation measures implemented in several Member States. Finally, exchange rate movements had a pro- rather than a counter-cyclical effect. During the previous period of strong growth in 1999-2000, the weakening euro increased price/cost competitiveness while the strengthening euro did not support export demand when economic growth slowed in 2002-2003. Interest rates declined in accordance with the slowdown in economic activity. Nominal interest rates have not been so low for

some 50 years and the real long-term interest rates have not been as low as they are now since the late 1970s. Nevertheless, investment activity remained particularly weak, reflecting the importance of macroeconomic factors such as weak demand prospects, a worsening of profit margins and a low degree of capacity utilisation but also the increase of risk aversion and high debt in the corporate sector despite the ongoing correction of corporate balance sheets.

Corporate adjustment to slow growth yielded depressed profit margins and a pronounced weakness of investment.

The perception of risk seems to have fundamentally changed due to economic (slowdown in growth), financial (bursting of the stock market bubble) and political factors (terrorism). All these factors raised corporate capital costs. In a nutshell, the typical euro-area company adjusted to the erosion of revenues by trimming down capital costs whereas the US company reduced both capital and labour costs. The effect was a profound weakening in the growth of labour productivity in the euro area, which translated into depressed profit margins. Investment was cut considerably on both sides of the Atlantic. The main difference was that, whilst almost all the adjustment in investment in the USA took place in the years 2001 and 2002, in the euro area weak investment performance lasted until 2003.

Forces of recovery are well intact.

Optimism as regards the outlook for the euro-area economy was and still is based on significant structural improvements in the euro area that imply a clear break with past patterns. Four positive factors stand out: (1) a stability-oriented macroeconomic policy framework; (2) growing resolve to tackle structural reforms; (3) continuously moderate wage growth; and (4) technological advances providing scope for improvements in labour productivity growth.

Monetary policy has been accommodative.

Monetary policy had to act against the background of only slowly receding rates of headline and core inflation. While most of the increase in headline inflation in 2001 was related to one-off effects (oil price hikes and food price hikes linked to bad weather and BSE), there was a substantial risk of second-round effects. Despite this, the ECB cut interest rates from May 2001 onwards by a cumulative 275 basis points. A positive lesson from the recent experience is that the monetary policy stance has been accompanied with continuously low and stable inflation expectations. Forward interest rates suggest that financial market participants seem to consider that neither the strong growth in monetary aggregates nor the currently low level of money market rates represents a threat to price stability in the short to medium-term.

Budgetary policy: easing did not stimulate economic activity.

In terms of both actual budgetary developments and as regards the implementation of the EU framework for fiscal surveillance the past few years have been a difficult period. The play of automatic stabilisers in the context of the slowdown implied a considerable worsening of government finances. But the increase in the nominal deficit for the euro area as a whole reflects also discretionary loosening by some Member States. Available evidence suggests that the impact of the tax cuts, which were enacted in several EU Member States (D, F, I, NL, and A) since 2001, did not yield the hoped-for increase in private consumption and investment. The less energetic pursuit of budgetary consolidation may, also in view of the growing awareness of the need to reform pension systems, have dented private consumption through

negative confidence effects. Moreover, worsening public finances may have prevented any further lowering of interest rates.

Budgetary consolidation needs to resume to tackle on time the looming budgetary implications of ageing ...

The deterioration of public finances witnessed since 2000, particularly in some Member States, has cast doubts on the commitment of several euro-area countries to achieve sound public finances over the coming years. This unfortunate development has been clearly marked by a breach by some Member States of the EU´s fiscal rules. In responding to this it is important that fiscal authorities do not settle for short-term solutions that undermine the EU fiscal framework and the need to pay adequate attention to sustainability issues. Indeed, the increased focus on the quality of public finances has highlighted that about half of the Member States face a serious problem of sustainability. Achieving sound public finances is an important prong in the strategy to tackle on time the looming budgetary implications of ageing. Member States should demonstrate a clear willingness to pursue the medium-term strategy that in some cases has already delivered periods of high and sustained growth.

… supplemented by further progress with encouraging labour market participation and economic growth.

Moreover, encouraging labour market participation and economic growth will be key to alleviating the problem of ageing populations. For example, enhanced efforts to help parents combine work and family life, which Member States are committed to undertake, may contribute to raise employment rates. In order to bolster and speed up implementation of the Lisbon strategy, the European Initiative for Growth seeks to mobilise investment in areas that will reinforce structural reforms, stimulate growth and create jobs. It targets public and private investment in networks and knowledge.

2. DRIVERS OF PRODUCTIVITY GROWTH: AN ECONOMY-WIDE AND INDUSTRY-LEVEL PERSPECTIVE

A new growth pattern has emerged in the USA and a small number of the EU's Member States since the mid-1990s.

A new growth pattern has emerged in the US and a small number of the EU's Member States since the mid-1990s. For the first time since World War II, the EU is now on a lower trend productivity growth path than the USA. Over the 1996-2002 period, the EU has proved incapable of reversing the long-run decline in its productivity growth performance whereas the USA has enjoyed a notable recovery in its secular trend.

Deterioration in EU productivity growth is due to inadequate investment and innovation.

The 1 percentage point decline in EU labour productivity growth experienced over the 1990s emanates from two factors. Half of the decline can be attributed to a reduction in the contribution from capital deepening. Within this category, whilst investment in information and communication technologies (ICT) contributed positively (but not as much as in the USA), the rest of investment performed poorly. The remaining half emanates from deterioration in total factor productivity (TFP). This should probably be seen as the greatest source of concern for policy makers. Improvements in TFP are generally attributed to a more efficient resource utilisation emanating from enhanced market efficiency; from technological progress resulting from investments in human capital, R&D and information technology; or from the natural catching-up process of the less developed EU countries through

increased business investment in general.

Economic growth in the EU in the 1990s is characterised by more labour input and less productivity.

In terms of GDP growth, the EU and the USA experienced significant breaks in the 1990s not only in terms of labour productivity but also with regard to labour input. The EU in fact achieved a sharp increase in its contribution from labour which, as mentioned above, was accompanied by equally sharp reductions in the contribution from productivity. The opposite pattern emerged in the USA. These divergent labour input and labour productivity trends are clearly linked. Up to one quarter of the 1 percentage point slowdown in EU productivity growth can be attributed to the higher employment content of growth. No policy trade-off should, however, be implied since boosting employment rates through bringing low-skilled workers into employment only leads to a temporary reduction in measured productivity growth, with no effect on the long-run productivity growth of the existing workforce.

Several Member States have outperformed the USA in terms of labour productivity growth.

A much more nuanced picture emerges at the individual EU Member State level. As regards labour productivity growth, seven EU Member States (Belgium, Greece, Ireland, Austria, Portugal, Finland and Sweden) performed well above the EU productivity average and even above that of the USA. Three of the seven, namely Ireland, Finland and Sweden were also capable of combining both strong productivity and high labour utilisation rates. The aggregate EU productivity gap therefore reflects the particularly poor performances of a number of the larger Member States, most notably Italy.

The industry-level analysis shows that superior US performance is concentrated in four ICT-producing and ICT-using industries.

The industry-level analysis shows that the superior performance of the USA in ICT-producing manufacturing and intensive ICT-using service industries is the principal source of the diverging productivity trends in favour of the USA. Whilst productivity in ICT-producing manufacturing industries has been growing at a significantly faster pace than in the associated ICT-using service industries, the latter account for by far the greatest proportion of the USA's upsurge in productivity. Labour productivity growth seems to be dominated by just five, out of a total of fifty-six, industries. All of these are among the ICT-producing and intensive ICT-using areas of the respective economies. The USA outperforms the EU in four of these five, namely in one ICT-producing manufacturing industry (i.e. semiconductors and other electronic equipment) and in three intensive ICT-using service industries (i.e. wholesale trade; retail trade; and financial services). On a more encouraging note, the EU is dominant in one ICT-producing service industry, namely telecommunications.

But with ICT contributing also positively to EU productivity growth, the slowdown has occurred in the non-ICT part of the economy.

The industry analysis also re-affirms that ICT is only part of the story behind the rising US and declining EU labour productivity trends. Just like in the USA, ICT also contributes to both capital deepening and TFP in the EU (although the extent of the gains in the USA is larger). The origin of the deterioration in EU productivity over the 1990s stems therefore from developments in the non-ICT, more traditional, group of industries, including services. Indeed, data reveal that both capital intensity and overall efficiency patterns in these sectors appear to be deteriorating. Accounting still for nearly seventy percent of total EU output, these developments are particularly worrisome. In addition, these are the parts of an enlarged EU economy which are facing the greatest competitive challenges from globalisation.

Productivity growth differentials appear to be related to some fundamental structural differences at the individual Member State level.

The key policy question addressed is whether the EU countries that experienced high productivity growth and the USA shared certain common characteristics that could explain their superior performance? More specifically, what were the channels via which the more fundamental factors driving growth (i.e. institutions, trade, market size, education and labour supply/demographics) affected investment and TFP in these countries, and how did these latter two factors interact to generate labour productivity growth? A model-based analysis shows that EU-US productivity differentials are indeed related to some fundamental structural differences at the individual country level, with five areas being identified as being quantitatively important and relevant in an EU context, namely the level of regulation, the structure of financial markets, the degree of product market integration, the size of knowledge investment and the ageing of the labour force.

"Lisbon strategy" simulation highlights the difficulties for the EU in becoming the most competitive, knowledge-based, economy in the world.

A "Lisbon Strategy" simulation, whilst explicitly concentrating on regulatory reform and the knowledge economy, implicitly highlights the importance of these five factors in determining the EU's long-run productivity growth rate and therewith for its ambitions to outperform the US in terms of potential growth.[3] In terms of boosting investment via regulatory reform, the "Lisbon Strategy" simulation showed that even a relatively rapid policy of deregulation towards equivalent US levels would not lead to sufficiently large productivity gains over the next seven years to close the present 10% efficiency gap with the US. Such a policy approach would appear to yield static efficiency gains rather than the dynamic efficiency benefits needed to achieve an outward shift of the "technology frontier". This suggests that deregulation alone, whilst crucial for investment, would be insufficient to meet the strategic Lisbon goal. It must therefore be accompanied by concerted efforts aimed at boosting the production of knowledge.

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[3] The Lisbon simulation captures two supply-side initiatives linked to the Lisbon strategy, namely (1) a reduction of the level of regulation in the EU to the US level and (2) higher spending on third level education, software and R&D. It suggests that the effect of implementing such a large package of reforms would be to significantly boost EU potential growth rates, on average by ½ to ¾ percentage point annually over a 5-10 year horizon.

Productivity gains from R&D and human capital investments ...

Regarding knowledge production, long run productivity gains seem to stem above all from investments in both education and R&D. Regarding education, investment that fosters higher educational attainment can be expected to yield productivity gains as explained in the next section. Regarding R&D, the focus should be on creating the framework conditions that would promote an increase in total investment in R&D. These conditions include a higher degree of product market integration (e.g. through completion of the internal market) and an investment environment which ensures the development of a more active risk capital market. The reforms in this direction would undoubtedly improve the EU's economic fortunes, even if taken by themselves they would still not allow the EU to overtake the US in productivity terms over the timescale laid out by the Lisbon agenda.

… will be partially offset by the parallel efforts to boost employment growth and from the effects of the EU's ageing labour force

Apart from the time it takes for the reforms to yield visible effects, two further obstacles need to be overcome to reach the productivity target put forward in Lisbon. Firstly the temporary efficiency trade-off faced in attaining the parallel employment target of 70% and secondly the continuous drag on productivity induced by Europe's ageing labour force.

The productivity analysis supports the conclusions of the 2003 Spring Report.

Realising the difficulties of measuring progress in structural reforms, the Commission and the Council devised a set of structural indicators which have become one of the main tools for assessing progress in achieving the Lisbon objectives. This year, the Spring Report presented a simple, but very informative, exercise counting the frequency with which each Member State was amongst the three best or three worst performing Member States in the EU on each indicator. Certain countries appeared again and again amongst the top three Member States, most notably Denmark, Sweden and Finland. It is important to note that these are precisely the same countries that had already undertaken deep and successful reforms well before the launch of the Lisbon strategy. On the other hand, the largest Member States, such as Germany, France and Italy, came out as clear laggards with respect to structural reforms. The strong productivity growth performances of a small number of Member States vindicate the policy framework established by the Lisbon strategy. To bear fruit, however, the strategy has to be backed up by commitment and the timely and thorough implementation of the different reform measures.

Reversing declining labour productivity trends depends ultimately on the policy choices made by governments in the five areas highlighted in the analysis.

Finally, whether recent EU productivity trends are likely to be permanent or transitory will depend on the policy choices governments make. The analysis confirms the importance to the EU's long-run productivity performance of a forceful implementation of a comprehensive reform strategy. It should aim at reducing the regulatory burden, further integrating markets, promoting human capital investment and enhancing the innovation potential of the economy. Implementation of such a wide-ranging reform agenda would create a more flexible, dynamic and investment-friendly business environment. Together with better functioning markets, and more risk-oriented financing mechanisms, this will set the conditions for a significant increase in the EU's underlying labour productivity growth rate.

3. EDUCATION, TRAINING AND GROWTH

Investment in education is a powerful influence on economic growth ...

Rising educational attainment has been a major influence on economic growth. Attainment can be defined as the successful completion of a given level of education, such as lower-secondary school or an undergraduate degree. Given the difficulties in comparing education systems in different countries, the number of years of study required to obtain a given qualification is usually used as a proxy. Several recent studies, based on improved attainment data, suggest that an extra year of average attainment in the 25-64 population could raise productivity by as much as 4 to 6 per cent. In the EU, average attainment has grown by about 0.8 years per decade since 1960. This means that education might have accounted for as much as 0.3 to 0.5 percentage points of annual GDP growth. Further possible benefits might result if education indirectly promotes technical progress in the longer term. Whether this continues to be the case in the future depends on many unknowns, not least the nature of technical change and the consequent demand for skills. Nevertheless, educational attainment in the EU as a whole is set to continue increasing in the medium term at a similar pace to that of recent decades. Thus, a similar contribution to growth might be expected, though this will vary considerably among Member States.

... and yields long-term benefits.

The full productivity benefits of investment in young people's education accrue over the whole professional life. Three quarters or more of the increase in average attainment over the next decade will result from investments already made, in some cases many years ago, as older workers retire and are replaced by younger and better-educated cohorts. In comparison, investments made today will have a relatively small impact on average attainment over the next decade. Nevertheless, for the benefits of education to be reaped throughout the working life of an individual, knowledge and skills must be maintained and updated. Indeed, education should be interpreted in the broadest sense of lifelong learning, from pre-school and basic education to adult education and training in the workplace. The impact of education on growth is expected to be highest in countries where enrolment in secondary and tertiary education has risen most rapidly over the past 30-40 years, and lowest in countries where enrolment was already high and has grown less rapidly. There is some evidence of high returns to education particularly in the case of people who would otherwise enter the labour market with low levels of attainment. Since initial education leads to further training opportunities, inequalities in attainment tend to widen over time. Those with few qualifications are faced with a higher risk of unemployment and the need for later and more costly attempts to improve employability.

The quality of education is as important as the number of years spent in education ...

The economic evidence suggests that the quality of educational outcomes – measured by scores in internationally comparable tests – may be at least as important as the number of years spent in school or college. In fact, when quality is taken into account, the estimated growth impact of the number of years of schooling tends to fall. A key question, then, is how quality can be improved. It is self-evident that adequate resources are necessary for a high-quality education system. On the other hand, the link between expenditure and outcomes across countries is weak at best, which suggests that resources are being used

with varying efficiency. Improving teachers' incentives to deliver high-quality outcomes may be more of a priority than increasing spending in some countries. Where increased resources are available, decisions on how these are spent – for example, on books, computer equipment, smaller class sizes, higher salaries for staff and so forth – may have important implications for quality.

... and greater efficiency would encourage investment in education.

Greater efficiency in the use of resources would increase the rate of return to investment in education. At tertiary level, for example, high drop-out rates and studies that often last well beyond the standard duration are equivalent to years spent outside the labour market without tangible benefits in the form of higher attainment. At primary and lower-secondary levels, demographic developments mean that the number of pupils is falling. This should in principle free resources. But, in practice, expenditure per student has tended to grow faster than GDP in recent years. If this continues, the additional cost in a decade could comfortably exceed the cost of an ambitious programme to increase enrolment in pre-school, upper-secondary, tertiary and adult education. Reforms in other areas, such as labour markets, tax and benefit systems and retirement incentives, would also increase the returns to education, thus encouraging investment.

Additional public resources should be focused where social returns are highest compared to private returns.

The available evidence suggests that the social returns to an additional year of schooling (i.e. the benefits to the whole economy) are broadly comparable to the private returns (i.e. the benefits to the individuals concerned). But both private and social returns are likely to vary considerably between, and indeed within, specific areas of education and training. There may be a case for targeted increases in public investment where the social returns appear high enough, and where they exceed the perceived private returns (otherwise government would merely subsidise investments that might anyway be made, leaving other more deserving projects unfunded, or unnecessarily raising the tax burden). A good case might be made for broadening access to pre-school education or for increasing upper-secondary participation, especially since these investments have long-lasting benefits and may help to even out inequalities in access to education that tend to widen over time. Where private returns are high and apparent, policy-makers should question whether increased public funding is needed to meet their objectives. Potential external benefits in terms of longer-term technical progress might justify certain public investments, including aspects of tertiary education.

Adult education and training may offer the greatest scope for raising average attainment in the longer term, but policies to encourage it must be efficient.

Since upper-secondary and tertiary participation cannot grow unboundedly, adult education and training is likely to offer the greatest scope for increasing educational attainment in the long term. Of course, the duration of the benefits is shorter than for children and young adults. Nevertheless, theory suggests, with some empirical support, that there are significant failures in the market for training, leading to under-provision. In addition, lifelong learning could play a crucial role in maintaining and renewing human capital acquired earlier in life, something which is not taken fully into account in the basic 'returns to education' framework. Lifelong learning could also help older workers to remain longer in the labour market, thus extending the benefits of earlier investments in human capital. If policies could be designed to address market failures in an efficient way, the returns could be higher

than those for traditional schooling. Experience suggests, however, that tax incentives, subsidies and co-financing schemes to encourage training will need to be designed and evaluated much more carefully than in the past. This would help to maximise incentives to undertake genuinely additional training, and to minimise deadweight losses, substitution effects and other inefficiencies that may otherwise quickly consume the potential benefits of such programmes.

4. WAGE FLEXIBILITY AND WAGE INTERDEPENDENCIES IN EMU

Wages play a key role in macroeconomic adjustment in EMU.

Over recent years, a near consensus view has emerged on the roots of high and persistent unemployment in many Member States, including all the major economies of the euro area and, more generally, on the low employment rates. Broadly speaking, this view regards the poor labour market performance of the countries concerned as the result of the interaction of a series of adverse macroeconomic shocks with unfavourable labour market institutions, and also product market regulations that have significantly limited the capacity to adjust to changes in economic conditions. Obviously, wages as the price of labour have a key role to play in determining the overall balance of supply and demand in the labour market. Furthermore, the formation of economic and monetary union (EMU) is often taken to put further demands on the flexibility of wages to compensate for lack of (national) instruments to deal with economic disturbances. If wages are too rigid, the necessary adjustment will come slowly and with considerable economic and social costs.

The downturn has exposed both the strength and the limits of wage setting mechanisms in the euro area.

Both common macroeconomic shocks and country-specific developments have put the flexibility of wage setting mechanisms in the euro area to a stress test in recent years. It was expected that nominal wage growth would remain consistent with price stability and productivity gains, thereby allowing companies to increase job-creating investment. Regarding actual developments, on the positive side, overall wage discipline has been preserved and risks that the inflation overshoot would lead to extended second-round wage effects have been averted. On the negative side, with nominal wage growth rather invariant to the cyclical situation, the slowdown in labour productivity growth translated into significant increases of nominal unit labour costs in 2001 and 2002. Hence, wage flexibility appears to have provided little, if any, support to the expected cyclical recovery so far.

Wage moderation should be pursued if EMU is to continue to deliver strong job growth.

After a prolonged period of wage moderation, the fall of the share of wages in GDP came to halt at the turn of the decade and remained broadly stable throughout the downturn. There are indications that the wage share will decrease again when the economy gathers momentum in 2004. Moderate real wage increases, consistent with productivity gains and the need of restoring profitability where necessary, help to increase employment and to lower structural unemployment over the medium term, without necessarily compromising domestic demand in the economy. This assertion is backed up by both standard economic theory and by the factual experience of many euro-area countries, in particular in the second half of the 1990s. Hence, in light of still high structural unemployment, further wage moderation is necessary in the euro area. However, it should also be noted that aggregate real wage

moderation is a fairly poor substitute for wage differentiation, when it comes to helping to price the low-skilled back into jobs. It needs therefore to be accompanied with specific measures targeted at raising employment among low-skilled workers.

Conventional wisdom has it that wage formation mechanisms in Europe are characterised by a high degree of rigidity and slow adjustment to shocks but evidence is still inconclusive.

Conventional wisdom has it that wage formation mechanisms in Europe are characterised by a high degree of rigidity and slow adjustment to shocks. A number of institutional features in the euro-area labour market could account for a lack of nominal as well as of real wage flexibility. Factors typically mentioned in this context include union power, coordination/centralisation of bargaining, bargaining coverage, the impact of collective bargaining on contract length, the use of wage rules in collective bargaining, including wage indexation, and, last but not least various insider-outsider mechanisms in the labour market affecting the sensitivity of wages with respect to unemployment. However, in line with findings from other studies, formal econometric analysis of Phillips curve-type wage equations suggests that wage inflation persistence in the euro area is not higher than in the USA. The finding of broadly similar degrees of nominal inertia across euro-area Member States, and in the euro area and the USA, makes it difficult to identify institutional labour market characteristics as the major determinants of nominal rigidities. Thus, while institutional and structural factors are a key to an understanding of what determines the level of equilibrium unemployment over the medium term, institutional labour market characteristics appear to be of less importance for the degree of nominal inertia in the economy.

EMU is affecting the wage bargaining system in several ways with potentially important implications for the adjustment to shocks in the euro area.

While it is still too early to draw final conclusions on potential channels through which EMU could impact on the incentives faced by its economic agents and on its wage bargaining systems, the picture is nevertheless becoming progressively clearer. Research has already identified a strong positive impact of the euro on product market integration via increased trade and foreign direct investment. This should lead to enhanced competition on product markets. The impact of EMU is somewhat less clear-cut in the case of wage interdependencies. The convergence of wages and unit labour costs has not waited for the single market, let alone EMU, to be completed. Available sectoral evidence suggests that convergence was in fact stronger in the 1980s than in the 1990s. The emergence of higher goods market integration and of stronger interdependencies in wage setting across countries – be it due to EMU or other factors – can affect the way in which shocks are absorbed and transmitted in EMU. Model simulations show that this partly depends on the nature of the shocks. Increased wage interdependency does not lead to major differences in the absorption of supply shocks but entails a more protracted adjustment to demand shocks. In the case of demand shocks, the wage and price response slows down if wage setting is interdependent, with simulations showing that it takes approximately one more year for the output adjustment process to work out than in the case without wage interdependencies.

5. DETERMINANTS OF INTERNATIONAL CAPITAL FLOWS

The creation of the internal market and the launch of EMU have fostered international capital flows.

The strong increase of international capital flows (portfolio flows and direct investments) over the past ten years is the combined result of legal and economic forces. As regards the EU, the full liberalisation of capital movements within the Community was finally accomplished on 1 July 1990 while capital movements between Member States and third countries were fully liberalised on 1 January 1994. The rapid expansion of domestic financial markets and surging international trade have been two of the main driving economic forces. In addition, the adoption of the euro and the resulting elimination of foreign exchange risk within the euro area have accelerated financial integration within the EU.

Increased international capital flows have strong implications for the global economy.

Enhanced financial integration has strong implications for the functioning of the global economy. International capital flows may serve both as a source of growth and as a transmitter of macroeconomic shocks. By smoothing consumption, capital flows play an important role in the adjustment to disturbances. Sudden shifts in the flow of foreign finance can, however, also create major domestic problems, as demonstrated by financial crises in several emerging economies in the past decade. Many emerging economies liberalised their capital flows in the 1990s, while maintaining weak financial institutions and pursuing macroeconomic and financial policies that turned out to be inconsistent with exchange rate stability. The outcome has been large financial imbalances driven by capital inflows and eventually financial crises and distress.

The need to finance high investment ratios without adequate national savings continues to lead to external deficits financed by FDI inflows in acceding countries.

Current account deficits are a common feature in the acceding countries. In several cases they amount to more than 5 percent of GDP, having increased over recent years in connection with rising foreign direct investment. Thus, the current account deficit in most cases is a reflection of large FDI inflows and not the main reason for the worsening of the external accounts. With the notable exception of Hungary, the external deficits are largely covered by non-debt-creating FDI inflows. In some acceding countries, privatisations are still under way. In others, second-round investment in the form of inter-company loans provide an important source of current account financing. On the whole, the acceding countries are likely to run considerable current account deficits for some time to come in order to compensate for their lack of domestic savings. Thus, foreign investments will continue to be a major motor of growth.

Adoption of EU acquis should contribute to financial stability in the acceding countries.

In the area of financial sector development and supervision, in particular, there are striking differences between acceding countries and many other emerging markets. Here the acceding countries have gradually implemented the EU acquis for regulation and supervision and have opened their markets to large-scale foreign ownership. This experience suggests that the acceding countries - by pursuing adequate policies - can avoid the negative experiences in other regions, thereby setting the pre-conditions for strong real convergence in a setting of financial stability.

Improving corporate governance systems should help the EU to attract capital flows.

Countries with good corporate governance systems are likely to attract international capital flows on better terms than countries with weak systems that invite fraudulent behaviour. With rising competition for capital inflows these issues are likely to become important determinants of capital flows in the coming years. The EU has already taken a number of steps to improve corporate governance in Europe, including the Financial Services Action Plan (FSAP) and the Market Abuse Directive. Work is also underway to strengthen accountancy standards, auditor independence and share-holders' rights. This will make the EU more attractive for growth-enhancing capital flows.

1. MACROECONOMIC DEVELOPMENTS IN THE EURO AREA

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1. MACROECONOMIC DEVELOPMENTS IN THE EURO AREA

1. Introduction

Despite signs of a pick-up in economic activity in the second half of 2003, the euro area is set to record economic growth below potential for three years in a row. After solid growth in the first two years of EMU, economic activity in the euro area faltered in 2001. With the economy seemingly recovering in early 2002, the slowdown was initially perceived to be a brief event. However, expectations were defied: the recovery did not unfold in the course of 2002 and growth dipped again. Real GDP growth virtually stalled in the first half of 2003.

In terms of annual figures, real GDP is expected to have grown by barely ½ per cent in 2003, down from about 1½ per cent in 2001 and 1 per cent in 2002. The unemployment rate increased to 8.9 per cent, up by ½ percentage point compared to the year before and almost 1 percentage point above the level in 2001. Over the same period, consumer price inflation hardly came down and remained above 2 per cent in 2003.

Sluggish economic activity can be associated with two main factors at work in 2003. Firstly, global economic uncertainty persisted throughout the spring of 2003. The Iraq conflict dominated headlines, stock markets nose-dived and the euro exchange rate continued to appreciate rapidly, especially against the US dollar. These events hit an economy that was already coping with the aftermath of past major past shocks, affecting the supply as well as the demand side of the economy. Secondly, there is some evidence that adjustment to past economic disturbances has been more anaemic than analysts and forecasters had expected.

The fact that the slowdown has persisted for three years suggests that supply-side factors have played an important role, the growth weakness not being solely attributable to demand factors. Market forces that usually initiate recovery seem to have worked less efficiently or strongly in the euro area than in other economies. Against this background, this chapter reviews patterns of economic adjustment in the euro area between 2001 and 2003. The intention is to identify the factors which acted as a drag on growth and economic resilience.

2. Macroeconomic developments in the euro area 2001-2003

2.1 Comparing the deterioration in output gaps: a cross-country perspective

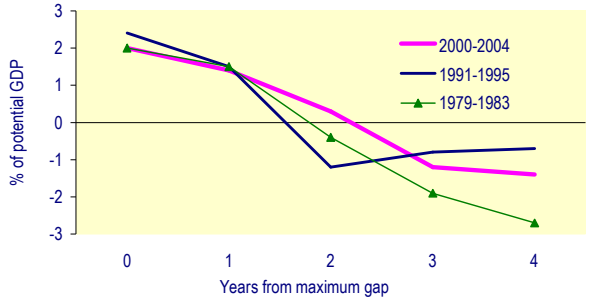
As analysed in past vintages of the Review, the euro area was hit by supply as well as by demand disturbances. They included: an increase in risk premiums on financial markets and a high level of corporate debt as the result of strong investment in equipment during the previous boom on the supply side and the decline in world trade and the oil price hikes on the demand side. However, the slump in stock prices, over-capacity in the ICT sector, the deterioration in external demand and higher energy prices affected all industrial countries.[4] But other economic entities, for example, the USA, Australia and Canada, were more successful in overcoming the global downturn. Consequently, factors specific to the euro area are key to understand why economic activity remained weak in the euro area.

2001-03 can best be described as a period of sustained growth slowdown rather than mild recession. That is, the defining feature has been the duration of the period of low growth rather than the severity of the shortfall in

[4] These shocks were analysed in detail in the chapters on the euro-area macroeconomic developments in the EU Economy Review of 2001 and 2002.

growth. A comparison of the last three major downturns in the region that now forms the euro area shows that they all started from a similar positive level of the output gap, i.e. between 2 and 2 ½ per cent. The output gap declined by 3 percentage points of potential GDP to an estimated minus 1.2 per cent in 2003. The magnitude of the change is broadly comparable to that observed in the early 1980s and early 1990s when the deterioration in growth had been sharper, but in the latter case recovery also took root earlier.

Graph 1: Output gap during major economic downturns, euro area



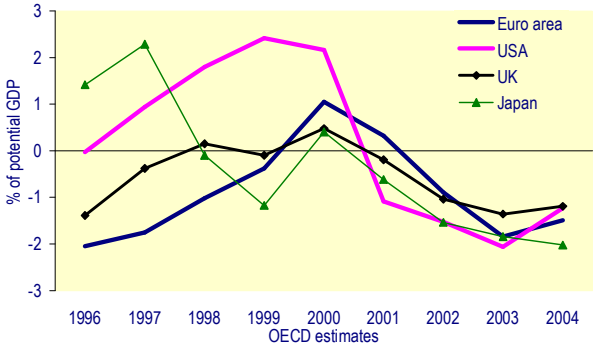
Source : Commission services.

The weakening in economic activity has spread to almost all the advanced industrial economies.[5] Graph 2 plots output gaps in four major economic areas, yielding a striking similarity of the change over time between the different areas.[6] Among the smaller advanced economic areas, which are not shown in the graph, it was only New Zealand where the output gap did not decline from 2000 to 2001. Slightly different was also the experience in Canada as the country's pronounced weakening in 2001 had already turned into a gradual recovery in 2002.

[5] The output gap is the preferred methodology for two reasons. It allows the slowdown in growth to be cumulated over several years and it abstracts from differences in rates of potential growth across countries.

[6] Because of the larger coverage of countries, the comparison is made on the basis of OECD calculations rather than on Commission estimates. While the level of euro-area output gap is lower with the OECD method compared to the Commission's method, the difference is quite stable over time, yielding a comparable variation over time.

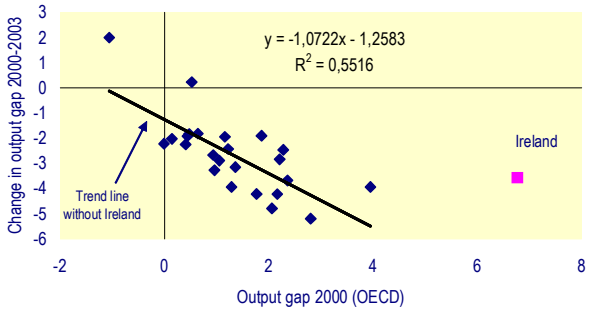
Graph 2: Output gaps in major economies



Note: Output gaps for 2003 and 2004 are OECD forecasts.
Source : OECD.

From an international perspective, the deterioration in the euro-area output gap has not been particularly large. Moreover, it looks as if the magnitude of the output gap's deterioration between 2000 and 2003 was strongly related to the size of the output gap in 2000 for three of the four major economic areas. It was abrupt from a high level in the USA and gentle from a low level in the case of the UK. The euro area is in an interim position and only Japan, which had hardly seen a positive output gap in 2000, seems to be an exception. Graph 3 relates the size of the output gap in 2000 to its change over 2000-03 for 22 advanced economies,[7] clearly supporting the notion that the strength of the previous boom had a large impact on the subsequent weakening. Those countries that witnessed the strongest deterioration in the output gap between 2000 and 2003 were also those were actual GDP was higher than potential in 2000, and vice versa. Except for Ireland, the size of the output gap in 2000 alone accounts for 55 per cent of the variation in its subsequent change up to 2003. This suggests that any explanation of the current growth weakness would be incomplete without reference to the events during the previous boom period.

Graph 3: Initial position and severity of slowdown in 22 advanced industrial economies



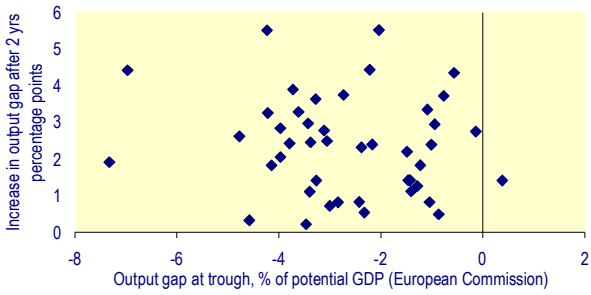
Note: Output gaps for 2003 is OECD forecasts.
Source : OECD.

While the strength of the cyclical upswing and global shocks may explain the magnitude of the recent

[7] Including the euro-area Member States.

economic weakening, there is so far no evidence that the depth of the current trough helps to predict the strength of the subsequent recovery. Graph 4 shows on the horizontal axis all minima of the output gap for the 15 EU Member States during 1965-2003, which is on average three troughs per country. The change in the output gap in the first two years after the trough is plotted on the vertical axis, yielding no systematic variation between both variables.

Graph 4: Severity of cyclical downturn and subsequent recovery, 15 EU Member States 1965-1997



Source : Commission services.

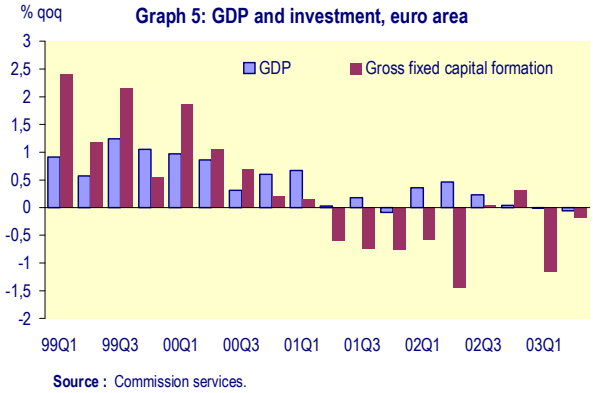
2.2 Weakening of all major demand components and employment

Economic activity started to weaken in the second half of 2000 when oil prices hiked and private consumption growth decelerated. While this could still be assessed as a normalisation from a previously high rate of economic growth, economic activity began to rapidly loose pace from spring 2001 onwards. From then on, investment posted a substantial negative contribution to GDP growth (see Graph 5) and the other demand components weakened considerably. On a more positive note, employment was more resilient than expected throughout the slowdown. This section describes the development of the major demand components and employment in 2001-03 and reviews the main contributing factors. A more detailed account of some key factors is given in Sections 3 to 6.

Investment was a major drag on economic growth

In the course of the slowdown, investment shrank substantially, declining from the second quarter of 2001 until the second quarter of 2003 by minus 0.6 per cent on average per quarter. Its contribution to growth was negative in each quarter except one.[8] The investment share in GDP has declined since the end of 2000 by 2.5 percentage points in nominal terms and this despite a considerable fall in interest rates.[9]

Graph 5: GDP and investment, euro area



Source : Commission services.

Short-term interest rates fell from their peak in November 2000 to September 2003 by almost 3 percentage points or by just over 2 percentage points if the 2000 average is compared with the 2003 average. Yields on 10-year government bonds declined by 1.2 percentage points on average between 2000 and 2003, independently of whether nominal or real rates are looked at.[10] While the absolute size of the interest rate reduction appears modest at first sight, the resulting level of interest rates is very low by historical standards. Nominal interest rates have never been so low for some 50 years and the last time real long-term interest rates have not been as low as they are now was in the late 1970s.

However, yields on government bonds and money market interest rates are not always a good proxy for firms' capital costs. Declining stock market prices and a rising spread between the yields of corporate bonds and government bonds suggest that the wedge between benchmark interest rates and firms' capital costs, which usually reflects risk and liquidity premiums, has not remained constant during the slowdown. Since this issue is dealt with in detail in Section 4.3, it suffices here to say that interest on bank loans to enterprises broadly followed the trends in benchmark markets.[11] Bank lending rates declined by 1.5 per cent between autumn 2000 and summer 2003, implying, however, that the

[8] Quarterly investment growth contributed positively to growth in the final quarter of 2002 due to special developments in Italy (expiry of tax incentives) and Germany (a technical correction of very weak investment in the first half of 2002 and re-construction after the floods in summer).

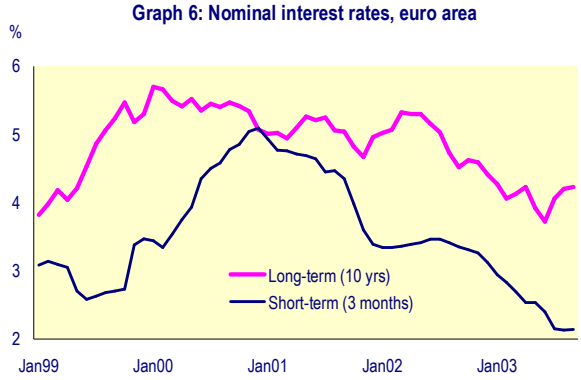
[9] The investment share is the preferred measure compared to investment growth, because it at least partially controls for the impact of GDP growth on investment. However, using the investment share instead of investment growth does not completely control for the impact of income effects because it itself is also pro-cyclical.

[10] German government bonds are used as a benchmark. Real rates in the graph are deflated with the contemporaneous change in the HICP.

[11] The closest match is between short-term lending rates (up to 1 year) and the three-month money market rate as well as between the long-term lending rate (over 1 year maturity) and the five year government bond rate. Therefore, these are considered here as benchmark rates.

spread to benchmark rates increased by about 1 percentage point (see Section 4).

Graph 6: Nominal interest rates, euro area



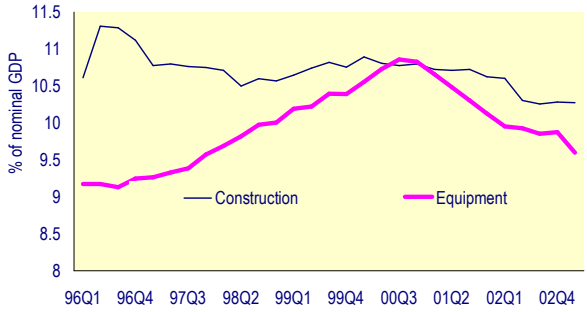
Source : Commission services.

From a macroeconomic perspective, it is somewhat surprising that investment growth has been so weak in the euro area. If there had been any over-investment in the previous boom, the investment share could be expected to return to its pre-boom level. However, the investment share in the first half of 2003 is at the same level as in the beginning of 1997 in real terms, i.e. before buoyant economic growth set in, and lower than in each quarter in the 1990s in nominal terms. Moreover, the increase in the investment share during the previous boom was moderate in comparison to the US experience.

A slightly different twist emerges when investment is decomposed into its main components, namely equipment and construction. It emerges that a sizeable increase in equipment investment in the second half of the 1990s has been masked by a drop in investment in construction. As regards investment in equipment, its share in GDP increased between 1996 and 2000 by a substantial 2.7 percentage points, i.e. double the increase of the overall investment share.[12] In summer 2003, the investment share was at the same level as in late 1998, suggesting that most of the normalisation has already taken place.

[12] Despite a broadening of the coverage of investment in the national accounts, which included expenditure on software and other intangibles to be treated as investment, investment from the perspective of the individual firms is likely to be an even broader concept. For example, spending in company re-structuring and education is usually not considered investment in the national accounting systems, but seems to play a crucial role when firms aim to embrace technical progress in ICT. See EU Economy 2001 Review: Chapter 6.

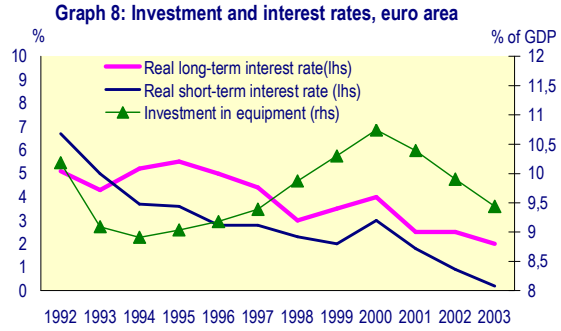
Graph 7: Investment share by category, euro area



Source : Commission services.

The decline in investment in equipment, despite falling interest rates, points to an important role of other forces.[13] Among them are: (1) macroeconomic factors such as weak demand prospects, a worsening of profit margins and a low degree of capacity utilisation; (2) the increase of risk aversion following the terrorist attack of 11 September 2001, corporate fraudulence and global uncertainty; and (3) the ongoing correction of corporations' balance sheets, where high debt-ratios had built up during the long boom period 1996-2000. The pronounced fall in stock prices, the weakening of credit growth and the virtual absence of issuance activity on equity and corporate bond markets support the notion that all factors have been at play and reinforced each other. The impact of corporate balance sheet adjustment, which is widely held responsible for subdued investment in the euro area, is analysed in detail in Section 4.

Graph 8: Investment and interest rates, euro area



Source : Commission services.

There is not yet a comprehensive and convincing explanation for the decline in the share of investment in construction from 11.5 per cent of GDP in 1995 to 10 per cent in the second quarter of 2003. Country data suggest that the trend decline in construction is almost exclusively due to developments in Germany, where the effects of the post-unification construction boom still appear to matter. In the euro area without Germany, the construction investment share has remained broadly constant at slightly below 10 per cent since the mid-

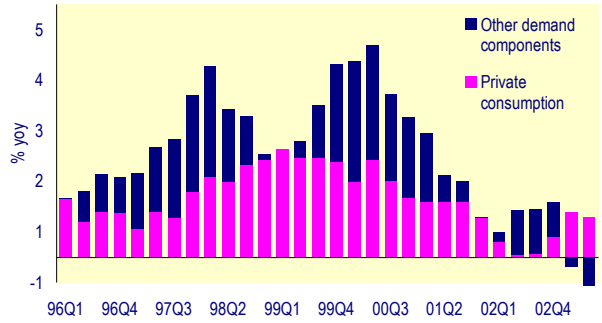
[13] For an analysis of the impact of equity prices, see EU Economy 2002 Review.

1990s. Against the background of falling interest rates, in both nominal and real terms, and given the historical sensitivity to interest rates, a practically constant investment ratio suggests that structural factors have held back activity. A number of factors appear to have been at work. Among them are: (1) ageing, which makes investment in housing less profitable in the long-run; (2) fiscal consolidation, as most of public investment is in construction; or (3) regulations on land use.

Private consumption supported growth less than could be expected

Despite posting the largest positive contributions to real GDP growth on average during the slowdown, private consumption underperformed. Private consumption growth in the euro area was just 1.2 per cent on average in 2001-03, which is about half a percentage point below the expansion of households' real gross disposable income over the same time. This means that the households' saving ratio increased during the slowdown from 14.5 per cent in 2000 to 15.3 per cent in 2003 in the eight Member States for which data is available.

Graph 9: Contribution of private consumption to GDP growth, euro area

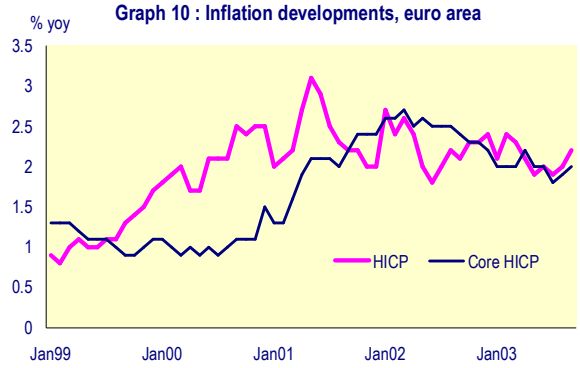


Note: Other demand components are public consumption, gross capital formation and net exports.
Source : Commission services.

This increase in the saving ratio is at odds with economic theory. The life-cycle hypothesis predicts that consumers would reduce savings in a downturn in order to smooth their consumption over time. Among the reasons that may explain why consumption has not been more resilient in the euro area, the following factors feature prominently: the stickiness of inflation, a worsening of unemployment prospects and the growing awareness of the sustainability of public finances.

Sticky inflation. Adjustment of prices on product and service markets is usually considered endogenous to the development of disposable income, consumer confidence and labour costs. Nevertheless, the extent to which the rate of inflation responds to a weakening of demand can have sizeable repercussions on private purchasing power. Euro-area headline inflation peaked in early 2001 and came down sluggishly by about 1 percentage point until 2003, only occasionally falling below 2 per cent. Core inflation[14] peaked in January 2002 almost a year after the slowdown set in at 2.7 per cent and it took one and a half year before it decelerated to 2 per cent.

Graph 10 : Inflation developments, euro area



Source : Commission services.

With less persistent inflation, private consumption growth would likely have been higher. In particular in 2002, when the euro notes and coins were introduced, private consumption was depressed by households' perception of a much higher increase in prices than actually occurred. Consumers' responses in surveys indicated an assessment of price development that was out of line with both past experience and actual developments.[15]

Worsening unemployment prospects. Whereas labour market rigidities probably lead to a smoothing of disposable income across the cycle, they may also affect consumption negatively via household expectations. In particular, insofar as rigidities are frequently associated with hysteresis effects, households may assess a spell of unemployment as more damaging for short to medium term revenue prospects when labour markets are more rigid. Against this background, a striking feature of the household surveys of the European Commission is that the link between worries concerning unemployment and other measures of household sentiment varies sizeable depending on the countries considered. Graph 11 displays the correlation since the beginning of the cyclical downswing between households' expectations regarding unemployment over the next 12 months and an average of the three other components of household sentiment.[16] Overall, the correlation tends to be lower in Member States where employment protection legislation (EPL) is less strict or where long-term unemployment is low. It also tends to be lower in most countries where

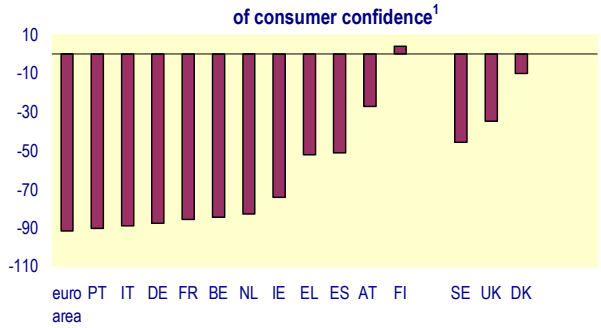
[14] Here defined as HICP excluding energy and unprocessed food.

[15] This issue was addressed in the EU Economy 2002 Review.

[16] Namely the "financial position over the next 12 months", the "general economic situation over the next 12 months" and "savings over the next 12 months". Together with the unemployment expectations, these three indicators form the overall indicator of consumer confidence presented in the European Commission surveys.

labour market reforms have recently brought large decreases in structural unemployment (Ireland, Spain and Finland). All Member States cumulating signs of less efficient labour markets with high unemployment, limited progress in the NAIRU in recent years and a high EPL index post a high correlation between the two variables (Belgium, Germany and France). In those countries, cyclical developments in employment seem to have a more pervasive bearing on overall consumer confidence and, presumably, on private spending than in countries enjoying more efficient labour markets. While the evidence is of illustrative nature, it suggests that contagion effects from unemployment worries to overall consumer sentiment are not more pronounced in economies characterised by a high degree of labour market flexibility.

Graph 11: Correlation between unemployment expectations and other components of consumer confidence[1]

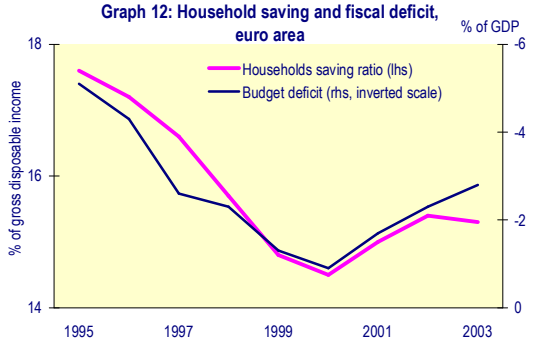


[1] Correlation between unemployment expectations and an index of the other components of consumer sentiment. Period covered is mid-2000 to April 2003.
Source : Commission services.

Sustainability of public finances. A further factor affecting private saving behaviour is public finances. While economic theory suggests that private consumption could move in the one or the other direction when fiscal policy is loosening, i.e. depending on whether Keynesian multiplicator or Ricardian wealth effects dominate, there is some reason to believe that the less energetic pursuit of budgetary consolidation may have dented private consumption.[17] For example, there is a close relationship between the behaviour of the euro-area household saving ratio and the budgetary deficit since the mid-1990s (see Graph 12). Moreover, quarterly growth in public and private consumption has tended to move in opposite directions since the beginning of 2001, suggesting a certain degree of substitution in their relationship (See Graph 24 in the budgetary policy section).

[17] For case studies on fiscal consolidations and their effect on consumer confidence, see European Commission (2003a).

Graph 12: Household saving and fiscal deficit, euro area

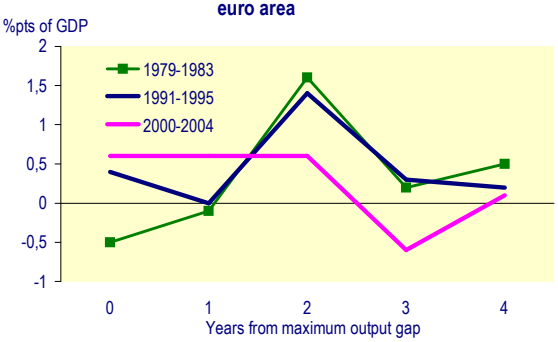


Note: Euro-area saving ratio derived from 8 Member States (BE,DE,ES,FR,IT,NL,AT,FI), deficit excl. UMTS receipts in 2000 and 2001.
Source : Commission services.

Low stimulus from external demand

External demand for euro-area goods and services has gradually weakened in the course of the slowdown. Real export growth fell from an annual rate of more than 12 per cent at the peak of the cycle in 2000 via 3 per cent in 2001 to a virtual standstill in 2003.[18] The development of net exports over cycles shows that their contribution to growth has been weaker than in past cycles (see Graph 13), in particular at the later stage of the slowdown. The same observation also holds if developments in export growth are compared across the slowdowns experienced in the 1990s. Quarterly export growth has been stronger in 1995/96 and 1998/99 than in the current juncture.

Graph 13: Contribution of net-exports to GDP growth, euro area



Source : Commission services.

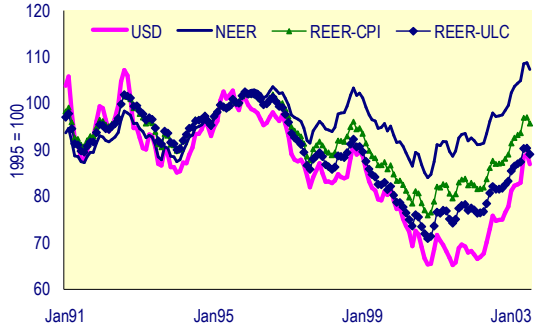
At the early stage of the slowdown, it was expected that growth in the euro area would receive a welcome stimulus from the recovery of external demand. These expectations were however disappointed and the ongoing appreciation of the euro's external value raised concerns that external demand may remain a missing driving force of the recovery.

Exchange rate movements can have an important role in kick-starting the growth process in small open economies. Although the euro area is not a small economic entity, it is relatively open and in many Member States the cyclical upturn was in the past

[18] National accounts data on exports include intra-area trade.

generally export-driven. However, since the introduction of the euro in 1999, exchange rate developments have been largely pro-cyclical. The euro exchange rate devalued against the US dollar when growth was high in 1999 and 2000, remained on a low level in 2001 and started to appreciate in 2002 when the slowdown became entrenched. From February 2002, which is the month from when on the euro exchange rate was on a clear appreciating trend, to September 2003, the external value increased against the US dollar by about 30 per cent. If bilateral exchange rates are weighted with the countries' share in foreign trade, the euro appreciation set in earlier and was smaller. Depending on the deflator used, the real exchange rate appreciated between 18 per cent (export prices) and 24 per cent (consumer prices, unit labour costs) from its trough in October 2000 to September 2003. That is, the loss in price competitiveness was smaller than suggested by the appreciation against the USD.

Graph 14: Euro exchange rate developments



Note: USD: US dollar, NEER : Nominal effective exchange rate, REER: Real effective exchange rate, CPI: Consumer price index, ULC: Unit labour costs (total economy).
Source : Commission services.

A real exchange rate appreciation reduces price competitiveness and tends to reduce exports. However, this effect is often dominated by the behaviour of a second determinant of foreign trade, namely the growth in world income. Indeed, the pattern of euro-area exports primarily reflects the deceleration in world import growth, which plummeted in 2001 and has recovered only moderately since then.

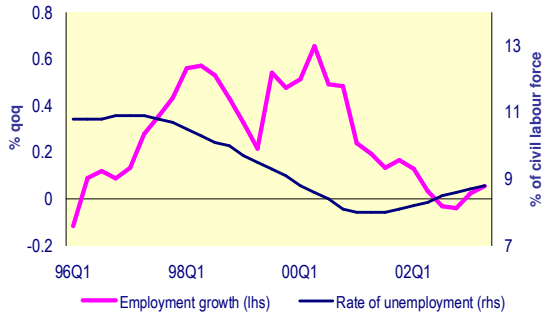
Moreover, an appreciation has two effects on import demand that tend to cushion its impact on net exports. First, declining exports lead to lower income, which reduces demand for imports. Second, an appreciation reduces import prices, which makes international inputs cheaper and exerts a favourable disinflationary impact on the whole economy. That is, domestic demand would compensate for lower external demand.[19]

Overall, analysing the total effect of the euro appreciation requires a look beyond the pure trade effect. Since a more detailed analysis of the trade and price channel is undertaken in Section 6, it is enough to point out at this juncture that the recent appreciation of the euro on foreign exchange markets has already left its trace in declining import prices but has not yet become visible in consumer prices.

Resilient employment

Employment growth weakened and the rate of unemployment increased in the euro area in the course of the slowdown. Compared with the experience of massive job losses during past downturns and most recently during the recession of the early 1990s, the performance during the present slowdown is remarkable. Employment growth decelerated strongly in the early phase of the slowdown but stabilised somewhat in 2001 at positive rates before dipping to zero in late 2002 and becoming slightly negative in 2003. The rate of unemployment reached a trough at the beginning of 2001 at 8 per cent and has gradually moved up to 8.8 per cent in September 2003.

Graph 15 : Employment and unemployment, euro area



Source : Commission services.

Labour market variables typically respond with a lag to changes in economic activity. Therefore, it remains to be seen whether the labour market adjustment in the euro area has already fully run its course. A number of factors could explain the observed resilience of employment in the euro area.

- Enterprises expected the growth slowdown to be a temporary phenomenon and hoarded labour to be prepared for the next upswing. As this expectation did not materialise, one would, however, have expected to see more massive job shedding in the most recent past.
- Employment protection laws may have prevented larger quantity adjustments on the labour market. This could explain the relatively moderate change in employment and unemployment but not the fact

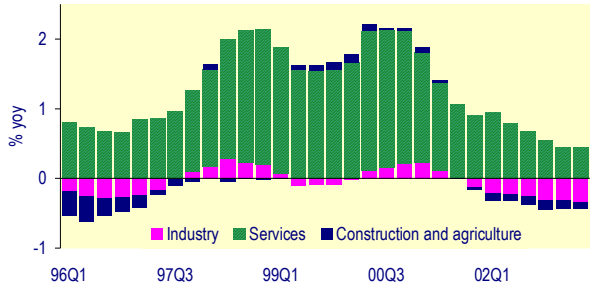
[19] If the exchange rate appreciation is driven by a change in the relative risk premiums, rising capital inflows from abroad rise, impacting favourably on domestic capital costs and thus on investment and thereby on economic growth. Due to balance of payments mechanics, the trade balance would decline.

that employment growth remained positive during most of the slowdown.

- The NAIRU might have continued to decline, encountering the effect of the cyclical weakening on unemployment. Similarly, a further expansion of labour supply may have countered the impact of the decline in labour demand on employment. In this case, one would, however, expect to see wage growth coming down.[20]

- There could have been increased substitution of capital with labour, i.e. a relative rise in the share of labour-intensive industries. An example would be the increasing share of services at the expense of industries, where production is typically thought to be more capital-intensive.[21] Graph 16 reveals that job creation took place predominantly in the euro area's service economy.

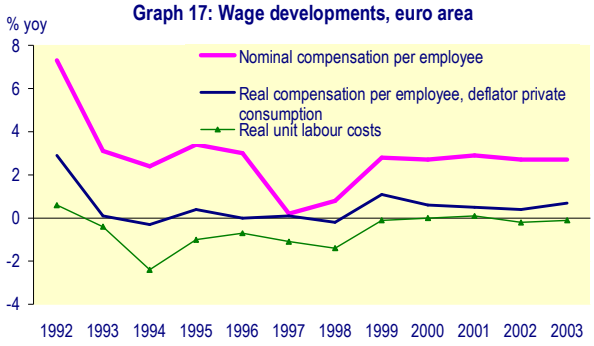
Graph 16: Sectoral contribution to employment growth, euro area



Source : Commission services.

Wage growth hardly responded to the slowdown in economic growth. In the euro area, nominal wage growth has remained on a plateau of about 3 per cent per annum since 1999 (see Graph 17). In real terms, a slight deceleration is visible from 1.1 per cent in 1999 to 0.5 per cent on average 2001-03. Such a downward adjustment is hardly detectable in real unit labour costs,[22] indicating that real wage growth was equal to or even higher than growth in apparent labour productivity during the slowdown.[23]

Graph 17: Wage developments, euro area



Source : Commission services.

The puzzling correspondence of stable wage growth with resilient employment has had both a positive and an adverse impact on economic recovery. On the one hand, it contributed to the stability of growth in private consumption since higher employment left wage earners with higher disposable income. This might help to explain why consumption growth was the most resilient demand component, even if households increased their saving ratio. On the other hand, constant real unit labour costs at a time when overall demand weakened had a negative effect on cash flow and the profitability of firms and thus a negative impact on investment.

2.3 The macroeconomic policy mix: responding to the slowdown

This sub-section reviews the policy-mix in the euro area, describing first the major policy responses taken during the slowdown and subsequently reviewing the conduct of monetary and budgetary policy in more detail.

Adjustment of macroeconomic policy variables

Concerning the adjustment of policy variables in the euro area, the area-wide budgetary deficit increased by almost 2 per cent of GDP from 0.9 per cent of GDP[24] in 2000 to 2.8 per cent in 2003. Most of this widening was due to the working of automatic stabilisers. This is witnessed by the more moderate increase in the cyclically-adjusted deficit by 0.4 per cent of GDP over the same time.

To assess the discretionary fiscal impulse, the change of the cyclically-adjusted primary balance (CAPB) is a frequently used benchmark. It differs from the cyclically-adjusted deficit by also neutralising the effect of changes in interest rates on public spending. Although changes in the CAPB of less than 0.5 per cent of GDP are typically assessed as broadly neutral, and therefore not likely to have a significant impact on the economy, the fiscal stance in the euro area can be considered as somewhat expansionary since 2000 (see Graph 18).[25]

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[20] This assumes that wages were determined in a pure market regime.

[21] It should not be taken for granted that industry is more capital-intensive than services because production in some service sectors, for instance financial intermediation, is quite capital-intensive and has been heavily influenced in the recent past by investment in information and communication technology.

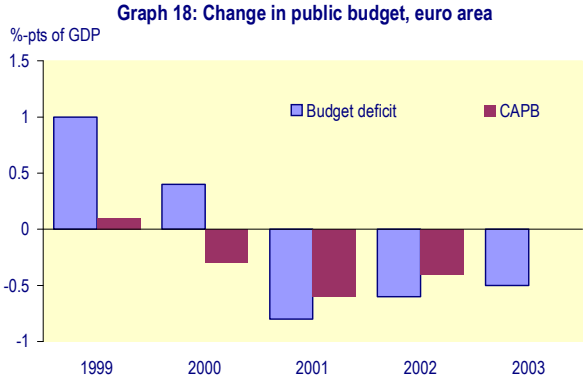
[22] Real unit labour costs are deflated with the GDP deflator.

[23] A more detailed account of wage flexibility in the euro area can be found in Chapter 4 of this volume.

[24] Excluding the one-off proceeds from UMTS licences.

[25] For a discussion of this indicator's limitations, see Larch and Salto (2003).

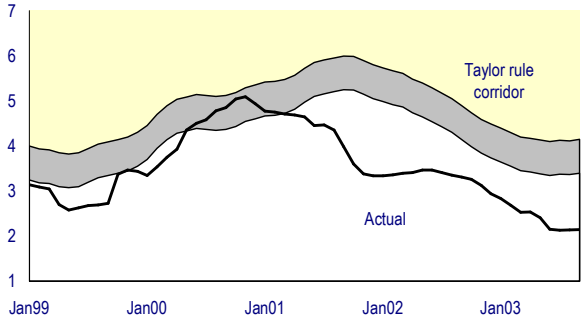
Graph 18: Change in public budget, euro area



Note : Deficit excluding UMTS proceeds, Cyclically-adjusted primary balance (CAPB) based on potential growth.
Source : Commission services.

The ECB cut interest rates from May 2001 onwards by a cumulative 275 basis points.[26] When assessed against a Taylor rule, which may be considered a representation of an auto-pilot central bank that responds equally to the deviation of inflation from target and the output gap, it would seem as short-tem interest rates have been accommodative to economic activity during the slowdown, in particular since the second half of 2001. Note that the Taylor rule already encompasses some cyclical stabilisation because the benchmark declines when the output gap deteriorates and vice versa. Therefore, deviations from the Taylor rule express additional leeway used by the central bank. Whereas empirical estimates of Taylor rules generally provide an accurate ex-post description of central bank policy, the Taylor rule in Graph 19 yields an interesting further insight. The ECB rate seems to lead the Taylor corridor, which is consistent with the notion that monetary policy should be based on future rather than on current economic developments.

Graph 19 : Short term interest rate: Actual and implied by the Taylor rule, euro area.

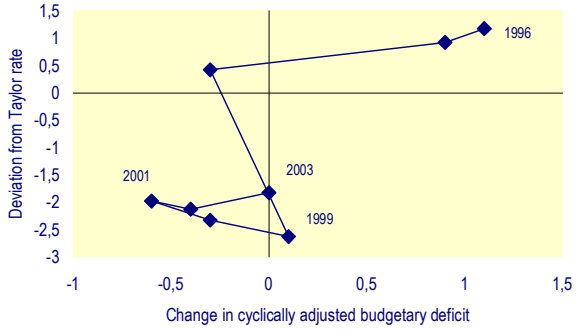


Note: Taylor rule based on median inflation, monthly figures.
Source : Commission services.

It is difficult to determine the point of time, from when on monetary policy can be considered to have been accommodative. An assessment based on the Taylor rule is not free from difficulties because the point of time when the short-term interest rate declined below the Taylor rate is strongly dependent on how the Taylor rate is computed. In addition to the well-known problem concerning the level of the real-interest rate, the use of the relevant inflation rate has a crucial impact. Based on a measure of core or median inflation, the monetary stance turned accommodative in autumn 2001. Based on headline inflation, which was much higher due to soaring energy prices in 2000, monetary policy could even be considered to have already started easing in 1999, i.e. before the cycle peaked. However, even by this measure the easing has become more substantial since the end of 2001.

In order to display the joint stance of monetary and budgetary policy, Graph 20 relates the annual change in the cyclically-adjusted budgetary balance to the deviation of the short-term interest rate from the Taylor rule. Deviating from conventional Taylor rate calculations, the calculation underlying Graph 20 uses the HICP realised a year later instead of the contemporaneous rate of inflation. This appears a good alternative to the use of actual rates of inflation, in particular in view of (1) the notion that the ECB bases its policy on expected rather than actual inflation and (2) the observation that short-term rates in the euro area lead the Taylor corridor.[27]

Graph 20: Policy mix, euro-area



Note : A positive number indicates restrictive policy. The Taylor rate was derived with a real interest rate of 3%, an inflation target of 1.75%, the HICP one year later to proxy inflation expectations and a weight of the inflation gap and the output gap of 0.5, respectively.
Source : Commission services.

According to this measure, both monetary policy and budgetary policy were accommodative in 2000-02, before budgetary policy turned neutral in 2003. Note that budgetary policy stimulated the economy when activity was still buoyant in 2000, implying the availability of lesser margins to support the economy

[26] The actual easing of the monetary stance seems to have started earlier because short-term interest rate had already peaked six months earlier. Between November 2000 and the first cut in official interest rates in May 2001, the three-month money market interest rate already fell by a significant 50 basis points.

[27] The drawback is the implicit assumption that both the central bank and money-market participants are able to correctly anticipate future inflation.

when the slowdown continued into 2003.[28] When the change of the two indicators is looked at instead of their level, it appears as if fiscal policy eased from 1999 to 2001 while the degree of easing was reduced in 2002 and 2003. Monetary policy, according to this measure, has become slightly less accommodative from 1999 to 2003.

These two indicators, while frequently used in policy discussions, do not reflect the complexity of all the intervening forces that eventually determine the effect of macroeconomic policies on economic activity. The following sub-sections provide a more detailed account of the factors affecting the impact of monetary and budgetary policy.

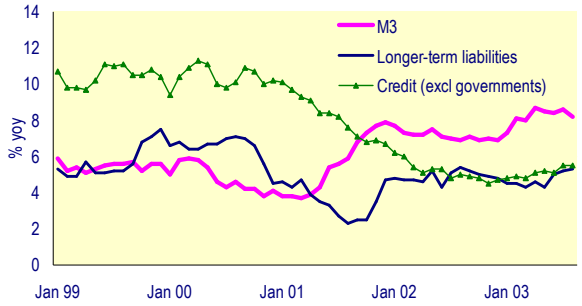
Monetary policy has been accommodative

Monetary policy had to act against the background of only slowly receding rates of headline and core inflation. While most of the increase in headline inflation in 2001 was related to one-off effects (oil price hikes and food price hikes linked to bad weather and BSE), there was a substantial risk of second-round effects, complicating the assessment of risks to price stability. Despite this, the ECB started cutting interest rates in May 2001 when headline inflation peaked and conducted six further cuts (overall 4 times by 50 basis points and 3 times by 25 basis points) despite a sluggish deceleration in the rate of inflation.

A further relevant feature for monetary policy in the slowdown was that the spread of risk aversion significantly affected monetary indicators. Flight to quality was a common driver of portfolio re-allocation, with government bonds benefiting from an increased desire for safe-haven securities and the incentive to hold shares considerably undermined by bad economic news and corporate scandals. The results were falling stock quotations and soaring government bond prices. Returns on government bonds declined sharply to historical lows. For example, 10-year euro-area government bonds yields were just 3.5 per cent in summer 2003 and US 10-year government bonds even approached 3 per cent in summer 2003, when a discussion on deflationary threats arose in the USA.

Also the reading of monetary aggregates was affected by rising risk premiums as agents considerably increased their holdings of liquid assets in bank accounts. In consequence, the share of M3 that is motivated by saving purposes has increased relative to that used for transactions. Graph 21 shows that an upward shift in M3 growth started in spring 2001. At the same time, both credit growth, which is the main counterpart of monetary growth, and growth in longer-term liabilities that do not belong to M3 decelerated sharply. M3 growth stabilised at a high level in late 2001 when also these two components stabilised.

Graph 21: Growth in monetary aggregates and main counterparts, euro area

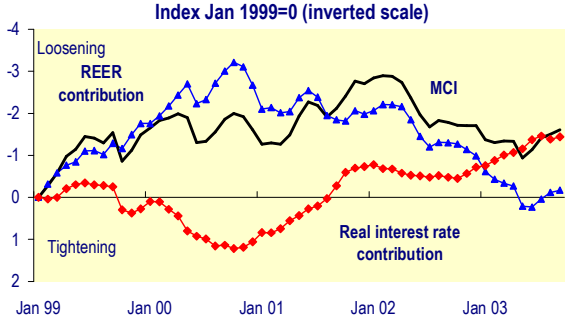


Source : ECB.

Two factors attenuated the impact of the ECB's interest rate cuts on economic activity. First, the increase in risk premiums prevented capital costs for enterprises from declining by a comparable amount. This issue is dealt with in Section 4.3. Second, the euro's appreciation on foreign exchange markets had a tightening effect on monetary conditions.

Monetary condition indices that use a relative weight of the exchange rate and the interest rate component of 1:6 suggest that on average monetary conditions were looser in 2001-03 than during the boom years 1999/2000. In 2001 the effect of lower real short-term interest rates more than offset the impact of the euro appreciation. In spring 2002, the exchange rate appreciation caused a tightening of monetary conditions, bringing the MCI back to the level recorded in spring 2001. Since mid-2002 the decline in the real interest rate component has broadly neutralised the effect of the real exchange rate appreciation on the monetary conditions index.

Graph 22 : Monetary conditions, euro area
Index Jan 1999=0 (inverted scale)

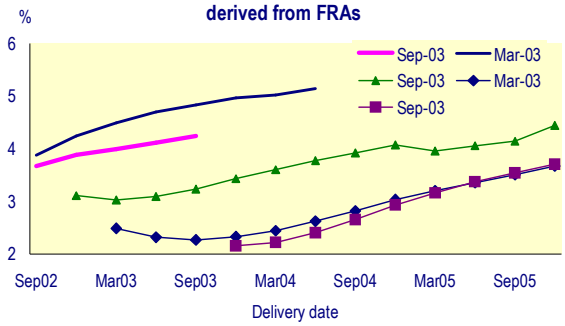


Source : Commission services.

[28] The graph could also be used to analyse the relationship between monetary and fiscal policy. However, the period since 1999 is too short to draw conclusions. When looking over period 1996-2003, assuming that policies where to some extent determined on a European level before the start of EMU, it appears as if there was no systematic relationship between monetary and fiscal policy. Of the eight observations, five are in the areas that indicate that both monetary and fiscal policy have had the same stance (restrictive in the upper right and accommodative in the lower left area) and two are in the area that indicates an opposite stance. The 2003 observation does not fit into this classification because fiscal policy was neutral.

The prices quoted for forward rate agreements (FRA) provide information on how interest rate expectations changed between 2001 and 2003. At the early stage of the slowdown, market participants expected short-term interest rates to climb strongly (see Graph 23). In spring 2002, it was forecast that the short-term interest rate could return to a level close to 5 per cent. This expectation, however, was revised over the summer of 2002, when markets expected that a lower level of interest rates would prevail into the autumn of 2003. Eventually, actual short-term interest rates were almost 100 basis points lower in autumn 2003 than expected by market participants a year earlier. Overall, the quotations of forward rate agreements in 2001-02 suggest that market participants assume the ECB will not increase interest rates faster now than before the monetary easing in order to undo the rate cuts undertaken during the slowdown. This can be derived from the slope of the lines in Graph 23, which expresses the expected increase in short-term interest rates and which was about the same in autumn 2003 and winter 2001/2002.

Graph 23 : Expected short-term interest rates derived from FRAs



Source : Commission services.

A positive lesson from the recent experience is that the monetary policy stance has been accompanied with continuously low and stable inflation expectations. Forward interest rates suggest that financial market participants seem to consider that neither the strong growth in monetary aggregates nor the currently low level of money market rates represents a threat to price stability in the short to medium-term.

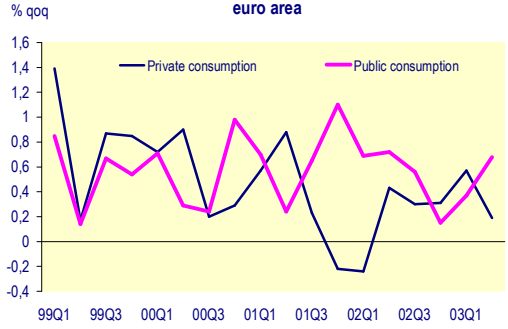
Budgetary policy easing did not stimulate economic activity

In terms of both actual budgetary developments and as regards the implementation of the EU framework for fiscal surveillance the past few years have been a difficult period. The play of automatic stabilisers in the context of the slowdown implied a considerable worsening of government finances. But the increase in the nominal deficit for the euro area as a whole also reflects discretionary loosening by some Member States.

Whereas budgetary policy in the euro area has been slightly expansionary over the last few years, its impact on the economy has been rather muted, if not adverse, for the following reasons.

- While public spending should have a direct effect on activity and via the multiplier effect also on private consumption, it seems that in recent years the latter has reacted rather negatively to sustained increases in public spending. For instance, there is a strong co-movement of the households' saving ratio with the budgetary deficit, suggesting that the increase in aggregate demand due to larger public deficits was attenuated by less spending from private households (See Graph 12). Similar evidence can be derived from the correlation between private and public consumption growth. Whereas quarterly growth in private and public consumption in the euro area is not systematically related over longer time periods, Graph 24 illustrates the surprisingly clear inverse relationship in the current slowdown.[29]

Graph 24 : Private and public consumption growth, euro area



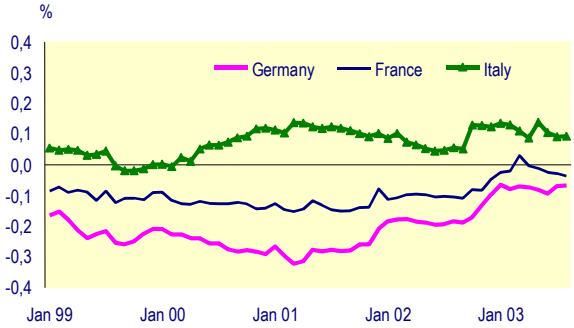
Source : Commission services.

- Tax reforms have been adopted in several EU Member States (in Germany, France, Italy, Netherlands and Austria), and are now gradually introduced over several years. The basic aim of such reforms was to simplify the systems, while at the same time widening the tax base and reducing marginal rates. They also included a substantial amount of tax relief. The evidence so far available on the impact of such reforms is that they have not produced the increase in private consumption that was hoped for. The increase in savings can probably be explained by the fact that such reforms were not considered credible, as the strategies to finance them were not well defined or were simply unrealistic, and therefore could not be perceived as permanent, a condition necessary to induce consumers to believe that their permanent income would be improved by such reforms.

[29] Whereas the coefficient of correlation between quarterly private and public consumption growth is not significantly different from zero over the 1990s, suggesting independence between both aggregates, the coefficient for the period since 2001 is a negative -0.65. In terms of annual growth, the coefficient of correlation between private and public consumption growth in the euro area is plus 0.58 per cent over the period 1970-2000, which implies a weak positive relationship. The coefficient for the recession 1992-93 is plus 0.25.

- The economic literature has identified a quite substantial effect of fiscal deficits on long-term interest rates.[30] In Europe, the increase in recent years in both actual and cyclically adjusted deficits may have prevented a further lowering of interest rates. However, the effect is difficult to interpret at the current juncture, when other factors such as the short-term interest rates set by the European Central bank, movements in the US capital market rates, the flight to quality and changes in risk premiums have put downward pressure on long-term interest rates. Nevertheless, the three large Member States that have budgetary difficulties, and of which the two larger ones are formally under scrutiny because their budgetary deficit has exceeded the 3 per cent of GDP limit, have seen a deterioration of their bond market rates compared to those countries where budgetary balances are on a healthier footing (see Graph 25).[31]

Graph 25 : Spread of bond market interest rates over the average of 6 Euro-area Member States



Note : The 6 Member States are BE, ES, IE, NL, AT, FI. Their average is weighted with their average public debt 1999-2002 in Euro.
Source : Commission services.

- The increased focus put in recent years in Europe on the quality of public finances has highlighted that about half of the Member States may face a serious problem of fiscal sustainability due to the ageing of population and the current design of pension systems.[32] Such prospects over the long term, together with growing awareness of the need to reform the pension systems and the lack of determination in correcting unbalanced budgets may be taking their toll on consumers' confidence.

[30] US studies suggest that a 1 per cent of GDP deterioration in the fiscal position increases the long-term real interest rate by 25 basis points. For an overview of the empirical literature, see Brooks (2003).

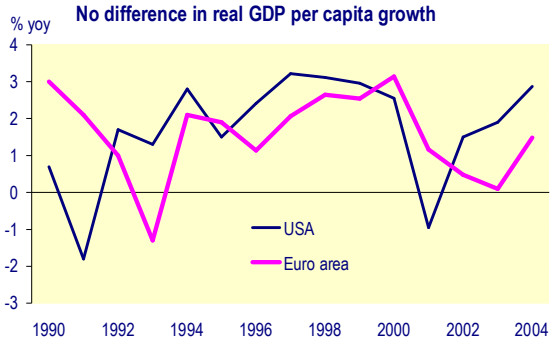
[31] For an analysis of how changes in issuance techniques might have influenced bond market spreads, see EU Economy 2002 Review, Chapter 4.

[32] For an overview of the impact of ageing populations on public finances, see Economic Policy Committee (2003).

Box 1: Economic performance and policies and in the euro area and the USA

There is a widespread perception that the US economic performance is much stronger than that of the euro area and that this is partly the result of differing macroeconomic policies conducted in the two areas. This picture needs to be qualified in several respects.

Comparisons of growth performance should focus on growth in GDP per capita rather than on overall GDP growth rates. It is often pointed out that that GDP grows much faster in the USA than in the euro area. Indeed, over the last decade GDP growth has been higher in the USA than in the euro area for every single year, except for 2001. On average over this period GDP grew 1.2 per cent faster. This quicker growth stems in large part from the much more rapid growth in the US population (about 1 per cent per annum) compared to the euro area (only ¼ per cent per annum). The difference in labour force growth is expected to increase over the coming years as the effects of ageing in the euro area come to be felt more clearly. It is therefore unrealistic to expect the euro area economy to match headline US growth rates in the years ahead. Any meaningful growth comparison should therefore take the differential impact of demographic developments into account by concentrating on growth in GDP per capita. Indeed, the differential in GDP growth since 1990 disappears when viewed in per capita terms. The growth performance and the rise in living standards in both economic areas were broadly comparable. Of course, given that the GDP per capita level in the EU stands at only 71 per cent of the US, catching up in Europe should be feasible. This is the objective of the Lisbon agenda that concentrates on raising employment rates and accelerating productivity growth.

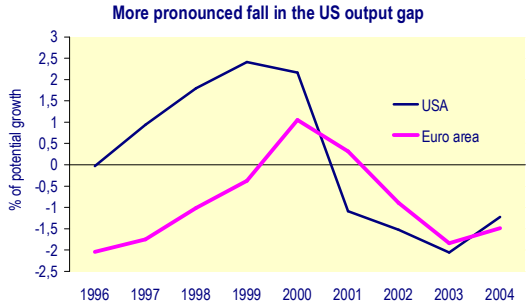


Source : Commission services.

Table: GDP and employment
average annual growth rates 1990-2003

	USA	Euro area
Real GDP	2.8	2.0
Real GDP per capita	1.6	1.6
Population	1.2	0.4
Working-age population (15-64)	1.0	0.3

Comparisons of policy adjustments should take differences between the euro area and the US duly into account. Over these last few years, US authorities have implemented a considerable easing of both monetary and fiscal policies. The US central bank cut interest rates by a cumulative 550 basis points since the beginning of 2001 while the US Federal budget balance deteriorated by 6.5 percentage points from a surplus of 1.5 percent of GDP in 2000 to an estimated deficit of 5 per cent in 2003. In comparison, the cut in ECB interest rates by a cumulative 275 basis points and the widening of the aggregate euro area budget balance by 3 percentage points from 0.2 percent of GDP in 2000 to an estimated deficit of 2.8 percent of GDP in 2003 seems to be much less important. A meaningful comparison should, however, take due account of the differences between the two areas.



Source : OECD.

A first difference resides in the relative deterioration of the output gaps in US and the euro area. The deterioration in the US output gap has been much bigger and sharper than in the euro area. The more considerable easing in policies seems to be partially explained by this background. Indeed, against the background of the important policy easing imparted in the USA it is all the more striking that the USA has nevertheless seen a bigger deterioration in the output gap than the euro area. This may reflect that the US economy has been far more affected by the impact of the common shocks hitting both the US and the euro area economy.

A second difference resides in the room for manoeuvre for monetary and fiscal policy. The rapid fall in consumer price inflation from 2.5 per cent in 2000 to 1.2 per cent in 2002 created considerable leeway for the US central bank to cut interest rates. In contrast, the room for monetary policy action in the euro area has been constrained by the persisting inflationary pressures that caused inflation to come down only slowly. However, it is noteworthy that real long-term interest rates – which are a more important determinant of corporate investment in the euro area than in the USA – have been lower than in the USA in the euro area since the end of 2001.

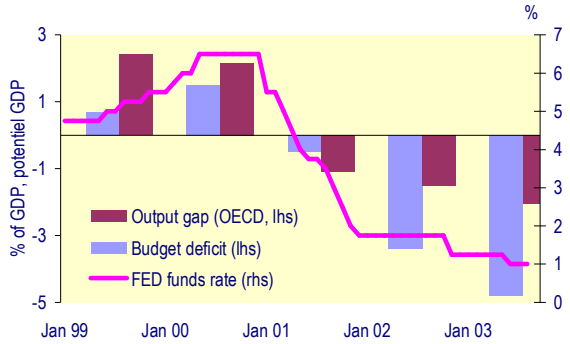
On the fiscal policy side, account should be taken of the fact that budget balances in the euro area were generally much less sound than in the USA at the onset of the slowdown, thereby limiting the scope for easing without compromising long run sustainability. On the latter point it should be noted that the euro area has much more of an ageing problem than the USA and that because of

this it should steer a more prudent budgetary course. Again on the fiscal front, it should be noted that in terms of fiscal stabilisation important differences exist between the euro area and the USA that explains why the latter has greater recourse to more visible and discretionary fiscal policy action. Reflecting the bigger size of governments and the progressiveness of the tax system, automatic stabilisers are roughly twice as important in the euro area and therefore lessen the need for discretionary policy action compared to the USA. In addition to the play of automatic stabilisers which do not require any policy decision and therefore are not very visible, some euro area Member States have also cut taxes. However, as consumers responded by increasing saving rates rather than by increasing spending, this failed to stimulate the economy. It corroborates the finding reported in the Commission's 2003 Public Finance Report that the credibility of discretionary policy action is important in the euro area.

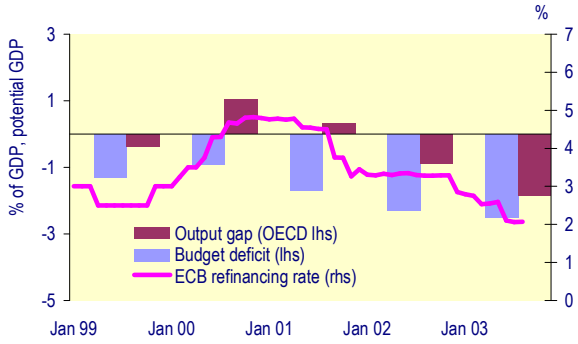
Third, any comparison of macroeconomic policy responses should also take account of the structural characteristics of the economy as the latter have important implications for the effectiveness and transmission of macroeconomic policy impulses. The US economy is generally considered to be more flexible than the euro area economy. This may be one reason why inflation fell much quicker and sharper in the USA providing the leeway to the US monetary authorities to act more forcefully.

Fourthly, the conduct of macroeconomic policies seems to be driven to a greater extent by short-term policy considerations in the US than in the euro area. The accumulation of government and household debt, showing up in a widening US current account deficit, can be expected to lead to a correction at some point in the future at the expense of domestic demand. The macroeconomic policy framework in the euro area is, short term pressures notwithstanding, oriented to a greater extent by the need to preserve medium term sustainability. This framework has entailed already important benefits for the euro area economy. It does not appear advisable to risk squandering the hard won credibility in going for a dash for growth in the short run.

US macroeconomic policies



Euro area macroeconomic policies



Relatively low potential growth and productivity increases in the euro area compared to the US limit the scope for macroeconomic policy action, and underline the need for pressing ahead with structural reform. Estimates of potential growth suggest a clear lead for the US over the euro area in the order of 1 per cent per annum. Again, the stronger population growth in the USA plays to its advantage. But apart from this factor, higher potential growth in the USA seems to derive from a better utilisation of human resources and a much higher and accelerating growth in labour productivity. If anything, the comparatively low potential growth in the euro area limits the scope for macroeconomic policy action as attempts to raise growth will quickly run into bottlenecks. A durable increase in growth potential will require forceful pursuit of structural reforms. These should help to unlock the euro area's hidden labour reserve and create the conditions for higher labour productivity growth (see Chapter 2 in this volume for a discussion on the drivers of productivity growth).

3. Resilience in employment due to the service economy?

The euro-area labour market withstood the slowdown in economic growth relatively well. During the 1990s, the service sector was the mainstay of job creation and employment growth exceeded 0.5 per cent quarter-on-quarter in each quarter between 1997 and 2000, helping to weather the Asian crisis in 1998/99.[33] Job creation in services gradually decelerated during the recent slowdown, but from a high rate. This section sheds some light on the role of the service sector during the current slowdown, asking whether developments specific to this sector have aggravated or cushioned the slowdown and to what extent.

3.1 The economic significance of the service sector

The services sector accounts for about 70 per cent of euro-area GDP and employment. However, surprisingly little is known about the significance of service activity for overall economic developments. Both data limitations and heterogeneity of the service sector itself complicate empirical analysis (see Box 2).

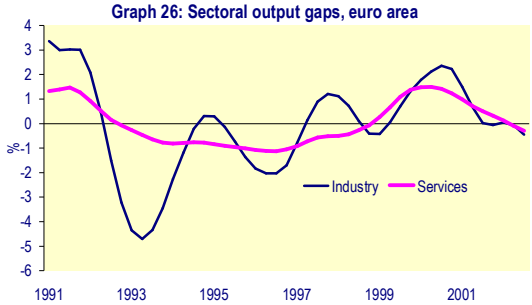
[33] For an analysis of the service sector in a medium-term perspective, see European Commission (2002a) and the Chapter 2 in this volume.

A rising share of services in economic activity is generally considered to have the following effects:

- business cycles are expected to become less pronounced because activity in services is less volatile than that in industry;[34]
- economic growth is likely to be lower over the medium to long term because productivity growth is generally perceived to be lower in services than in industry;[35]
- inflation is thought to be higher if wage growth in services is similar to that in industry and sectoral productivity is lower. In this case, higher unit labour costs in services would translate into rising service prices relative to industrial prices. [36]

The theoretical conjectures about growth and volatility in the service economy find partial support in Table 1 (next page). In the period for which quarterly data is available, cyclical volatility is markedly lower in the service than in the industry sector, supporting the notion that the rise of the service sector may dampen cyclical variation. Labour productivity growth was on average weaker in services than in industry. This did not translate into lower growth in value added because employment growth was much more vivid in services. Relatively lower growth in labour productivity is consistent, however, with higher sectoral inflation given that real wage growth was about the same in both sectors.

Graph 26: Sectoral output gaps, euro area



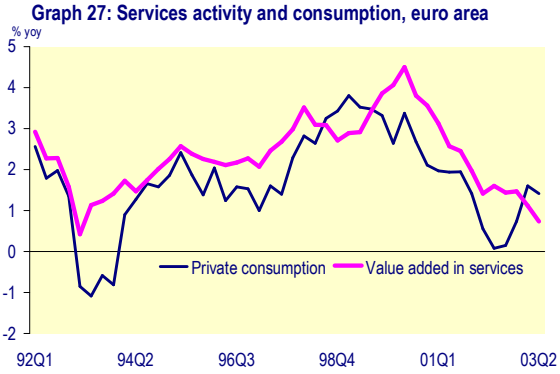
Source : Commission services.

The different frequency of the service cycle compared to the industrial cycle raises some interesting questions. First, it appears as if activity in the service economy is to some extent de-coupled from that in industry, activity in both sectors seemingly being driven by different factors. Second, the duration of divergence suggests an important impact of supply-side factors on economic activity in the service economy rather than just the working of demand forces.

3.2 Demand for services: buoyant in the boom and severely weakening in the slowdown

Different trends in industrial and service activity are only possible if demand from industry for services is not a major part of overall demand for services. The de-composition of demand can be analysed by means of input-output Tables. Absent such a tool for the euro area hitherto, Table 2 displays the relationships derived from the French input-output table 2000. It is evident that the service sector itself is a heavy user of inputs generated by the service sector. On the other side of the spectrum, other services, which constitute public services, health and education, are almost exclusively designated for final use in consumption.[37] Demand from industry and other parts of the economy for services as intermediate goods makes up only a sixth of total resources.[38] Exports constitute only a small part of demand, consistent with the high number of non-tradables and the still relatively low degree of openness in the service sector.

Graph 27: Services activity and consumption, euro area



Source : Commission services.

Consumer demand for services deteriorated markedly in the current slowdown. Comparing the behaviour of demand for services over the business cycle suffers from the non-availability of detailed data over a long time span. The data available so far reveals that strong private consumer demand in the late 1990s was spread to many goods and services. Particularly strong was demand for communications, recreation and restaurants, which are also the sectors where demand has declined strongly in the current downturn.

[34] See Dalsgaard et al. (2002).

[35] Baumol (1967) was the first who conducted an analysis of this issue. For a critical review see Oulton (2001).

[36] This is the Harrod-Balassa-Samuelson effect.

[37] For the classification of services, see Box 2.

[38] The share of demand for broadly defined financial intermediation services is, however, a quarter and that of financial intermediation narrowly defined even more than 50 per cent.

Table 1: Some stylised facts on activity in the service sector, y-o-y % change average (1992Q1-2003Q2)

	Value added	Employment	Productivity*	Prices**	Real wages+	Volatility++
Services	2.3	1.5	0.8	2.1	0.4	0.9
Industry	1.3	-1.4	2.6	0.9	1.1	2.8

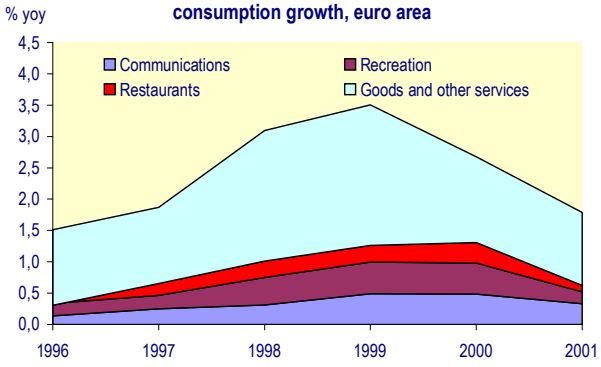
* Value added in constant prices per person employed; ** Value added deflators of both sectors; + Compensation per person employed, not adjusted for hours, deflated with consumer prices; ++ Standard deviation of annual growth in real value added.

Table 2: Composition of demand for services, France 2000

	Provision as / to					
	Intermediate goods		Final demand			
	Services	Other sectors	Investment and stocks	Exports	Private consumption	Public consumption
Services	26	15	4	3	29	24
- Trade	39	6	0	8	47	0
- Financial intermediation	34	26	7	3	27	3
- Other services	4	1	0	1	22	72

* % of total resources in market prices. Differences in sums are due to rounding.

Graph 28: Demand for selected services: contribution to consumption growth, euro area



Source : Commission services.

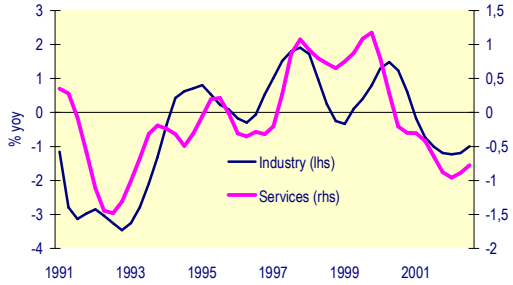
Specific factors have weighed on household demand for some services in the past two years. As the pace of deregulation in transport and telecom has become slower, price cuts in these sectors have moderated relative to the late 1990s, providing a more muted stimulus to demand. Consumption of transport services and package holidays also grew fiercely in 1999 and - particularly against the background of worries related to terrorism - is reported to be weak in the recent past.

Turning to demand from the corporate sector, value added growth has been particularly weak in the current downturn in financial intermediation, which also includes business services. Demand for these services benefited in the mid-1990s *inter alia* from corporations' preparation for EMU, deregulation (airlines, telecom) and technical progress in the ICT sector, but is now hit by companies' efforts to cut operating costs and restore profit margins.

3.3 Supply of services: employment growth driven by structural factors

The sustained difference in the cyclical development of industry and services documented above suggests that the remarkable strength of the service economy in the late 1990s could be related to supply-side forces.[39] The main difference between economic activity in industry and services is in employment trends. Whereas employment growth in industry stagnated over the 1990s, job creation was vibrant in the services sector. Given the similarity of the cyclical component[40] of employment between both sectors shown in the Graph, the difference in employment performance is almost exclusively due to trend employment.

Graph 29: Employment growth, cyclical component euro area



Source : Commission services.

The favourable impulse to employment in the mid-1990s might stem from various factors. Firstly, the impact of

[39] For a detailed analysis of the changes in the labour market structure in the 1990s, see European Commission (2002b, 2003b).

[40] The cyclical component is defined here as the change in the output gap.

wage moderation is studied below. Secondly, outsourcing from industry into services has had an impetus. But given that more jobs were created in services than lost in industry, it provides a partial explanation at best. Thirdly, the rising participation of women in the workforce has been a factor. Many women work in services and the spread of half-time jobs has probably encouraged many of them to take up a job. Equally, relaxation in contract type or the flow of educated people into the labour market may have contributed.

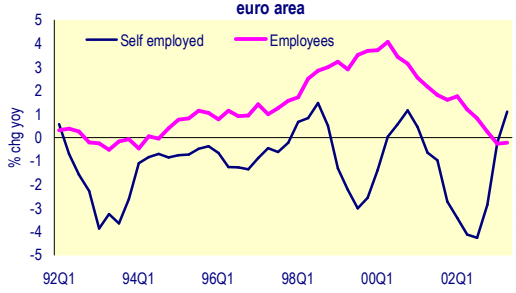
Apart from more employment-friendly conditions on labour markets, a favourable entrepreneurial climate in the mid-1990s might have encouraged the opening-up of new businesses and stimulated service employment. Whereas some caution is warranted as regards the statistical classification as self-employed or employee, tentative evidence can be drawn from the observation that job creation in services was particularly strong shortly after growth in self-employment had accelerated.[41] Taking the data at face value, self-employment in financial services increased considerably between 1996 and 1998. In trade services, self-employment growth was weaker in absolute figures, but also relatively strong when compared with the historical trend.

Graph 30 : Composition of employment in financial services

Source : Commission services.

The reasons for the relative increase in self-employment could be associated with microeconomic conditions (new technologies, product market reforms), macroeconomic stability (low interest rates, price stability, budgetary consolidation) or psychological factors (booming stock markets, envisaged start of EMU). Changes in self-employment seem to follow cyclical patterns, with numbers declining in the early 1990 recession as well as during the Asian crisis. The reduction in self-employment in trade services is particularly strong at the current juncture, in terms of both magnitude and duration.

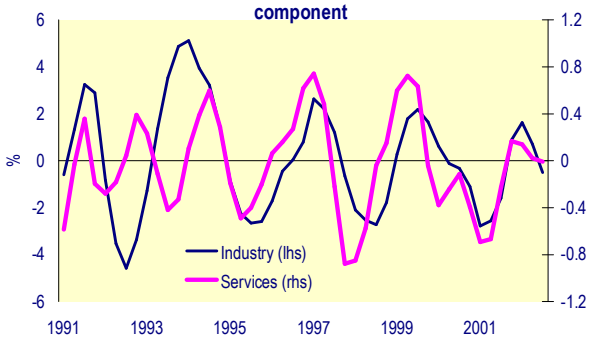
Graph 31 : Composition of employment in trade services euro area



Source : Commission services.

Despite higher and more volatile productivity growth in industries than in services in absolute terms, the change in apparent labour productivity growth in both services and industry is quite similar over time. This holds for both trend growth and trend-corrected productivity data, measured in output per person employed. Trend productivity growth almost halved in both sectors during the 1990s. Trend-corrected productivity data presented in Graph 32 show that the cyclical pattern of productivity growth in industry and services differed only in the early 1990s. Since about 1994 they have moved in tandem, albeit with a different amplitude as volatility in industry exceeds the one in services by a factor of 5. This suggests that the reasons for differences in activity are unlikely to be linked to the main determinants of productivity growth, for instance capital-deepening and technical progress.

Graph 32: Labour productivity growth, cyclical component



Source : Commission services.

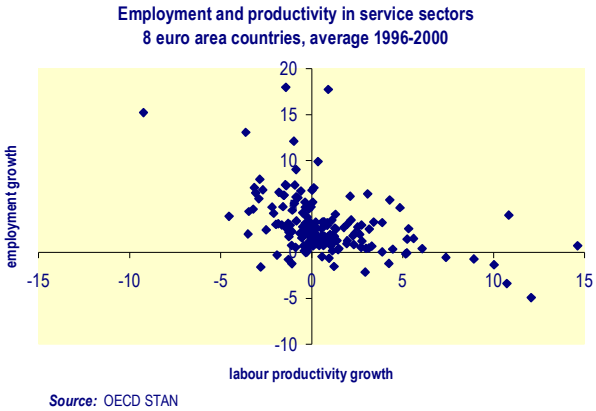
[41] The observed lag between the growth in self-employment and total employment could be a technical factor, as firms need time to get established and expand the workforce.

Box 2: Measurement problems in services

Statistical coverage of the service sector has increased considerably over the past years, but data availability for business cycle analysis is still insufficient. Currently, a breakdown into three broad services sectors is available in the national accounts (see Table). A major problem is the sector's heterogeneity, encompassing output produced with a lot of capital and high-skilled labour as well as output generated by low-skilled labour and without much capital. For instance, trade services in the NACE classification encompasses not only retail and wholesale trade, restaurants and hotels, which generate output mainly for consumption, but they also include the sub-sectors of transport and communication, which produce mainly intermediate output used in other business. Financial services include the real-estate sector, whose output is mainly geared to final usage rather than for input in other sectors.

Table: Statistical coverage of the euro-area service sector in quarterly national accounts

Sector	Consists of	Share in GDP	Share in employment
Trade	NACE G-I: Wholesale and retail trade, hotels and restaurants, transport, storage, communication	22	25
Financial intermediation	NACE J-K: Financial intermediation, real estate, business activities	27	14
Other services	NACE L-P: Public administration, education, health, etc.	21	30



Source: OECD STAN

Measurement problems seem to be particularly pronounced in the financial intermediation sector, which creates 27 per cent of euro-area gross value added and employs 14 per cent of labour. A recent OECD working paper documents that labour productivity growth in the broadly defined financial intermediation sector was on average negative over the 1995-2001 period in 10 out of the 16 industrial countries for which data is available.[1] For the euro area as a whole, national account data displays that labour productivity growth (gross value added per person employed) in the sector "financial intermediation, real estate" was minus 0.5 per cent on average over the 1992-2002 period. At the same time, nominal wages in this sector increased by 5.9 per cent and employment by 2.5 per cent, yielding a rather puzzling constellation of macroeconomic variables.

Moreover, measurement of output is often complicated as a lot of activity takes place in the public sector where decomposition into labour costs and profits is cumbersome or in small private firms where hours worked are often not available. Data on value added is subject to serious difficulties in distinguishing output into intermediate goods and final usage. Moreover, it is almost impossible to cater for quality improvements in services, which has a potentially large impact on deflators. For these reasons, productivity comparisons have to be treated with caution. For instance, due to relatively high labour-intensity in production, numbers of hours worked are crucial ingredients of productivity calculations but not generally available. It is meanwhile a well-known fact that mis-measurement is an issue in the service sector, as evidenced by the wide variation of productivity developments across countries as well as by negative productivity growth in some service sectors that feature at the same time high employment growth. The latter is demonstrated by the Graph, which displays employment and productivity growth in disaggregated service sectors in 8 euro-area countries in the late 1990s.

In addition to the statistical problems mentioned above, the financial intermediation sector seems to be particularly exposed to the following three issues. First, the sector includes quite heterogeneous services, ranging from banking and insurance services to real estate, renting and business services. On the other hand, communication services are not included. Second, output of financial services is hard to measure. For example, banks charge not only fees but profit also from the difference between borrowing and lending rates (the so-called "financial intermediation services indirectly measured [FISIM]" component, which is not recorded in the EU national accounts as final consumption). Third, disentangling intermediate inputs from final usage is complicated. A large share of financial intermediation services is used as inputs by other services and only a relatively small fraction is used in private consumption.[2]

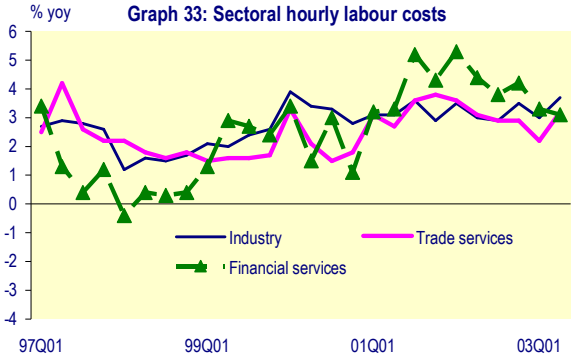
[1] Negative rates are mainly due to developments in real estate, renting and business services rather than in narrowly defined financial intermediation. See Wölfl, A. (2003).

[2] For a US study of how ICT affects productivity in the financial sector on the basis of input-output analysis, see Klein et al. (2003).

3.4 Wage developments in services: strongly linked to industrial wages

One would expect buoyant employment growth in services to be first of all a consequence of wage moderation. However, Graph 33 reveals that actual wage growth in services tends to follow that in manufacturing quite closely. Moreover, this appears to be more or less independent of whether hourly labour costs or compensation per employee is looked at.[42] Hourly labour costs in trade-related services sectors in particular tend to develop in line with those in manufacturing whereas those in financial intermediation (broadly defined) do so to a lesser degree.

Graph 33: Sectoral hourly labour costs

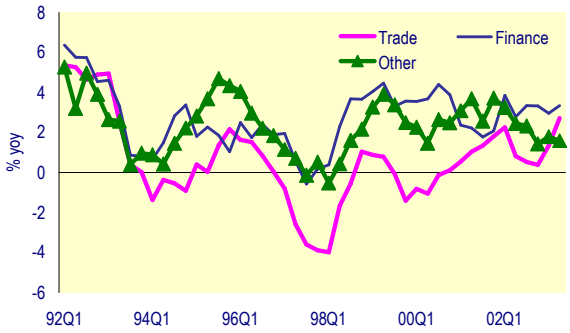


Source : Commission services.

The combination of strong co-movement of wage costs in services and industry with lower productivity in the former generates higher average unit labour costs in the service sector compared to those in industry. Indeed, Graph 34, for which unit labour costs were derived from Eurostat's quarterly national accounts, reflects that wage growth outpaced productivity growth in services during the period under consideration. Since 1999, wage developments in the service sector have exerted limited but constant upward pressure on prices. This holds in particular for financial services, but less so for trade-related services. On average, the increase in nominal unit labour costs in services outpaced those in industry by 1.1 per cent throughout the 1990s. This is compatible with the observed difference in sectoral inflation.

[42] Nominal compensation, which stems from the national accounting system, has the advantage that the series goes back to 1991, whereas Eurostat's labour cost index starts only in 1995.

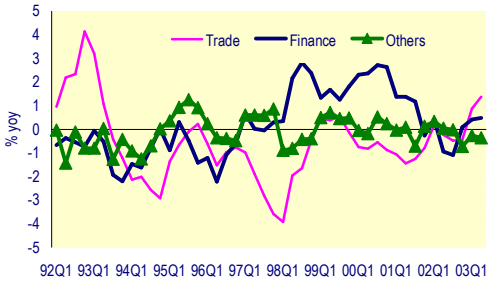
Graph 34: Nominal unit labour costs



Source : Commission services.

Real unit labour costs in services had been supportive to employment growth since the mid-1990s but became less so during the boom of the late 1990s. On average, developments of real unit labour costs were fairly similar in services and industry. This makes it difficult to explain why employment growth was so buoyant in services. Wage trends likewise seem to provide little help in explaining why employment growth in services was resilient during the Asian crisis.

Graph 35 : Real unit labour costs in service sectors



Source : Commission services.

To some extent, high growth in real unit labour costs in the financial intermediation sector is responsible for the lack of fit with the employment performance. Real unit labour costs in trade-related services remained moderate during the Asian crisis and subsequent periods. While conclusions on the basis of a few observations only should be treated with caution, it can be stated that the moderate growth in real unit labour costs in trade-related services during the Asian crisis is consistent with continuously strong employment growth in this sector.

3.5 Conclusions: past buoyancy in services due to favourable supply-side developments

Activity in the service sector had been particularly buoyant in the late 1990s and the tentative evidence available suggests that it was mainly related to supply-side factors. Remarkably, the late 1990s had witnessed strong employment growth in services and at the same time accelerating growth in real unit labour costs. This is consistent with the view that wage moderation had no

strong impact on the favourable development in sectoral employment. An alternative hypothesis would be that, for instance, deregulation in product and labour markets in the mid-1990s has allowed enterprises to create profitable jobs in services despite rising real unit labour costs.

It is also likely that the service sector benefited more from the take-up of ICT than industry, without, however, the impact of new technologies being already visible in productivity data. This would require acknowledging that national accounts do not yet give an accurate picture of true productivity developments in "hard-to-measure sectors" and in particular in the financial intermediation sector. Taking account of the increase in equity and housing prices in the late 1990s, it may well be that economic agents expected to benefit more from financial services and that they were accordingly prepared to pay more than what macroeconomic performance data suggests financial services were worth.[43]

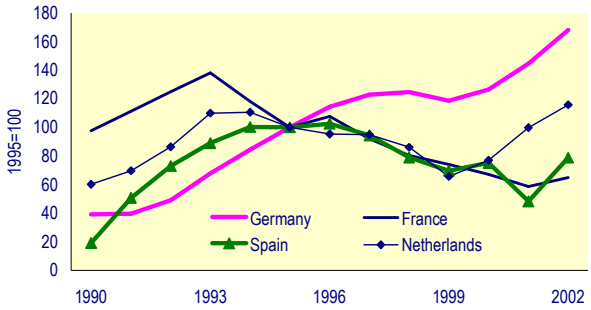
Both demand for and employment in services weakened considerably in the current slowdown. Sectoral employment growth decelerated but has remained positive throughout the slowdown, suggesting that the favourable structural effects that had driven job creation in services in the last half of the 1990s are still intact.

4. How have corporations adjusted to the slowdown?

The growth slowdown of 2001-03 has put immense pressure on enterprises to adjust. A number of enterprises, in particular small and medium-sized enterprises, had to give in to this pressure, as evidenced by the increase in the number of bankruptcies in some euro-area Member States, in particular in Germany. Reflecting differences in corporate structure and insolvency legislation, the picture is not uniform across Member States. The number of business bankruptcies even declined in France.

[43] Interestingly, there is a strong co-movement of growth in real unit labour costs in financial intermediation and stock market prices for the period 1996-2002, with a coefficient of correlation with the German stock market index of 0.8. It could be the reflection of performance-related pay in the financial sector or of increasing competition among firms for employees that drove up wages in the course of the stock market bubble and vice versa afterwards.

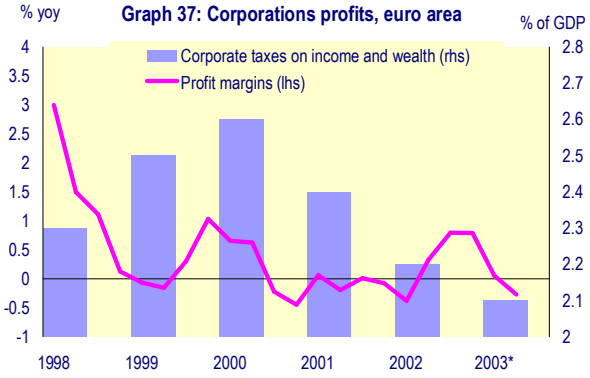
Graph 36: Business bankruptcies in selected euro-area countries



Source : Commission services.

Graph 37 plots two proxies of corporate profitability. While being imperfect measures, they both confirm the deteriorating corporate profitability in the slowdown. First, growth in unit labour costs outpaced the increase in the GDP deflator throughout most of 2001-02.[44] This suggests that an important cost component outpaced revenues and depressed profit margins at a critical juncture. Second, taxes paid by corporations on income and wealth declined from 2.6 per cent in 2000 to 2.1 per cent of GDP in 2003, reflecting both the cyclical impact and changes in the tax system.

Graph 37: Corporations profits, euro area



Note : Profit margins are calculated as GDP price deflator minus unit labour costs.
Source : Commission services.

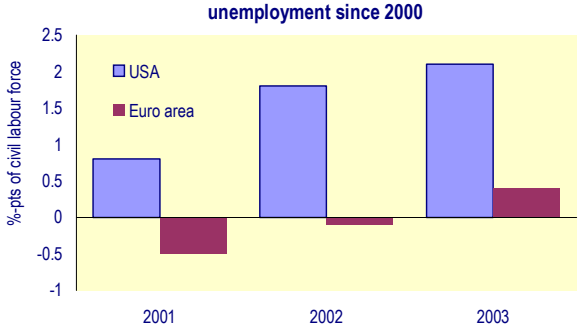
This section compares differences in corporate adjustment in the USA and the euro area and their implications for recovery. In both economic entities, initial conditions at the peak of the business cycle were broadly similar. During the boom period of the late 1990s, a large number of new firms had entered the market, in particular in services and ICT. Job creation had been strong and firms had taken on significantly more financial debt, implying some pressure on profit margins by labour and capital costs in the event of a downturn.

In a nutshell, the typical euro-area company adjusted to the erosion of revenues by trimming down capital costs whereas the US company reduced both capital and labour costs. The consequences were a relatively sharper

[44] This is equivalent to the inverse of real unit labour costs.

deterioration of labour market conditions in the USA, as witnessed by a 2 percentage point increase in the rate of unemployment between 2000 and 2003. Investment was cut considerably on both sides of the Atlantic, the main difference being that almost all the adjustment in investment in the USA took place in the years 2000 and 2001. The euro area, in contrast, experienced a weak investment performance that has lasted well into 2003. On a more positive note, unemployment started to increase only at a rather late stage of the slowdown.

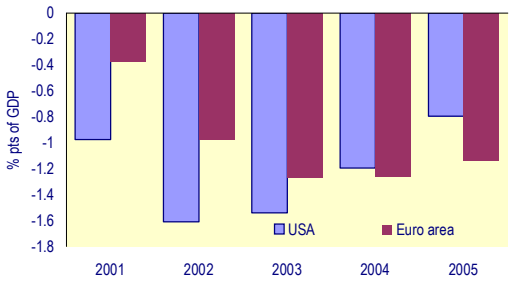
Graph 38 : Cumulative change in the rate of unemployment since 2000



Source : Commission services.

Comparing the change in the rate of unemployment or in the investment share, as done in Graphs 38-39, illustrates the main differences between the USA and the euro area. However, the comparison of crude numbers should not be taken at face value because this would assume that both labour market overheating and over-investment during the boom 1996-2000, if they had existed, were of a similar magnitude in both economic entities. Evidence of potential imbalances is much weaker for the euro area than for the USA, which was the reason why a faster recovery in the euro area was expected. For instance, it is generally considered that the trough of the unemployment rate in the USA of 4.0 in the year 2000 was particularly low in absolute terms as well as when assessed against NAIRU estimates. The euro-area rate of unemployment reached a minimum of 8.0 per cent in summer 2001, i.e. double the rate of the USA. Equally, the increase in the overall investment share was more pronounced in the USA during the 1990s. It increased by 1.9 percentage point of GDP between 1996 and 2000 and by as much as 4.0 percentage points if the period from 1991-2000 is taken as a reference. In the euro area the share of investment in GDP grew by just 1.3 percentage point between 1996 and 2000, and was even lower in 2000 than in 1991/92. Finally, although numbers are not strictly comparable, analysts assess capacity utilisation to be much lower in the USA than in the euro area.

Graph 39 : Cumulative change in investment in equipment since 2000



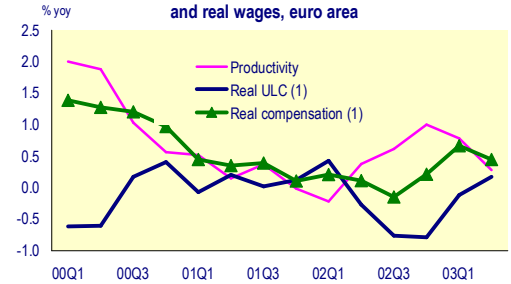
Source : Commission services.

4.1 Adjustment via labour markets

Employment has traditionally been less cyclical than GDP in industrial economies. This reflects the existence of hiring and firing costs linked to employment protection but also to imperfect information in the job search process or the need to acquire company-specific knowledge. The early perception that the slowdown was only short-lived may initially have contributed to the slow adjustment in the euro area. It seemed to have lost in importance relative to structural factors when the expected recovery failed to materialise in 2002.

The consequence of the lagged and modest employment response by euro-area enterprises was a profound weakening in the growth of labour productivity. Since wage growth remained steady, decelerating labour productivity growth translated into rising unit labour costs and – as a mirror image - depressed profit margins. Real unit labour costs, however, decelerated from 2002 onwards when labour productivity growth recovered from the trough recorded in early 2002.

Graph 40 : Labour productivity, real unit labour costs and real wages, euro area



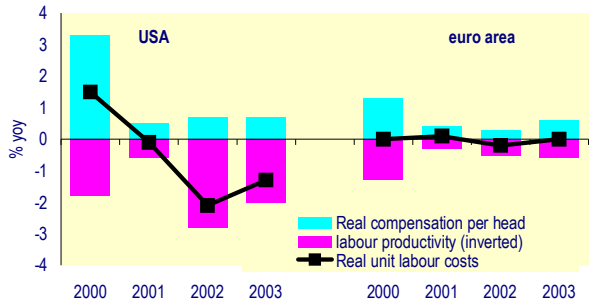
Source : Commission services.

Both quantity and price adjustment were different in the USA. Employment shrank in the first phase of the cycle and unemployment increased. Real unit labour costs decelerated, first driven by falling real wage growth and subsequently - when real wage growth recuperated - by a pick-up in labour productivity growth.[45] From 2002

[45] Productivity growth in the USA was even more marked than shown in the graph below, when the US data on hourly output in the business sector is applied. This business sector productivity is the standard measure used by the US Bureau

onwards, productivity growth in the US business sector has exceeded the rates registered during the boom of the late 1990s. This is an atypical pattern; its continuation will crucially determine the chances of the US economy to remain on a sustained growth path.

Graph 41 : Real unit labour costs and its components, USA and euro area



Source : Commission services.

To some extent, the marked difference in labour productivity growth between both areas is due to the lagged effect of buoyant investment in ICT in the 1990s in the USA. A further factor is the relatively quick recovery of investment in equipment and software in the course of the slowdown.[46] Observers have increasingly found evidence that whereas US productivity growth in the late 1990s was strongly driven by both capital-deepening and technical progress in the ICT-producing sector, recent improvements are related to ICT usage especially in services.[47] Similar evidence of lagged benefits from past ICT investment has not yet been detected in the euro area.

A second factor explaining the difference in productivity performance is related to adjustment in the quantity of employment. Labour cutbacks in the USA inflated productivity figures because typically the least productive labour is set free first. The opposite effect can be observed for the euro area. Labour hoarding may have caused an underestimation of the underlying productivity trend in the euro area. In order to assess this effect, one needs to know whether this labour hoarding in the euro area was voluntary or the effect of labour market rigidities. Absent explicit statistics on hiring and firing costs, the subsequent graph displays the OECD indicator of employment protection legislation (EPL), comprising a number of detailed measures of the strictness of EPL in areas such as procedural requirements, notice and severance pay and prevailing standards of "unfair" dismissal.[48] With the exception of Ireland and, to a lesser degree, Portugal, the average EPL measure displays relatively little dispersion across Member States in the euro area. Lower levels of employment protection can be found in other EU Member States (United Kingdom and Denmark) or in the USA.

Table 3: EPL and productivity in the current downturn

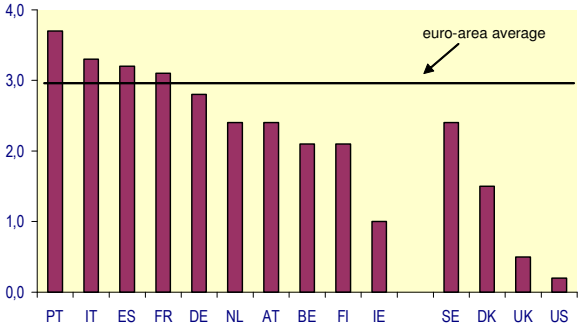
	Low EPL countries (1)	**euro area**
Productivity performance (2)	-0.1	-1.2
Loss in output gap (3)	-1.9	-1.7
EPL	0.8	3.0

(1) IE, DK, UK, US.
(2) Difference between average growth in real GDP per head over 2001-02 and trend growth in real GDP per head. The latter is calculated as the average growth over 1993-2002.
(3) Difference in output gap between 2000 and 2002.

Source: Commission Services and OECD

To check the likely negative impact of EPL on the cyclical adjustment of employment, Table 3 compares the average productivity performance in the downturn for the four countries in Graph 42 enjoying the lowest level of EPL and for the euro area as a whole. The two groups of countries have gone through a cyclical slowdown of similar magnitude as witnessed by a similar decline in the output gap. However, in the group with a low EPL, the deceleration of productivity relative to trend has remained quite limited.[49]

Graph 42 : Employment protection legislation



Source : Commission services.

of Labour Statistics. Output and labour input are corrected for the activity of the public sector, non-profit institutions and private households.

[46] Investment in equipment and software contributed to US economic growth in five out of six quarters from the beginning of 2002.

[47] See Triplet and Bosworth (2002) and Chapter 2 in this volume.

[48] See Nicoletti G., Scarpetta S.and O. Boylaud (2000).

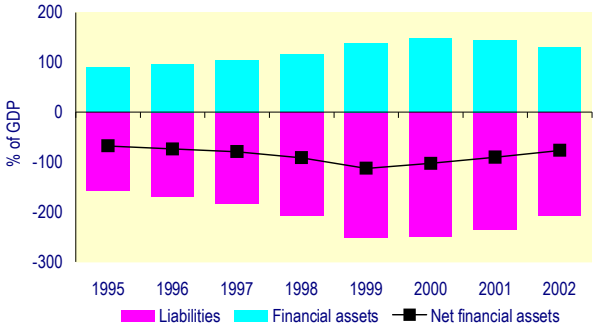
[49] For a more detailed discussion of the variables used and labour market adjustment in general, see *Quarterly Report on the euro area 2003-II.*

4.2 Balance sheet adjustment in euro area corporations and its impact on investment

The weak investment performance of the euro area is probably more than a reflex to previously strong investment in equipment. A second factor is the need to adjust to an unsustainable trend in corporations' financing behaviour during the economic boom.[50] At that time, a number of factors stimulated rising activity on financial markets. For example, (1) technological advances in ICT promised extraordinary high returns; (2) a wave of merger and acquisitions took place, motivated by the strategy of companies to adapt to a global level playing field; and (3) an immense increase in stock prices of, in particular, high-tech firms that seemed to confirm perceptions of an upward shift in potential output growth.

While rates of overall economic growth and especially labour productivity growth were more modest in the euro area than in the USA, euro-area corporations participated in the global investment upsurge. Investment in equipment increased by a sizeable proportion, foreign direct investment and portfolio capital outflows from the euro area being particularly buoyant. During the boom of 1996-2000 internal funds did not keep pace with capital spending in the euro area. The financing gap of the non-financial corporate sector widened to about 3.5 per cent in 2000.[51] Concerning stock variables, liabilities in the non-financial corporate sector increased from 150 per cent in 1995 to 250 per cent of GDP in 2000 (see Graph 43).[52] It is not only investment in physical capital that increased during the boom period. Vivid merger and acquisition activity inflated corporations' asset and liability positions alike.[53] The sector's holding of financial assets almost doubled in absolute figures between 1995 and 2000. Net financial assets increased from minus 67 per cent in 1995 of GDP to minus 112 per cent in 1999. Until 2002, the ratio has improved to minus 76 per cent of GDP.

Graph 43 : Financial assets and liabilities of non-financial corporations, euro area



Source : Commission services.

The slowdown in economic growth put the sustainability of these positions into question. Many companies have undergone credit rating downgrades, which directly increased their financing costs. Moreover, weaker demand deteriorated cash flows and lower stock market prices caused a decline in the value of collateral. Overall, the perception of risk seems to have fundamentally changed due to economic (slowdown in growth), financial (bursting of the stock market bubble) and political factors (terrorism). All these factors raised firms' capital costs, which increased much more than indicated by the yields of benchmark government bonds.

Economic theory does not provide a benchmark for an optimal level of debt. While it was for a long time believed that financing decisions did not matter at all for investment, there is now consensus that information asymmetries, moral hazard and transaction costs are sensitive issues that crucially determine firms' debt and their financing of capital expenditure.[54] They are particularly relevant for small and medium-sized enterprises. While empirical work has found that cash flow and other financing variables have a significant effect on investment, an assessment of whether the debt ratios reached in 2003 represent an equilibrium value or not is still difficult. Thus, it is uncertain whether the balance sheet adjustment since 2000 has fully run its course by 2003.

Comparing the eight euro-area Member States, for which detailed data is available to date, reveals a clear pattern between the change in corporate investment and corporations' net borrowing. This suggests that the increase in debt in 1996-2000 had been related to strong investment activity, just as the de-leveraging in 2000-03 has been linked to weak investment (see Graph 44).

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[50] See Jäger (2003), BIS (2003). For an empirical analysis of the effects of balance sheets on investment in manufacturing in Germany, France, Italy and Spain, see Vermeulen (2002).

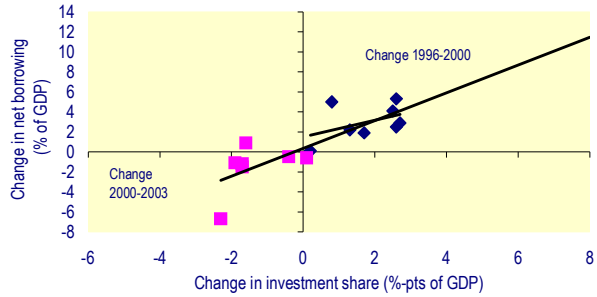
[51] Data quoted from National Bank of Belgium Financial Stability Review (2003)

[52] Financial assets and liabilities are non-consolidated data. All the data on financial stocks stems from Eurostat's financial accounts. The euro-area aggregate consists of data from 9 Member States, with Greece, Ireland and Luxembourg missing.

[53] A further one-time factor was the auctioning of UMTS licences, which had a sizeable impact on the financing positions of telecommunication enterprises.

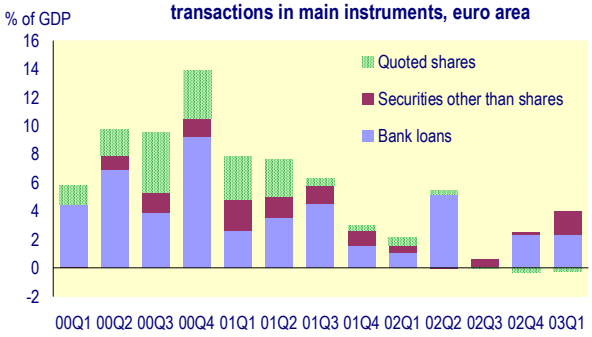
[54] The initial position is the famous Modigliani-Miller theorem. For a review of the current literature, see Hubbard (1998).

Graph 44 : Investment and net borrowing of corporations, 8 euro-area Member States



Source : Commission services.

Graph 45 : Financing of non-financial corporations: transactions in main instruments, euro area

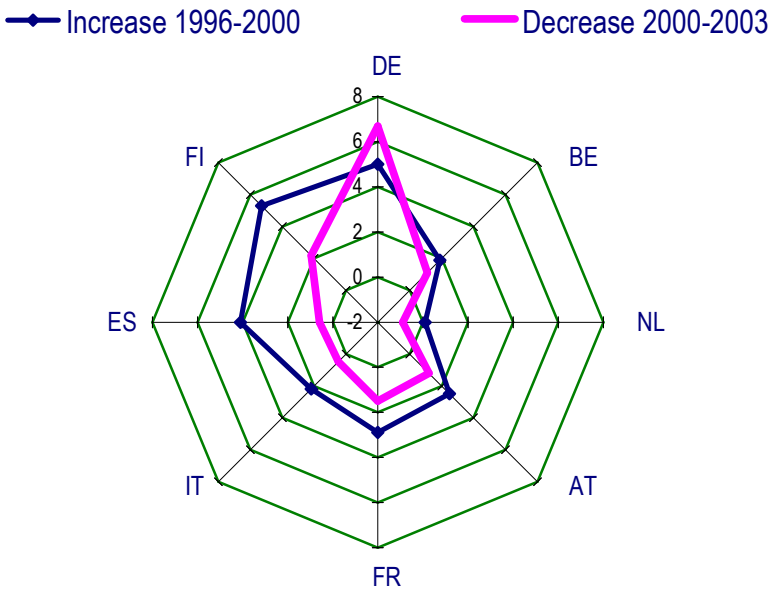


Source : Commission services.

Data on the current condition of corporate balance sheets is limited, but evidence suggests that companies are exploiting improvements in financing conditions (see Graph 45). There are, for instance, signs of a tentative pick-up in the growth of debt financing in the euro area. Loans to euro-area non-financial corporations increased slightly, confirming the mild turnaround recorded in the final quarter of 2002, and issuance of corporate debt securities accelerated in 2003. There was also some recovery in secondary issuance of equity, although Initial Public Offering activity remained weak.

Sectoral national accounts data suggests that the increase of corporations' net borrowing in 1996-2002 has not been fully corrected by 2003. The extent, however, varies among Member States (see Graph 46 where countries are shown clock-wise in order of the magnitude of the correction since 2000). Whereas the decline in corporations' net lending/GDP ratio in 2000-2003 had been even larger than the previous increase in Germany, there are still wide gaps in Finland, Spain and Italy.

Graph 46: Change in corporates' net borrowing



Source : Commission services.

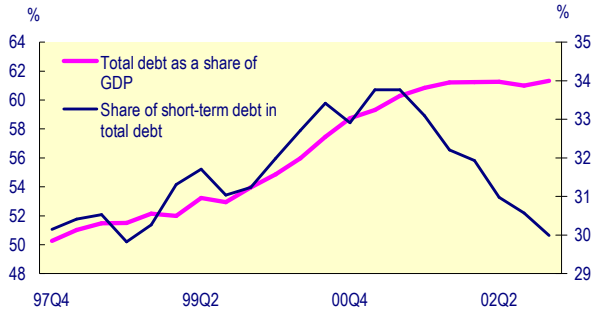
4.3 Risk considerations shaped credit supply

Weak investment in combination with a low level of interest rates in the current slowdown represents a break with the relationship observed during the 1990s (see Graph 8). It is puzzling why the build-up of financial debt during the boom period in the second half of the 1990s had left no clearer trace in interest rates at that time. This sub-section looks at the supply side of the credit market in order to identify the possible factors behind this apparent oddity.

One reason is probably to be found in the cyclical behaviour of bank lending and in particular the different importance of risk considerations in an upswing and a downturn. Bank credit is the dominant form of external financing for most enterprises and as banks in some euro-area Member States have developed long-term relationships with their corporate clientele, conditions on credit markets represent more than a snapshot of supply and demand conditions at a particular point of time. The effect is that credit availability tends to depend on a number of non-price factors related to the risk characteristics of the borrower, for instance the value of collateral, firm size and branch of activity.[55] Since early 2003, the ECB has been conducting a survey among banks in order to assess this kind of lending conditions. The ECB's first three surveys reveal a trend towards a continuous tightening of credit standards, with the number of respondents, which indicated a tightening, encouragingly declining in the course of 2003.

There is some evidence that risk considerations were not particularly prominent in the previous boom. Bank lending to the corporate sector reached double-digit growth rates and short-term lending in particular was vibrant. Until 2000, retail loan interest rates slid downwards both in absolute terms and when expressed relative to comparable market rates. At the same time, corporations accumulated debt.

Graph 47 : Non-financial corporate sector debt, euro area (share in %)



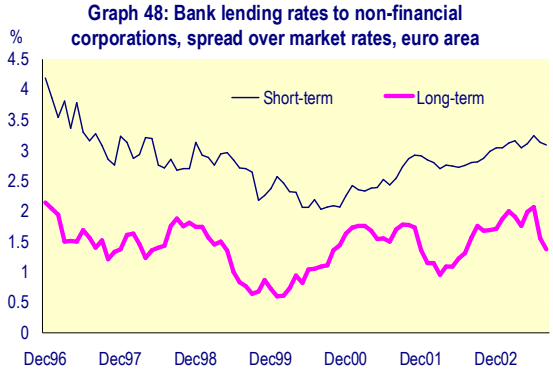
Source : Commission services.

Some structural developments in the financial sector may have contributed to the willingness of financial institutions to take greater risks in the late 1990s. On the one hand, financial institutions were faced with pressure on the margins in traditional branches of activity. On the other hand, they had the scope to intensify activity in new business areas. Declining levels of interest rates in combination with increased competition among financial institutions and a trend towards dis-intermediation among large enterprises put pressure on interest margins. Banks, for instance, responded by shifting into new branches of activity, as evidenced by the expansion of fees and commission as a source of bank profits relative to traditional interest income. Moreover, financial services are a heavy user of ICT and the technical advances in this area caused a decisive reduction in information, processing and transaction costs. Monetary and financial integration widened the level playing field, encouraging financial institutions to broaden the geographical coverage of activity. Further structural factors may have directly encouraged institutions to become less risk-averse. For instance, the development of markets for credit derivatives, which allow for a more efficient allocation of risks within the financial system, and strong profit prospects may have encouraged risk-taking, Improved regulation and the absence of any failure among major financial institutions may have also contributed to a less risk-averse attitude among financial institutions.

Banks apparently re-assessed the risk of their credit exposure during the downturn. The need to scale down profit expectations has certainly played a role, as well as deteriorating balance sheets of loan takers and banks. The consequence of their shift towards a more risk-averse lending policy seems to have made it difficult for enterprises to obtain short-term credits in particular, even if they were prepared to pay higher interest rates. At the aggregate level, this is witnessed by a divergence in market conditions for long and short-term credit, where the latter constitute about a third of the total market for bank credit to non-financial corporations. Growth in medium to long-term credit volumes (more than 1 year) decelerated slightly, i.e. from an average of 9 per cent in 1999-2000 to 7.8 per cent between 2001 and the first half of 2003. Over the same period, growth decelerated from an average 10 per cent to less than 2 per cent in the market segment of credits of up to one year. It has even shrunk in each quarter from 2002 onwards. As regards price terms, interest on bank loans broadly followed the interest trend in government bond markets, declining by 1.5 percentage points between autumn 2000 and summer 2003. The spread of both long-term loan rates with five-year government bonds and short-term loans to three-month money market rates widened by about 1 percentage point.

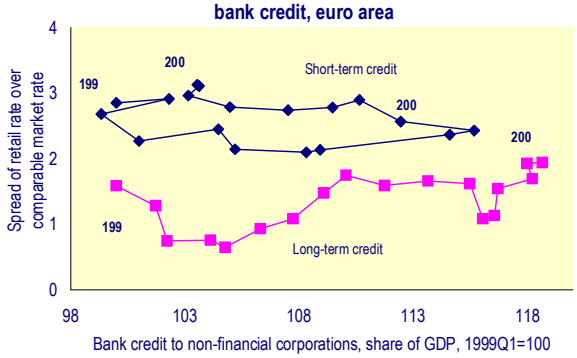
[55] Economic theory has shown that the credit supply curve may be backward-bending when the borrower needs to address lenders' moral hazard and asymmetric information. See Stiglitz/Weiss (1981).

Graph 48: Bank lending rates to non-financial corporations, spread over market rates, euro area



Source : Commission services.

Graph 49 : Price-volume combinations on the market for bank credit, euro area



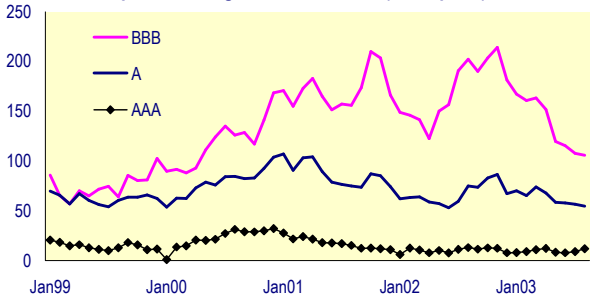
Source : Commission services.

Graph 49 combines the information of Graphs 47 and 48 on credit volumes and interest rate spreads. It shows that the observations from 1999 to 2003 are consistent with a slight upward-sloping supply curve of long-term credit. The increase in the demand for loans relative to GDP caused the interest rate spread to increase by 1.3 percentage points between summer 1999 and summer 2003.[56] Conversely, the curve for short-term credit displays an almost constant spread until 2001 despite rising volumes. Afterwards higher spreads coincided with lower credit volumes, suggesting that banks relied prominently on non-price factors when allocating credit.

The explanation for the divergence is probably related to the fact that short-term credits are often used to bridge sudden short-falls in cash flows. Therefore, corporations asking for short-term credit may have been considered more risky than long-term credit, which is supposedly dedicated to long-term investment.[57]

An increase in the differentiation of risk considerations among companies is also witnessed by the behaviour of spreads on corporate bonds over government bonds. The interest of high-quality corporate bonds only temporarily swelled in 2000. The timing of this hiccup suggests that it was more likely related to the burst of the stock market bubble than to the weakening of the economic outlook. Since early 2001, spreads of AAA bonds have fallen whereas spreads have widened considerably for lower-rated borrowers. This implies that the cost of bond financing has not fallen in line with the yields on benchmark government bonds, and has even risen for low-grade borrowers. It is only in 2003 that a sharp narrowing of the spread has taken place.

Graph 50 : Corporate bonds, euro area
Spreads over government bonds (basis point)



Source : Commission services.

[56] Note that the increase in demand for long-term loans does not reflect an improvement in the incentive to conduct long-term investment projects but is due to the deterioration of conditions on issuance markets for shares and corporate bonds (See Graph 46). Also, the low level of long-term interest rates may have encouraged companies to re-direct their lending from short to long-term credits.

[57] The notion that banks perceive short-term credit to be more risky than long-term credit is also supported by the fact that ECB statistics display short-term retail lending rates to have consistently been higher than long-term lending rates since the beginning of the series in 1996. This does not, however, imply that the same borrower would obtain a cheaper credit if he opts for a long-term maturity, except in the case of pronounced expectations that short-term interest rates will decline in the future.

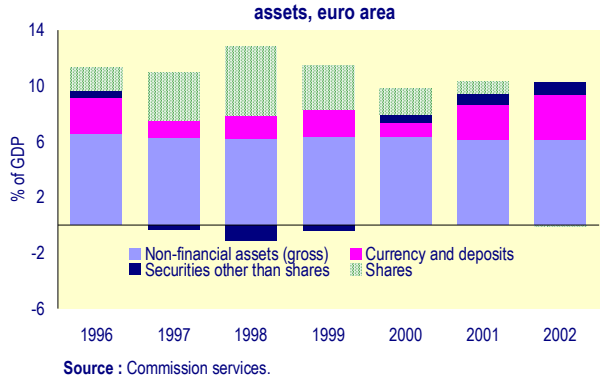
Table 4: Key indicators for euro-area banks					
	1998	**1999**	**2000**	**2001**	**2002**
Credit quality					
Loan loss reserve / gross loans	2.82	2.77	2.59	2.58	2.68
Loan loss reserve / impaired loans	72.43	74.16	77.41	88.82	74.63
Loan loss reserve / gross loans	3.90	3.73	3.35	2.91	3.60
Solvency					
Equity / total assets	4.03	4.06	4.28	4.17	4.32
Profitability					
Return on avg. assets (ROAA)	0.44	0.52	0.73	0.43	0.27
Return on avg. equity (ROAE)	11.17	12.96	17.42	10.29	6.38

Source: Bankscope – based on the 140 largest banks

It is very likely that the increase in risk differentiation is directly related to the difficult economic and financial situation, which has raised concerns about the health of the banking sector. Several signs of stress have been registered. First, corporate insolvencies in the non-financial corporate sector had a negative impact on banks' balance sheets. Loan loss provisions have increased substantially in 2001. Second, the profitability of banks has fallen due to the increased loan loss provisions, reduced activity in financial markets and lower valuations of security holdings. Third, the creditworthiness of some banks has fallen. Credit rating agencies have lowered or put under review the ratings of several major banks.

A shift towards more risk aversion is also detectable in households' saving behaviour. It was believed that the bursting of the stock price bubble would have a strong effect on households' preparedness to take risks. Indeed, some evidence suggests that this has been the case. For example, the households' savings ratio increased by about 1 percentage point of GDP, despite a lowering of interest rates. Second, a larger proportion of financial wealth was accumulated in risk-free assets, in particular in currency and deposits (see Graph 51). In 2002, the households sector did not acquire shares and other equity.

Graph 51 : Households' net acquisition of selected assets, euro area



Source : Commission services.

Households' acquisition of non-financial assets, which mainly constitutes housing, hardly declined in gross terms. Households continued to accumulate debt in the course of the economic downturn, mostly to finance house purchases. Traditionally, purchasing property is seen to be less risky than the holding of financial wealth, although strong price increases for property seem to challenge this view. Mortgage lending growth has generally been strongest in those Member States where house prices have increased most – such as Greece, Spain, Ireland and the Netherlands (see Table 5). In terms of financing, mortgage lending growth remained above a robust 7 per cent annual rate in the years 2001 to 2003. Retail activity and more specifically the buoyancy of household lending has supported bank profitability, cushioning the impact of rising loan-loss provisions and falling commission income.

Table 5 : Nominal property prices, euro area
(annual change in %)

	Residential property		Household debt	
	1995-02	**2002**	**1995-02**	**2002**
BE	5.2	6.5	5.1	1.5
DE	0.0	1.0	4.4	2.5
ES	9.8	17.4	13.2	6.2
FR	4.8	6.7	6.2	6.2
IE	14.5	14.2	:	:
IT	3.7	10.0	8.1	6.3
NL	11.2	4.5	12.7	7.0
FI	8.2	8.7	4.3	4.7

Source : BIS.

The economic effect of a shift in risk attitudes is similar to an interest rate change. Less risk-taking on the part of households and financial intermediaries implies higher capital costs for investment. It can go hand in hand with

declining interest rates because savers' and probably also financial intermediaries' appetite for low-risk government bonds will keep bond yields low. If the allocation of credit were fully driven by prices, a spread between market rates and lending rates would emerge. Such a spread materialised in the euro area in 2002-03 in the market for long to medium-term loans but not for short-term loans, where allocation apparently relied strongly on non-price mechanisms.

The risk of not obtaining short-term credit at a time when demand weakens and in consequence revenues deteriorate is a particular threat for enterprises. If they were close to bankruptcy, banks would face moral hazard problems, which might explain the moderate increase in retail rate spreads. Whether reliance on non-price factors is welfare-distorting depends in this case on the efficiency of the non-price factors in discriminating between profitable and non-profitable enterprises and investment. While this issue is perhaps impossible to assess at the macroeconomic level, the extent of the deterioration in investment together with the slump in productivity growth suggest that banks have been particularly demanding when allocating short-term loans in the past few years.

4.4 Conclusions: strong adjustment pressure on corporations and financial intermediaries

This section documented that the growth slowdown exerted considerable pressure on enterprises to adjust and its implication on employment and investment. The built-up of corporate debt in the long cyclical upswing of the 1990s was an additional burden on the corporate sector. While the balance-sheet constraints in the private sector have eased in the course of the slowdown, it is difficult to say whether de-leveraging has been fully achieved. Moreover, activity in the financial sector was not insulated from the adjustment pressure. Despite some concerns about the health of financial institutions, the euro-area financial sector weathered the slowdown relatively well, without any major institutions failing. Nevertheless, there was a weakening in credit availability, in particular for short-term credit.

It is still premature for a final assessment of the corporate adjustment in the euro area vis-à-vis that in the USA. The growth performance of the USA during the slowdown has been superior and forecasters also attach a more favourable economic outlook to the USA than to the euro area. However, the slowdown did not contribute to reducing the US external balance. Relatively steady investment in combination with a deteriorating labour market and consequently the prospect of less private savings means that the US recovery is not taking place on sound foundations. The consequence of the pronounced investment weakness in the euro area, on the other hand, augurs badly for accomplishing high labour productivity growth in the near future and high potential GDP growth over the medium term.

5. How sticky is inflation?

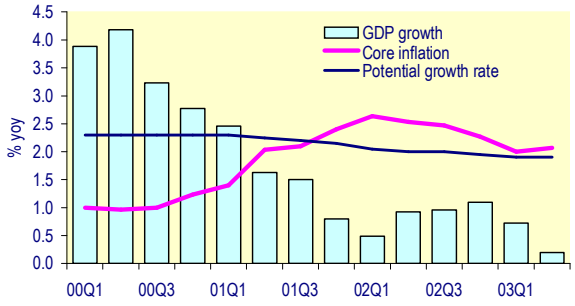
From a rate of barely 1 per cent in early 1999, HICP inflation accelerated to just over 3 per cent in May 2001. It slowly receded afterwards, fluctuating around 2 per cent in summer 2003. While most of the increase was related to one-off effects due to rising energy and food prices as well as the euro depreciation, there was a substantial risk of second-round effects, complicating the assessment of risks to price stability. The persistence of inflation above the 2 per cent ceiling, despite a slowing of the economy, presented a challenge to the ECB and may have contributed to the weakening in private consumption.

5.1 The cyclical responsiveness of inflation

In the short to medium term, several factors determine the level of inflation in an economy, including external price shocks, administratively set prices, domestic demand, and external demand. This section looks into how inflation is related to real GDP growth. All other things being equal, standard macroeconomic theory indicates that when real GDP growth falls below potential there are downward pressures on inflation in the economy. The recent slowdown provides an occasion to observe how fast this mechanism comes into play in the euro area.

Against the background of volatile prices for energy and unprocessed food in 2000-03, headline inflation can give a misleading picture of the underlying price trend and its relationship with the business cycle. As can be seen in Graph 52, core HICP inflation, which excludes energy and unprocessed food, stabilised four quarters after real GDP growth fell for the first time below the potential rate in 2001Q2, and started slowing four quarters later.

Graph 52 : GDP growth and inflation, euro area



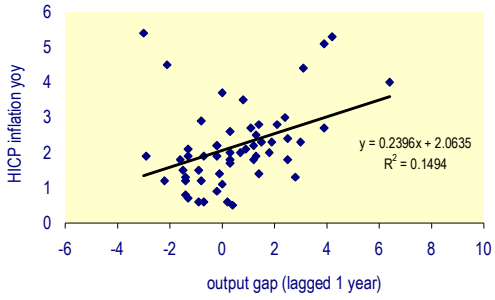
Source : Commission services.

Individual Member State data reveal differences in how quickly inflation responded to below potential growth in GDP. The average lag of four quarters is observed in Austria, Germany and Belgium. The Netherlands exhibited a large rise in inflation in the first three quarters following the drop in GDP growth below its potential, and started a more gradual decline after five quarters. In France and Spain inflation started to fall six

quarters after GDP growth dropped below average, for Portugal it took eight quarters, while in Italy evidence on a correlation between inflation and GDP growth is mixed in the current downturn.

Graph 52 suggests that the output gap tends to impact on inflation with a lag of four to five quarters in a cyclical downturn, both for the euro area as a whole and for most Member States. This is a useful observation for analysing the effect of differences in cyclical positions on inflation dispersion in the euro area. Indeed, Graph 53 and the simple regression depicted in it show that a country's inflation rate is positively linked to the cyclical position of the economy, implying that cyclical differences do help to explain inflation dispersion in the euro area.[58] As expected, however, differences in cyclical positions explain only part of the whole magnitude of differences in inflation.[59]

Graph 53 : HICP inflation and output gap in the euro area Member States 1996-2002



Source : Commission services.

Both findings have important implications for economic adjustment in the euro area. First, the one-year lag with which inflation responds to the output gap suggests that inflation is persistent, i.e. the effect of economic shocks peters out over a long period. Second, the differences in the cyclical response among Member States means that common shocks to the euro area may cause some divergence in economic performance.[60]

[58] The picture does not change systematically if core inflation is used instead of headline inflation because over the medium term both inflation measures should converge. Indeed, the accuracy is slightly better with HICP than with core inflation.

[59] For an in-depth analysis of inflation differences, see European Central Bank (2003).

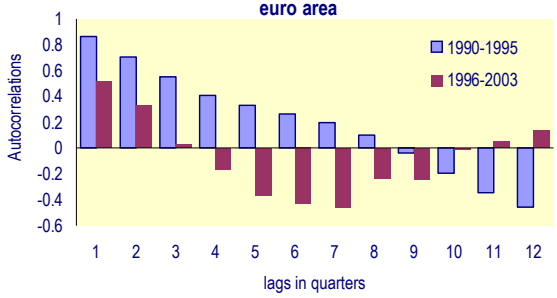
[60] Both issues are supported by the results of simulations with wage equations in Chapter 4.

5.2 A primer on inflation persistence

Inflation persistence can be understood as the time it takes after a given shock for inflation to go back to the level prior to the shock. While intuitively easy to grasp, the concept of persistence is not easily measured in practice. There are a variety of possible approaches to measuring it, but in general there is no agreement as to which one is the more satisfactory overall.[61]

Perhaps one of the most direct ways to gauge the degree of inflation persistence is to look at the correlation of inflation in a given quarter with inflation in earlier quarters. Using data for the euro area, Graph 54 gives some evidence that there might have been a change in the degree of inflation persistence over the 1990s. Indeed, the autocorrelations of headline inflation for the period 1996-2003 are noticeably lower than those observed for the early 1990s. The same result can be obtained if a comparison is made of the autocorrelations of the 1996-2003 period with those for the entire 1990-2003 period. There are many potential reasons for such a finding. In particular, the new policy regime put in place in the run-up to EMU and thereafter could have altered inflation expectations markedly, producing a reduction in the level of inflation persistence.[62]

Graph 54 : Consumer price inflation persistence, euro area



Source : Commission services.

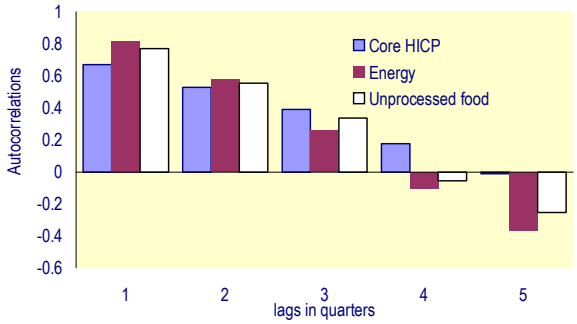
The dynamics of inflation persistence can be further investigated with the same univariate approach by looking at the evidence for the main components of HICP inflation. Unfortunately, HICP data only exists for a relatively short time period and therefore comparisons with the early 1990s are excluded. Nonetheless examining the data for the period 1996-2003 provides some useful insights. For example, the degree of persistence for core HICP inflation is somewhat lower than for headline inflation for short lags (Graph 55). This is probably due to the fact that the more volatile

[61] The literature is divided on what is the best way of measuring inflation persistence and the results tend to be quite sensitive to different methods, specifications and time periods. For example, Batini (2002), using model-free methods, argues that inflation persistence in the euro area has changed little over the last 30 years.

[62] The same type of evidence is reported in IMF (2003).

items are not included in core inflation. The volatile components of the HICP display strong persistence in the short term, i.e. the first two quarters. Thereafter. shocks to these components appear, however, to fade out quicker.

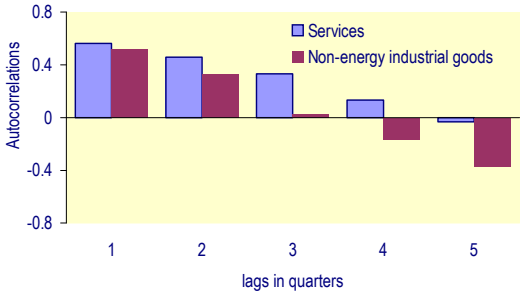
Graph 55 : Persistence of core and non-core inflation, euro area



Source : Commission services.

Moreover, doing the same exercise for the two main core inflation components shows that, as could be expected, the degree of inflation persistence is higher in the services sector than in the non-energy industrial goods sector. The correlation of inflation in a given quarter with the immediate previous quarter is higher for services inflation and the correlation with earlier quarters also declines more markedly for services inflation. The coefficient of correlation goes down to zero after three quarters for inflation in non-energy industrial goods, whereas this happens only after four quarters for inflation in the services sector. This evidence would indicate that much of the persistence of core inflation (and hence headline inflation) stems from persistence in the services sector. This could in turn be related to differences in the degree of competition between sectors, to the higher importance of wage costs for services relative to industrial goods and to the fact that the service sector is more insulated from external shocks.

Graph 56 : Persistence of core inflation components, euro area

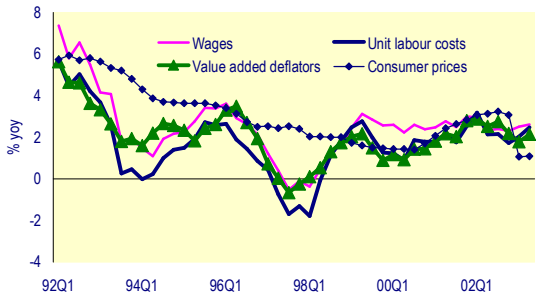


Source : Commission services.

5.3 Service inflation revisited[63]

In 2002, service inflation accelerated to rates of 3 per cent despite a slowdown in economic growth. At the same time, inflation in consumer goods decelerated in conformity with the cyclical weakening. Graph 57 shows that service inflation hardly responded to cyclical conditions over the 1990s and started to accelerate in 2001, when economic growth had already weakened. Comparing service prices for various indicators, the graph shows that sectoral wage growth, unit labour costs and value added deflators move closely over time whereas service consumer inflation does less so. This suggests that sectoral cost developments have only little explanatory power for sectoral price developments.

Graph 57: Service inflation, euro area



Source : Commission services.

However, price developments were less distinct in the recent slowdown in the manufacturing and the services sectors than headline inflation suggests. This is because the wedge between service inflation and overall inflation was strongly determined by developments in energy prices. Evidence can be drawn from the trends in service prices and prices of non-energy goods, which both experienced a very similar development over time, i.e. decelerating inflation until 2000, subsequently accelerating until spring 2002 and decelerating once more since then. (see Graph 58). The spread between service and non-energy industrial prices shows some co-movement with the rate of headline inflation. It is high when the overall rate of inflation is high.[64] Moreover, it displays a higher degree of auto-correlation than both components, suggesting that there is a strong link between prices in both sectors.[65]

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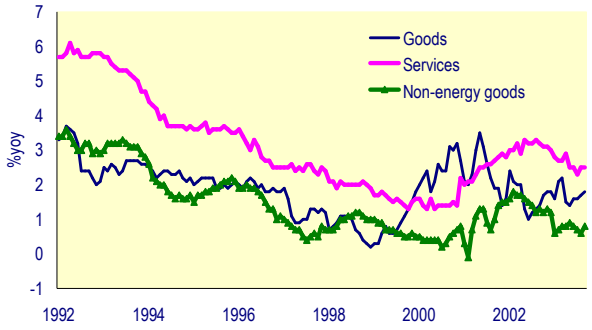
[63] The determinants of service inflation were already briefly analysed in the EU Economy 2002 Review.

[64] Energy prices seem to be an important further determinant of this spread. This is reasonable because energy is a more important input in industry compared to services and accordingly energy prices should affect industrial prices faster than service prices.

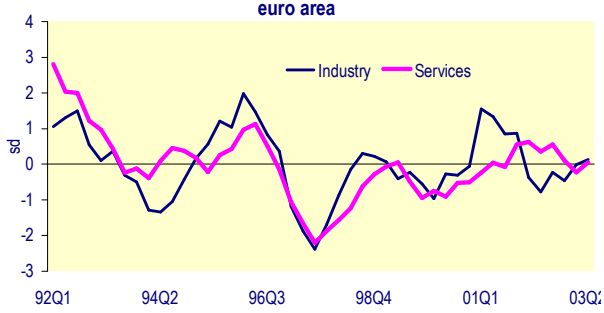
[65] See also Section 0 on the service economy.

Graph 58 : Sectoral inflation: demand perspective consumer prices, euro area



Source : Commission services.

Graph 59 : Normalised sectoral cost inflation, euro area



Source : Commission services.

Inflation dynamics in the services sector is also similar to those in industry when value-added deflators are looked at.[66] Inflation, measured by value-added deflators, differed by 1.2 percentage points on average between the services and industrial sectors, which is the same as the difference obtained from consumer price statistics.[67]

When correcting for higher average inflation in the service sector compared to the industrial sector and for differences in volatility, it becomes evident that, firstly, value-added inflation in both sectors coincided in the first half of the 1990s but that, secondly, synchronicity turned into a small lag of service inflation relative to industrial inflation in the second half of the decade. Industrial and service prices moved in tandem, most visibly when inflation in industrial prices accelerated in 1998 and later in 2001 but also during the subsequent deceleration. However, service inflation followed the trend in industrial prices with a lag of some quarters. This observation fits into the picture of a stable long-term relationship between industrial and services prices where the latter slowly adjusts to the former.

Cost developments are very dissimilar across the different service sub-sectors. Comparing the value-added deflator in different service sectors with the deflator for the total economy reveals that prices in the financial intermediation and other services sector increased relative to the rest of the economy throughout most of the 1990s.[68] Output from trade-related services and industry has become relatively cheaper.

As regards behaviour over time, inflation in trade services was very similar to industry. Prices in the (broadly-defined) financial intermediation sector posted a different evolution. Inflation was higher than in other sectors in the early 1990s and converged to the economy's mean until 1998. Since 1998, it has developed out of tune with price developments in industry and trade-related services. The acceleration of inflation in financial services continued, whereas it decelerated in industry, first, in mid 1998 and then again, more pronouncedly, in 2001. This implies that the lag in service inflation that emerged in the late 1990s is attributable to a special trend in prices in the financial intermediation sector. This observation is consistent with the relatively strong growth in unit labour costs in the financial intermediation sector discussed above (Section 3.4).

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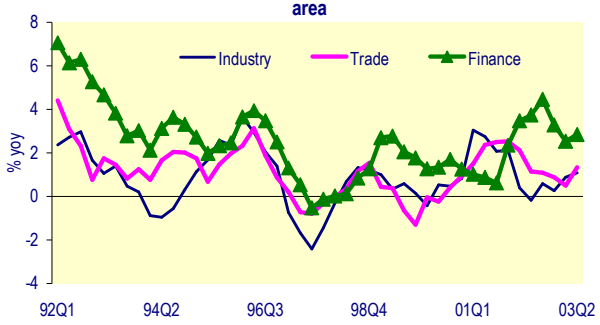
[66] Gross value added (GVA) is GDP less net indirect taxes plus subsidies on products plus "financial intermediation services indirectly measured". As these items are small compared to GDP, the difference between GVA deflators and the GDP deflator is negligible for growth rates. One of the reasons for looking at value added deflators is that they provide a sectoral breakdown that is similar to that available for the labour cost indicators used above, hence facilitating the consistency of the analysis of wage and price developments at the sectoral level. A second reason is data availability, as a detailed HICP sectoral breakdown for the whole period under consideration does not yet exist.

[67] The difference between service inflation and goods inflation in the HICP was also 1.2 percentage points over the same period. See also Section 3.4.

[68] In conformity with the classification used by Eurostat, trade services in this note include retail and wholesale trade, communication, transport, hotels and restaurants. Financial services include financial intermediation, real estate and business services. The category “other services” comprises mainly public services, health and education.

Graph 60 : Sectoral cost inflation: service sectors, euro area



Source : Commission services.

5.4 Conclusions: service inflation the culprit at last?

Economic theory conjectures that wage developments in services are closely connected to those in industry and differentials in productivity growth then translate into on average higher services inflation. Although this theory is considered to hold generally over the long term, the empirical picture of the euro area over the last ten years provides some support for it. On average since the early 1990s, the difference between costs and prices of the service sector and the industrial sector has remained fairly constant at about 1 ¼ percentage points for unit labour costs, value added deflators and consumer prices.

Although productivity differences explain the average spread between service and industrial inflation relatively well, it has only little explanatory power for price developments in the service sector in the short-term. Instead, service prices are strongly related to consumer price developments in non-energy goods. This finding suggests that consumer prices in the service sector only weakly respond to sector-specific supply and demand conditions. Instead, suppliers follow some kind of price-imitation strategy between sectors.

6. How sensitive is the euro area to external developments?

Owing to the introduction of the euro, which eliminated nominal exchange rate volatility within the euro area, and the establishment of a stability-oriented macroeconomic framework, the euro area was expected to be more resilient to external economic shocks than in the past. At the same time, however, global economic interdependence increased. Technological progress in the ICT sector reduced transaction costs and an increasing numbers of countries opened their markets. Trade in goods and services accelerated in the last decade as did the magnitude of international capital flows.

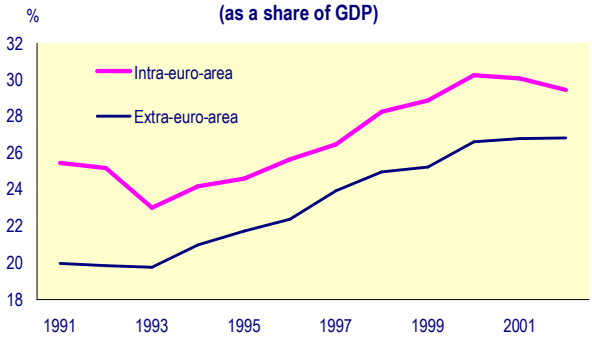
The net effect was that the euro area did not become more insulated. After reviewing how some of the main factors shaping international interdependencies have developed, this section examines the extent to which the deterioration in world trade and world growth since 2000 affected the euro area.

6.1 Factors shaping cross-border linkages

Trade linkages have traditionally been considered to be important in transmitting economic disturbances across borders. Other channels run through capital market integration, production as well as through confidence and information linkages.

(1) Closer economic integration intensified intra euro-area trade flows, i.e. from a share of 23 per cent of GDP in 1993 to about 30 per cent at the end of the decade. At the same time, extra euro-area trade increased by a similar magnitude from 20 to 27 per cent (See Graph 57).

Graph 61 : Real trade in goods, euro area[1] (as a share of GDP)

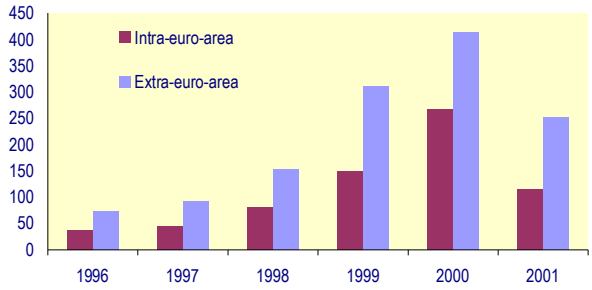


[1] Trade is measured as the sum of imports and exports.
Source : Commission services.

(2) Foreign direct investment (FDI) flows have equally intensified within the euro area and with other countries. Capital outflows to the USA were particularly buoyant but the acceding countries also benefited from a remarkable increase in foreign investment inflows.[69] (See Graph 62).

[69] In the late 1990s, a lot of euro-area investment was reportedly channelled to the USA. About a third of the extra euro-area FDI outflow was invested in the USA. Although reliable data on bilateral portfolio investment flows is not available, there is reason to believe that euro-area investors heavily invested in US Dollar assets in the late 1990s. US statistics reveal that about 20 per cent of US securities held by foreigners were held by euro-area residents in 2000. According to Warnock and Cleaver (2002), this figure is very likely an underestimation because some of the 27 per cent share registered for the UK may be indirectly held by euro-area residents.

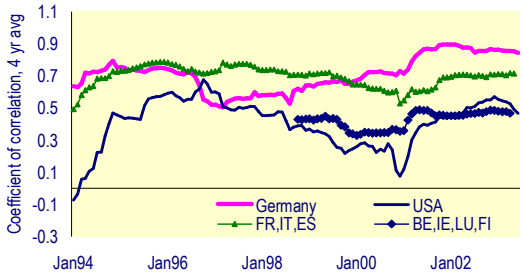
Graph 62 : Outward foreign direct investment, euro area, level in billion euro



Source : Commission services.

(3) The consequence of the observed trend in FDI is an increase in foreign ownership, which should go hand in hand with a trend increase in the international interdependence of production, especially if FDI is undertaken by multinational enterprises. Graph 63 provides some tentative support for the hypothesis that the cross-border correlation of production in manufacturing tends to increase over time.

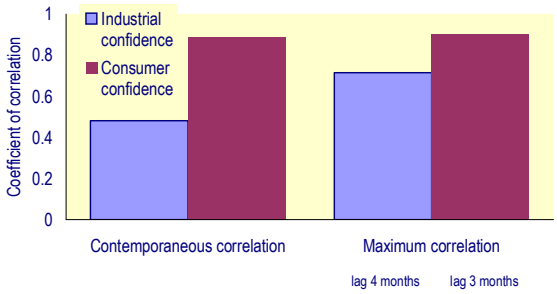
Graph 63 : Correlation of quarterly manufacturing production growth with euro area aggreagate



Source : Commission services.

(4) Security prices and economic sentiment are closely linked across borders, implying that they exert a comparable impact on domestic economic activity in different economies. Owing to information and communication technology, financial asset prices respond almost instantaneously to global news on all major markets. Economic sentiment among industrial producers and consumers is strongly correlated between the USA and the euro area, reflecting both cyclical synchronisation and the similarity of perceptions related to economic and financial developments.

Graph 64 : Correlation of economic sentiment in surveys betweeen USA and euro area, Jan 1999- Jul 2003

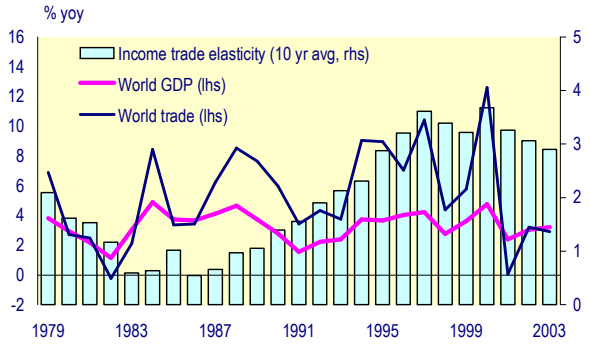


Source : Commission services.

6.2 The world trade shock revisited

The year 2000 marks both the zenith and the abrupt end to a period of spectacular growth in world trade. Annual trade growth peaked at more than 12 per cent in real terms, after having grown by about 8 per cent on average in 1996-2000. The favourable growth environment was probably not the dominant factor behind this development, as evidenced by the fact that import growth clearly outpaced output growth over the last decade. Whereas global import volumes grew on average at only double the size of real output in the second half of the 1980s, this so-called income elasticity of trade increased to a factor of 3 in the first half of the 1990s and moved on to a factor of more than 4 in the period 1996-2000.

Graph 65 : World trade and output



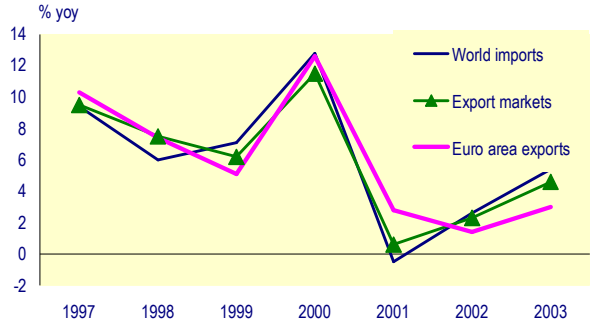
Source : IMF.

Compared to the experience of the 1990s, the growth in world trade since 2000 can be described as modest. The previously strong rates seem to be attributable to a one-off shift in the level of the trade to GDP ratio, driven *inter alia* by (1) the increased number of countries that have opened their economies to trade and foreign investment, and (2) progress in the technical and political sphere which reduced information and transaction costs. While the adjustment to the new level yielded transitorily high rates of growth, this factor seems to have lost momentum since 2000. Moreover, two factors are likely to have significantly contributed to the bleaker development in international trade. Sluggish global output growth may have dented trade.

Furthermore, international terrorism increased risk premiums in international transactions.

As regards the impact of the global trade shock on the euro area, export performance has weakened in line with the development of demand in the euro area's export markets (see Graph 66).[70] Thus, euro-area exports did not deviate from their historical track. Market shares on average remained constant in 2001-03, having widened in 2001 against the background of the euro depreciation, but closed in 2002-03 when the euro appreciated.

Graph 66 : Export performance, euro area



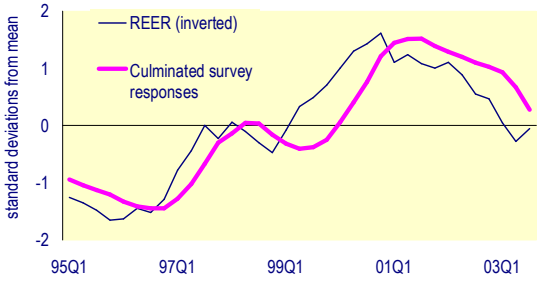
Source : Commission services.

6.3 No support from pro-cyclical exchange rate variation

The synchronised slowdown of economic growth in most parts of the world limited the role for flexible exchange rates to smoothen adjustment. The exchange rate is one of the key macroeconomic prices that could bring relief in a slowdown and may provide a welcome impulse to recovery. This notion of a currency appreciating in an upturn and depreciating in a downturn is not, however, supported by historical evidence.[71]

The most recent experience of the euro exchange rate is another example of exchange rate movements that are not necessarily conducive to stabilising the cyclical situation. In 1999-2000 the euro depreciated when growth was strong, further stimulating international price competitiveness and adding to the inflationary shock of climbing oil prices. Moreover, the perceived weakness of the euro prompted many investors to channel capital to the USA, where returns appeared higher. In 2002-03, by contrast, the appreciation of the euro undermined the price competitiveness of exports. Indeed, Graph 67 displays a strong co-movement between the actual development of the euro's real exchange rate (inverted, deflated with total economy unit labour costs) and industrialists' assessment of competitiveness as indicated in the Commission's business surveys.[72] Industrialists pay more attention to variations in exchange rates than Graph 67 would suggests, which shows that world import demand is the dominant determinant of export growth and only a relatively minor role can be allocated to exchange rate variations.

Graph 67 : Assessment of price competitiveness, euro area



Source : Commission services.

As shown above (Box 3), the pass-through to domestic prices was slow, implying that the strengthening of the currency provided only partial relief to domestic demand. Price stickiness seems to have prevented a stronger increase in purchasing power and thereby a larger off-setting of falling external demand by domestic demand.

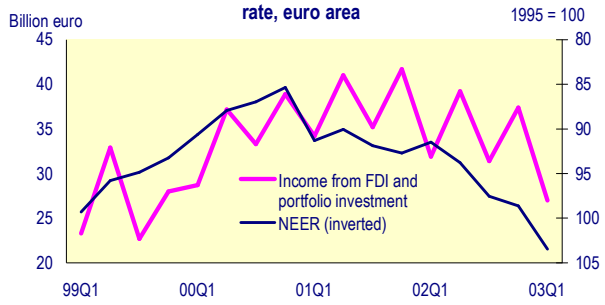
The exchange rate exerted a further pro-cyclical impulse through its impact on the value of capital invested abroad. For example, euro-area investors that bought US assets when the US dollar was still expensive face exchange rate losses when they sell their assets when the euro is strong. A 20 percentage point appreciation of the euro against the US Dollar implies that the yield of a bonds if held over 10 years declines by about 2 percentage points, i.e. an interest of 6 per cent in USD, which was noted for 10-year government bonds in 2000, translates into a 4 per cent return in euro. Although the sum of capital income flows from FDI and portfolio investment amounted to barely 2 per cent of GDP in 2002, such a shortfall in revenues is already visible in the balance of payments' income account (see Graph 68). More important than the effect on investors' wealth or cash flow is probably their impact on the value of international securities as collateral.

[70] Whereas the annual perspective gives the impression that trade is almost invariant to changes in exchange rates, the picture is less clear-cut if high-frequency data is looked at.

[71] For a comprehensive review of the issue, see IMF World Economic Outlook, May 1998, Chapter 3.

[72] As the EC survey asks for the assessment of the change in the competitive position, the balances were culminated over time in order to compare them with the level of the real exchange rate. Both variables in the graph are normalised (the difference from the mean being divided by the standard deviation in 1995-2003).

Graph 68 : Capital income from abroad and exchange rate, euro area



Source : Commission services.

6.4 Conclusions: export performance not invariant to the world cycle.

The deceleration of world trade had a marked impact on the euro-area's export performance, with the euro appreciation having contributed to slight losses in market shares. Usually, one would expect the exchange rate appreciation to stimulate domestic demand because import prices decline and terms of trade become more favourable. As the pass-through of exchange rates to consumer prices has been slow, evidence is weak that domestic demand in the euro area has already been much influenced by this positive effect.

Box 3: The exchange rate pass-through to inflation in the euro area

As much as the depreciation observed during the first two years of the euro raised fears about the potential inflationary impact, the recent appreciation of the euro exchange rate is raising interest about the potential to reduce inflationary pressures in the euro area.

In principle, the way exchange rate changes are transmitted to domestic prices, i.e. the exchange rate pass-through (ERPT), can be understood as follows. Exchange rate fluctuations condition the extent to which external price developments affect the prices of imported goods, expressed in euro. In turn, changes in import prices can affect domestic consumer prices through direct and indirect channels. The direct effects come through the pricing of both homogenous products (e.g. energy, coffee) and from less homogeneous imported goods that nonetheless enter the consumer basket nearly directly. The indirect effects stem from the degree to which import prices impact on costs of intermediate goods in the production process and from the price reaction of domestically produced substitutes or complements to imports. Indirect effects are also induced via the impact on net exports, and thereby on aggregate demand. There may also be second-round effects arising from the response of wage setting as well as of fiscal and monetary policy to the impact on inflation. Accordingly, abstracting from the indirect effects via net exports and the second-round effects, the pass-through of exchange rate changes to consumer prices may be considered in two stages: (i) the pass-through from exchange rate changes to import prices, and (ii) the pass-through from import prices to final consumption prices, possibly via producer and wholesale prices.

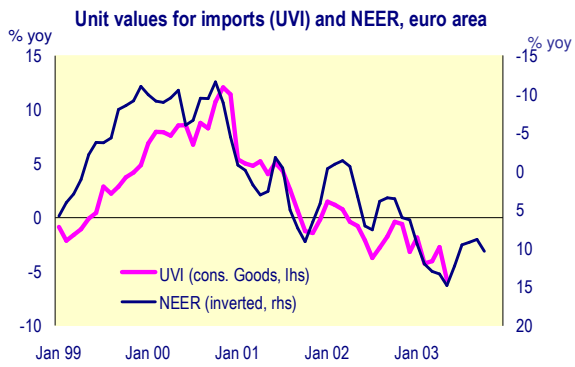
The following Table provides an overview of five recent studies that have looked at the evidence for the euro area or a subset of its Member States. Despite differences *inter alia* in model specification, the price measures used and the sample period, these studies do provide evidence in favour of two common conclusions. Firstly, the pass-through in the euro area is generally found to be partial, and to diminish through the chain of distribution. Secondly, the time lag of pass-through increases as the exchange rate shock is propagated through the distribution chain to final consumer prices. For import prices it is typically found that between 20-50 per cent of the total effect takes place on impact and the remainder within 3-8 quarters. For producer and consumer prices there is generally little effect on impact. Most of the effect occurs with a considerable lag, with consumer prices showing a more delayed response than producer prices. These studies suggest a pass-through to consumer prices of between 2-16 per cent after with most of the effect occurring with a lag of 1½ to 2 years.

Table: Empirical studies on the degree of pass-through of an exchange rate shock, euro area.
(as percent of the initial shock).

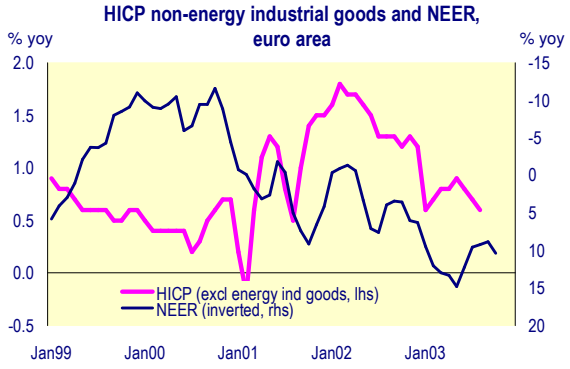
Pass-through on:	Import prices	Producer prices	Consumer prices
McCarthy (2000)[1] (1976Q1 – 1998Q4)	50% on impact, total 60% after 8 quarters	3% on impact, total 20% after 8 quarters	0% on impact , total 8% after 8 quarters
Hüfner and Schröder (2002)[2] (1982M1 – 2001M1)	(n.a.)	(n.a.)	4% after 1 year, total 8% after 3 years
IMF (2003) (1990:1 – 2002:12)	3% after 1 month, total of 117% after 18 months	0% after 1 month, total of 17% after 18 months	0% after 1 month, total of 2% after 18 months[3]
Hahn (2003) (1970Q2 – 2002Q2)	20% after 1 quarter, total of 50% after 3 quarters	10% after 1 quarter, total of 30% after 3 years	2.5% after 1 quarter, total of 16% after 3 years
Anderton (2003) (1989Q1 – 2001Q4)	25-40% in the same quarter as the shock, total 50-70% after 15 months	(n.a.)	(n.a)

The impact of recent developments in the euro exchange rate on import prices, producer prices and consumer prices is clouded by the simultaneously large fluctuations of oil prices. Nevertheless, an analysis of the co-movements since 1999 between the nominal effective exchange rate (NEER) of the euro and inflation in non-oil extra-euro area import prices, producer prices and consumer prices is broadly in line with the results of academic research. It indicates that the exchange rate pass-through for the euro area as a whole is rapid and large to import prices, while distinctly more muted and lagged to producer and consumer prices.

To get an idea of the actual delays involved in the response of inflation at the level of import prices one can look at the correlation between changes in the NEER of the euro and inflation in unit values for imports of consumer goods.[4] This is the component of total unit import values that can be expected to capture best the impact of changes in the exchange rate that may be later passed-through to final consumer goods. The correlation is highest without any lags in unit values for imported consumer goods, indicating a swift response of imports inflation to the changes in the NEER



Source : Commission services.



Source : Commission services.

Reflecting this observation, almost immediately after the NEER began appreciating at the end of 2000, annual rates of change in unit values for consumer goods also began decelerating (see Graph). Thereafter, in line with the observed developments of the exchange rate, inflation in unit values for consumer goods registered a prolonged period of downward movements, declining by some 18 percentage points to May 2003. Over the preceding period in which the euro depreciated, inflation in import unit values for consumer goods increased by 13 percentage points. Comparing these figures with the corresponding changes in the NEER hints at a pass-through in this sector of around 72 per cent, indicating partial but near complete pass-through at the level of import prices.

The correlation of changes in the NEER with inflation in producer prices for consumer goods, taken as the relevant measure that excludes the effects of oil price changes, is highest at lags of three to four quarters. Accordingly, inflation in consumer goods at the producer stage peaked in April-May 2001 seven months after the NEER had stopped depreciating. From January 1999 to the peak month (April 2001), inflation in this component increased by 3.8 percentage points and from the peak month to August 2003 it declined by 2.1 percentage points. Comparing these numbers with the corresponding changes in the NEER suggests an approximated pass-through of 16 per cent, that is, a considerably more subdued reaction of producer prices than import prices to given exchange rate changes.

Consumer prices have reacted with a longer time lag than producer prices to the appreciation of the euro. The correlation of changes in the NEER with inflation in non-energy industrial goods, which is the component of overall HICP inflation that can be expected to reflect first and foremost the impact of fluctuations in the exchange rate, is highest at lags of 16-18 months. Given this lag reaction, taking the difference in inflation between July 2000, instead of January 1999, and the month when the series peaked, gives an increase in inflation of 1.6 percentage points (see Graph). From its peak in February 2002 to August 2003, inflation in this component declined by 1.2 percentage points. These figures, together with the corresponding changes in the NEER, yield a rough approximation of the observed pass-through of 7 per cent.

Several reasons have been advanced in the economic literature to explain why the pass-through to consumer prices is lower than to import prices. At the point of sale to the consumer, prices of imported goods have to cover the costs of domestic distribution and retailing, and they contain a significant component of domestic wages, profits and taxes. This means that changes in import prices are only one of several components of total costs that determine the final consumer price. The extent to which changes in cost are reflected in final prices may depend also on differences in market structure across industries and on strategic considerations of firms. In particular, empirical studies tend to find considerable scope for "pricing-to-market" for heterogeneous goods, i.e. the practice of foreign firms to align their pricing strategy to domestic conditions in order to preserve market share. The higher the degree of pricing-to-market, the more muted and delayed would be the pass-through of exchange rate changes to consumer prices.

Overall, the economic literature finds that the degree of exchange rate pass-through typically depends on a number of interrelated microeconomic and macroeconomic factors. The most important ones are the state of overall demand (cyclical conditions), whether the exchange rate change is perceived to be temporary or permanent, whether the country (destination/origin) is large or small, the industry-specific market structure, product characteristics as well as the macroeconomic policy set-up, in particular the degree of credibility of monetary policy.

[1] Approximate values as derived from graphic representations of the effects reported in the paper for D, F, B and NL and averaging using HICP weights. The study in addition covers the US, Japan, the UK, Sweden and Switzerland.

[2] Euro area estimates are only made for the effects on consumer prices, based on a constructed aggregate using estimates for F, D, I, NL and E. The relative speed of adjustment for import and producer prices is also assessed, but using a non-comparable average of the five countries.

[3] If the core inflation measure used – HICP excluding energy and unprocessed foods - is replaced by headline inflation the degree of pass-through raises to near 10 per cent.

[4] The available proxies are unit value indices from foreign trade statistics. Although unit values are commonly used in empirical studies of the pass-through, they have well-known drawbacks. Unit values are calculated as the value of the products divided by their quantity, which is proxied by the weight of the products in terms of tonnage. For some products where the decline in weight does not match a decline in quantity (e.g. computers), unit values would yield a distorted picture of price developments. Unit values also do not correct for changes in quality and tend to under-represent new commodities, leaving large scope for measurement bias.

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2. DRIVERS OF PRODUCTIVITY GROWTH

AN ECONOMY-WIDE AND INDUSTRY LEVEL PERSPECTIVE

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DRIVERS OF PRODUCTIVITY GROWTH

AN ECONOMY-WIDE AND INDUSTRY LEVEL PERSPECTIVE

1. Introduction

The 1990s have witnessed some important shifts in the underlying growth performances of the EU and US economies, with a significant gap opening up in terms of GDP, and more importantly, GDP per capita, growth rates. From a situation over the period 1980-95 when EU and US living standards were growing at roughly an equivalent rate, the second half of the 1990s has seen the emergence of a significant growth gap in favour of the USA. These EU-US differences are mirrored at the EU Member State level, with simple measures of dispersion indicating that individual country divergences relative to the average EU performance have grown by close to 50 per cent in the 1990s compared with the 1980s. These extra- and intra-EU divergences in economic fortunes have been the subject of intense research efforts in recent years,[73] with policy makers keen to decipher the reasons for their own respective outturns and to further refine the "magic formula" for boosting their long run growth performances.[74]

The present study will contribute to this ongoing debate regarding the sources of growth in general, with specific attention being devoted to productivity determinants given their importance in shaping medium to long run changes in living standards. Any analysis of growth however must be seen as an ongoing process, with economies in a constant process of "creative destruction" and with the emerging structural patterns difficult to disentangle from cyclical influences and policy adjustment lags. Consequently, while the main sources of growth over long periods of time are easily established, less success is possible in explaining more recent breaks in trends and in assessing whether these breaks are durable or not.[75]

While conscious of such uncertainties the present study examines the empirical evidence to ascertain whether some tentative conclusions can be drawn regarding recent trends and future prospects in terms of productivity. The study is particularly interested in establishing whether a genuine break has occurred in the 1990s in the post World War II pattern of EU convergence to US living standards, with the previous rapid progress of the 1960s and 1970s, and the stabilisation of the 1980s, now giving way to a further pulling ahead by the USA over the second half of the 1990s. A number of key questions are addressed, firstly, whether this break in the convergence pattern is likely to be permanent or transitory; secondly, in terms of explaining recent EU and US trends in investment and technical progress, what was the role played by information and communication technologies (ICT)[76] and by increases in the employment content of growth; and finally whether any policy lessons need to be learnt by EU, and especially continental EU, Member States, from the growth pattern which has emerged in the USA and a small number of individual EU countries.

[73] See, amongst others, Scarpetta et al (2000); Bassanini et al (2002); Colecchia and Schreyer (2002); and OECD (2003).

[74] See, for example, Temple (1999) and Ahn and Hemmings (2000) for surveys of the literature on economic growth.

[75] As a general point, readers should be mindful that international comparisons of growth performances are particularly problematic at the present time due to a range of differences in the measurement techniques used in the national accounts of the respective countries. These differences include, for example, the use or non-use of new methodologies for constructing price deflators for the output of fast growing, high technology, industries or for measuring the output of a number of the service sectors. Some of these measurment issues have been overcome in the industry datasets used in section 3 of this paper.

[76] See, for example, Gordon (2000); Oliner and Sichel (2000); Council of Economic Advisors (2000); Pilat and Lee (2001); Baily and Lawrence (2001); and Daveri (2002).

In terms of content, following the present introduction, Sections 2 and 3 present the broad stylized facts concerning growth and productivity trends at the economy-wide and industry levels for the USA and the 15 EU Member States.

- Section 2, drawing on official data sources and using mainly a growth accounting approach, concludes that the EU is now, for the first time in decades, on a trend productivity growth path which is lower than that of the USA. This recent EU performance reflects a deterioration in terms of both investment and innovation and marks a serious downgrading relative to the situation in the early 1990s when annual EU labour productivity growth was averaging nearly 2 ½ per cent, compared with 1 per cent for the USA. Since then EU labour productivity growth has declined by a full 1 per cent point to 1½ per cent, compared with an acceleration in the USA to 1¾ per cent.
- Section 3, exploiting two new, internationally comparable, industry datasets based on the OECD's STAN database, goes on to pinpoint the small number of industries which have been driving the EU-US productivity differentials over recent decades and in particular over the second half of the 1990s.[77] In terms of individual countries, it also highlights the negative contributions from a number of the larger Member States, most notably Italy, in driving the overall deterioration in the EU's performance. An interesting feature of this dataset is that, for all countries, it uses US hedonic deflators for deflating the relevant ICT industries and classifies computer software as investment expenditure (and not as a business expense which is the convention in a large number of EU countries). It therefore provides a more accurate estimate of the contribution of ICT to the growth performances of the respective countries. In this way it is possible to assess whether the decline in EU labour productivity growth could be due, as some commentators have suggested,[78] to mismeasurement of the growth impact of ICT.[79] Unfortunately, despite pointing to a positive contribution to growth from ICT in the EU, the industry level analysis still confirms the conclusion from the economy-wide analysis in Section 2, namely that the EU as a whole has experienced a significant decline in its trend productivity growth rate over the second half of the 1990s. The positive contribution of ICT to EU productivity growth over this period in time, both in terms of capital deepening and TFP growth, was firstly on a lower scale than that experienced in the USA and secondly, all the EU gains on the ICT side were more than offset by a sharp deterioration in the performance of the non-ICT part of the EU economy, which it must be stressed still accounts for around 70 per cent of EU output. In contrast the non-ICT part of the US economy, whilst not showing the spectacular gains experienced on the ICT side, has nevertheless steadily improved its productivity performance over the second half of the 1990s.

The final section of the paper tries to draw some policy lessons from the aggregate and industry analyses. In particular it addresses two key questions, firstly, why the EU as a whole has not gained as much as the USA in terms of ICT; and secondly, why the non-ICT part of the US economy has been doing significantly better than the equivalent part of the EU economy in terms of both investment and innovation trends. The section tries to answer these questions by assessing the relative merits of the major hypotheses for explaining productivity growth over time[80] – i.e. the role played by the regulatory environment (product, labour and financial markets)[81]; by the degree of openness of economies[82]; by the efficiency of knowledge production (R&D and education)[83]; by the determinants of physical investment levels[84]; and finally by demographics.[85] An analytical framework is presented which combines standard growth regressions with recent developments in

[77] The data used in section 3 draws heavily on a study prepared for the Enterprise Directorate-General by M. O'Mahony and B. van Ark (2003): "EU Productivity and Competitiveness: An Industry Perspective - Can Europe Resume the Catching-up Process?".

[78] For example, Jorgenson (2003) asserts that ICT has made a much larger contribution to growth in the non-US G7 countries than that suggested by official statistics. In his recent paper, "Information Technology and the G7 economies", he compares the growth performances of the G7 economies, on the basis of an internationally comparable dataset (similar to the one used in section 3) which focusses on the impact of investment in IT equipment and software. See also the "Economist" article "Computing the gains", of 25 October 2003, which summarises the Jorgenson paper.

[79] Regarding price measurment issues for ICT goods, see Colecchia and Schreyer (2002), and Pilat and Lee (2001).

[80] See Barro (1990), Barro and Sala-i-Martin (1995), and Mendoza et al (1997).

[81] See Soskice (1997), Nickell et al. (1997), Eichengreen and Iversen (1999), Nickell and Layard (1999), Nicoletti et al (2001), Scarpetta and Tressel (2002), Scarpetta et al (2002), and IMF (2003).

[82] See Sachs and Warner (1997), Alesina et al (1997), Frankel and Romer (1999), and Ben-David and Kimhi (2000).

[83] See Lucas (1988), Romer (1990), Grossman and Helpman (1991), Coe and Helpman (1995), and Aghion and Howitt (1998).

[84] See Arrow (1962), Romer (1986), De Long and Summers (1991), Mankiw, Romer and Weil (1992), and Levine (1997).

[85] See EU Review (2002), and Jones (2002).

endogenous growth theory. An assessment is made using this framework of issues such as whether the second half of the 1990s was exceptional in terms of ICT technologies (with regard to both industry specialisation and the speed of diffusion) and whether the slowdown in EU productivity growth over this period simply reflected the temporary negative effects of a higher employment content of growth. In terms of future scenarios, a "Lisbon Strategy" simulation examines the impact on EU growth of implementing those policy reforms which have been established by the regression analysis (covering a total of 21 OECD countries) as being vital for sustaining labour productivity growth in the long run. In terms of policy conclusions, this last section stresses that international labour productivity differentials to a large extent reflect differences in the basic determinants affecting physical capital formation (especially the regulatory environment and the structure of financial markets) and the creation of knowledge (where R&D expenditures are closely linked with educational attainment levels, the openness of economies and market size considerations).

2. Growth accounting analysis at the aggregate economy level

The main objective of this section is to present the basic stylised facts concerning growth patterns in the EU and the USA over the last 40 years. In order to get a more complete understanding of the underlying factors driving the aggregate performance and to set the stage for the industry analysis in Section 3, the results of some basic growth accounting analyses are described.[86] At the outset it is important to distinguish between the different measures of growth performance which will be used. In addition to actual GDP, this section will make reference to two basic indicators of the relative performance of the different economies, namely GDP per capita (which simply adjusts for changes in population and represents the widest possible measure of a country's living standards) and GDP per hour worked (which adjusts the GDP per capita measure for changes in employment and hours worked and constitutes the primary indicator used in this study to compare the underlying productivity performance of the various countries).

GDP and GDP per Capita Trends 1960-2002

In terms of GDP and GDP per capita, Table 1 and Graph 1[87] provide an overview of the EU and US performances over the last four decades. At the outset, the EU enjoyed a period of strong convergence towards US standards of living, with an average annual growth rate of GDP per capita of 3 ¼ per cent in the 1960s and 1970s, which was ¾ of a percentage point higher than that of the USA. This performance formed part of a continuous post World War II process of EU income convergence, with GDP per capita levels rising from less than 50 per cent of the US level in the 1950s to over 70 per cent by the early 1980s. Over the subsequent period to 1995, the convergence process in effect stalled, with GDP per capita growth rates in the EU only managing to grow at rates similar to those of the USA, with both areas growing by about 2-2¼ per cent, on an annual average basis, in the 1980s and by 1-1¼ per cent in the first half of the 1990s. While a stalling of the process was an obvious concern to EU policy makers over this period, especially given the relatively low level at which the convergence process had halted, a more worrying trend emerged over the second half of the 1990s, with US living standards clearly moving onto a higher growth path relative to that of the EU, with the result that the convergence process went into reverse. This trend break which, on the basis of standard statistical techniques, can be traced to the year 1995, witnessed the USA growing at nearly ½ a percentage point higher, in GDP per capita terms, compared with the EU over the period 1996-2000, with Graph 1 also indicating that this trend break has largely persisted over the period 2000-02.

Table 1: Economic and demographics trends 1981-2000 (annual average % changes for the USA and EU15)

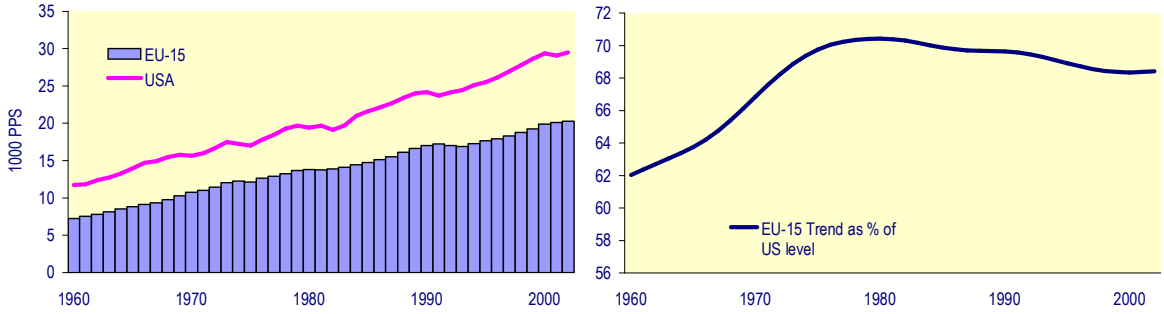
	EU15	USA
	1961-80	
GDP	3.9	3.7
Population	0.6	1.2
GDP per capita	3.3	2.5
	1981-90	
GDP	2.4	3.2
Population	0.3	1.0
GDP per capita	2.1	2.2
	1991-95	
GDP	1.6	2.4
Population	0.4	1.3
GDP per capita	1.2	1.1
	1996-2000	
GDP	2.7	4.1
Population	0.3	1.3
GDP per capita	2.4	2.8

Source: Commission services.

[86] See, in particular, Barro (1991); Sala-i-Martin (1997); Temple (1999); Durlauf and Quah (1999); and Levine and Renelt (1992).

[87] Given the problem of deciphering underlying patterns in the data series, the present paper makes recourse to trend series which have been calculated using a Hodrick Prescott statistical filter. These trend series are mainly used in the graphs, with the actual data series (normally period averages) being given in the Tables.

Graph 1 : GDP per capita : EU + USA (1960 - 2002)



Source: Commission services.

TABLE 2 : Decomposition of US and EU15 average GDP growth rates

	1966-70	1971-80	1981-90	1991-95	1996-2000	1996-2002
			USA			
GDP	**3.4**	**3.2**	**3.1**	**2.4**	**4.0**	**3.2**
Labour	**1.6**	**1.6**	**1.7**	**1.3**	**2.4**	**1.5**
(Hours Worked)	***(-0.8)***	***(-0.5)***	***(-0.1)***	***(0.2)***	***(0.4)***	***(0.2)***
(Employment)	***(2.4)***	***(2.1)***	***(1.8)***	***(1.1)***	***(2.0)***	***(1.3)***
Labour Productivity (Hourly)	**1.8**	**1.6**	**1.4**	**1.0**	**1.6**	**1.7**
(TFP)	***(1.2)***	***(1.1)***	***(1.1)***	***(0.8)***	***(1.2)***	***(1.1)***
(Capital Deepening)	***(0.6)***	***(0.5)***	***(0.3)***	***(0.2)***	***(0.4)***	***(0.6)***
			EU15			
GDP	**5.0**	**3.2**	**2.4**	**1.7**	**2.6**	**2.2**
Labour	**-0.7**	**-0.6**	**0.1**	**-0.7**	**1.1**	**0.9**
(Hours Worked)	***(-0.9)***	***(-0.9)***	***(-0.6)***	***(-0.5)***	***(-0.3)***	***(-0.3)***
(Employment)	***(0.2)***	***(0.3)***	***(0.7)***	***(-0.2)***	***(1.4)***	***(1.2)***
Labour Productivity (Hourly)	**5.6**	**3.8**	**2.2**	**2.4**	**1.6**	**1.4**
(TFP)	***(3.8)***	***(2.4)***	***(1.5)***	***(1.4)***	***(1.2)***	***(0.9)***
(Capital Deepening)	***(1.8)***	***(1.4)***	***(0.7)***	***(1.0)***	***(0.4)***	***(0.5)***

Source : All data are from AMECO / Eurostat, except for the hours worked series which are from the Groningen Growth and Development Centre (GGDC).

Standard Growth Accounting Analysis

Theories about what exactly determines economic growth at a high and sustainable rate have been discussed at length since the 1950s and are not exempted from controversy. However, in recent years, the neo-classical growth model, initially proposed by R. Solow (1956) has been increasingly used in "growth accounting" analyses which decompose real GDP growth into its main determinants. The objective is to try to measure the proportion of the overall growth rate of GDP which can be attributed to the accumulation of factors of production (i.e. to the growth of employment and fixed capital) and the part which can be attributed to independent technical progress or total factor productivity (i.e. the so-called *Solow growth residual*). Indeed, such a framework captures the essential characteristics of the USA, EU and individual EU Member States performances and is useful in pinpointing the broad sources of the recent changes in growth. In fact, as Graph 2 and Tables 2 and 3 show, the engines of growth have changed significantly in the course of the 1990s, with marked differences not only between the EU and the USA but also within the EU itself.

Decomposition of EU and US Growth Performances into the Contributions from Labour and Labour Productivity

While the post 1995 experience is the time period of most intense interest to policy makers, for a more complete understanding Table 2 and Graph 2 show data from the mid 1960s in order to put the most recent years into their proper historical context. What is striking from the data presented is the fact that the long established US and EU trends for both labour utilisation and labour productivity have each been altered dramatically over the second half of the 1990s.

- **Labour utilisation**

The second half of the 1990s has witnessed a reversal of the US trend of a strong contribution to growth from labour which has been a feature of the US performance since the 1960s. From a situation as recently as the mid 1990s when over 60 per cent of the US overall trend growth rate was emanating from labour, in 2002 only 1/3 was attributable to this factor of production. This however must be seen in the context of the recent period of "jobless growth" in the USA and with the fact that the US employment rate is at around 72 per cent compared with 64 per cent in the EU. For the EU the turnaround in its performance has been significant, with its origins around the start of the 1990s but with the trend accelerating strongly over the second half of the decade. In terms of trend growth, the EU is now in a situation where labour is contributing almost as much as in the USA which compares with the situation in the mid 1990s when labour's contribution to growth in the EU was only one-tenth of that of the USA.[88]

- **Labour productivity**

Unfortunately, for the EU the strong recovery which took place in terms of the utilisation of the factor of production labour was accompanied by a correspondingly negative trend which emerged for labour productivity. In addition, for the first time in decades the EU has now a rate of productivity growth which is lower than that of the USA. Whilst there has been a reversal in the extent of the employment content of US growth, nevertheless the USA is still in the relatively unique position internationally of being able to combine both a high employment rate and a strong productivity performance. In terms of employment creation, the USA has since the early 1970s consistently outperformed the EU, with the present employment rate 8 percentage points higher in the USA. Indeed until recently the EU was able to maintain its relatively high standards of living compared to the USA due to its superior productivity performance. If this productivity route to prosperity is now in doubt, the EU is facing a difficult future since the present recovery in labour utilisation rates is, by definition, a temporary phenomenon. Furthermore, looking towards the medium term, it is only a matter of a few years before the negative effects of ageing populations really start to impact on the potential growth rates of a large number of EU Member States.

Further breakdown of labour utilisation and labour productivity

An inverse relationship between the contributions to growth from labour utilisation and labour productivity has been very evident for the EU, and to a lesser extent the USA, over the second half of the 1990s. This suggests that a further breakdown of both growth components is needed in order to decipher the underlying determinants.

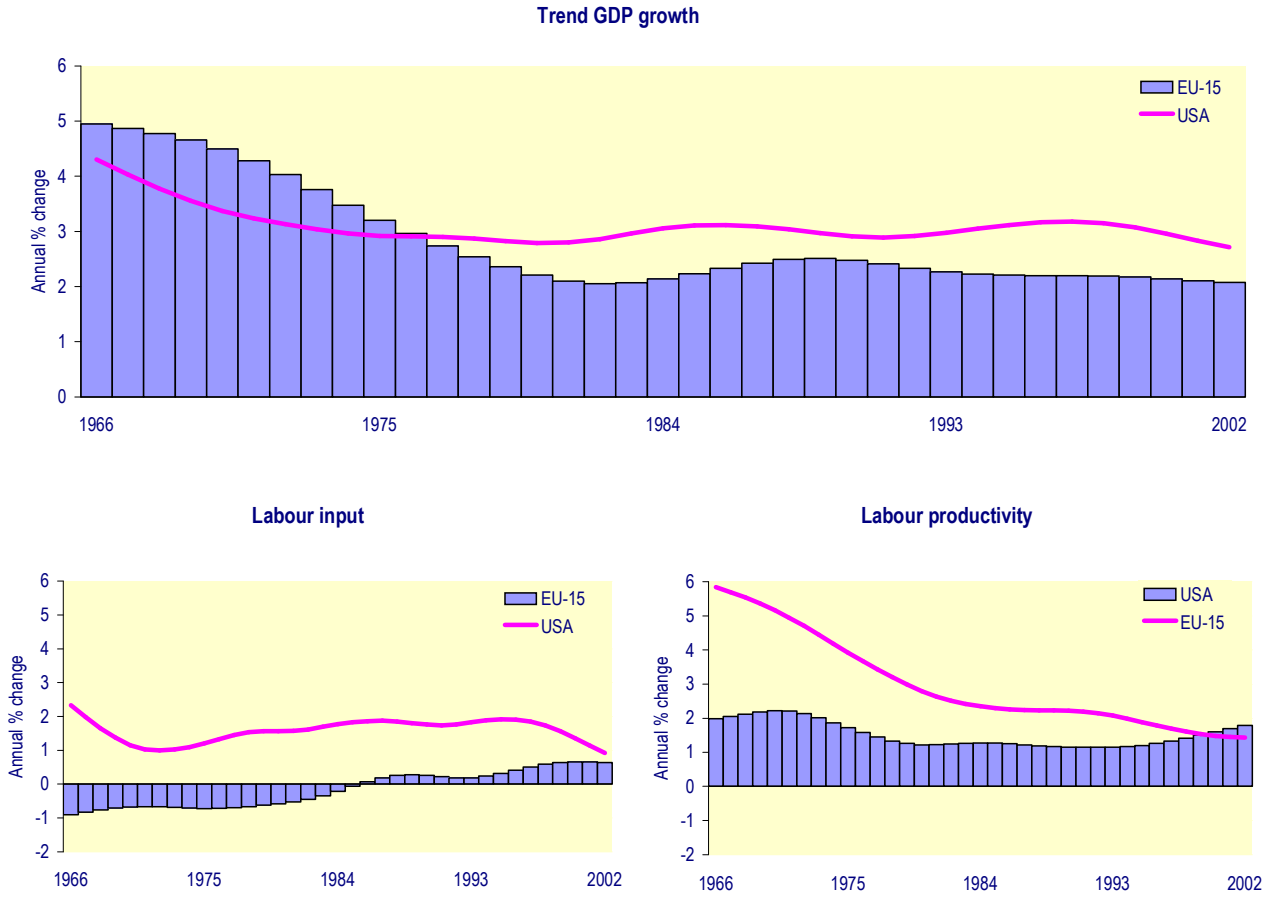
Labour utilisation decomposition into hours worked and employment

The breakdown of the individual roles played by hours worked and employment in determining the overall labour input trend is shown in Graph 3:

- For the EU, the marked upward trend in the overall contribution from labour is driven by employment growth rather than by an increase in hours worked. While the fall in average hours worked is now substantially less than in previous decades, nevertheless the average time spent at work continues to fall in the EU.
- The situation in the USA is very different to that in the EU, with the average hours worked per worker starting to rise in the late 1980s and with this trend persisting up until 2002. At the same time the US employment creation performance is on a downward trend, driven by the jobless growth pattern of recent years, with the EU now in the historically unusual position of having an employment growth rate which compares favourably with that of the USA.

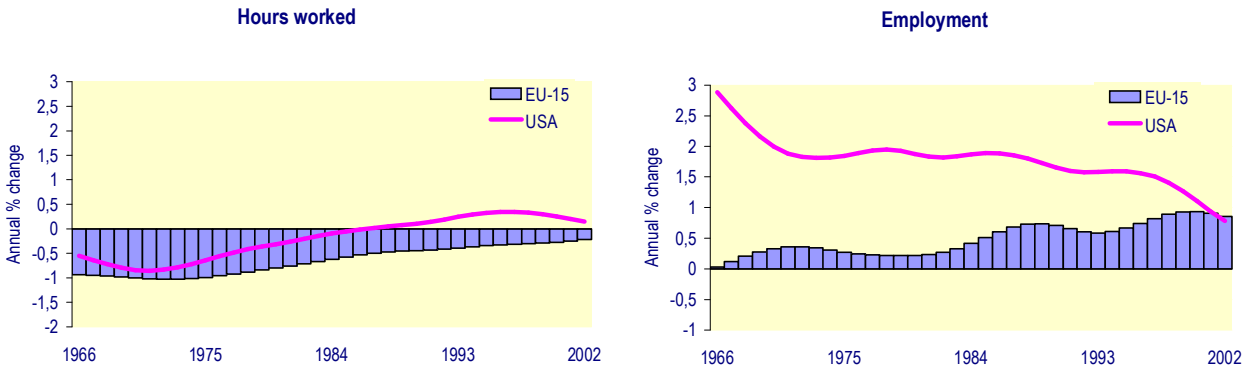
[88] Factor input proportions in the EU have altered in a labour-friendly way over recent years. This pattern reflects the effects of the real wage moderation which took place over the period as well as the support provided by some structural labour market reform efforts. Employment growth has also been accompanied by a marked decline in capital/labour substitution, which is suggestive that EU employment creation has been occurring in the relatively less capital intensive service industries (see Section 3).

Graph 2 : Trend growth and its labour and labour productivity components (1966-2002)



Source: Commission services and GGDC.

Graph 3 : Breakdown of trend labour input into hours worked and employment



Source: Commission services and GGDC.

Labour productivity decomposition into labour productivity decomposition into capital deepening and total factor productivity (TFP):

- **Capital deepening**: The growth process in industrialised countries is characterised by a process of continuous capital deepening, which is crucial for productivity and, consequently, income growth. In terms of capital deepening trends for the EU, following a long period stretching over 3 decades when the growth rate of the capital/labour ratio in the EU was at significantly higher levels than in the USA, a growing gap has emerged over the second half of the 1990s in favour of the USA (Graph 4).[89] While it can be questioned whether the US trend is a sustainable one given the "bubble-like" features evident over this period, what is more puzzling is the poor EU performance, with meagre/falling rates of investment despite rising profitability and declining costs of capital. The significant fall in EU capital deepening reflects not only a halt to unfavourable capital-for-labour substitution trends but also other, hopefully temporary, phenomena such as the negative effects emanating from the collapse in equity markets. While this latter, generally more sanguine, view of recent investment patterns will hopefully turn out to be the reality, other more worrying structural factors may also be at play, such as locational investment considerations[90] and adverse demographic trends.[91]

- **TFP**: Finally, and from an EU perspective potentially the most concerning aspect of the analysis so far, is the evolution of the TFP trend. For the first time in a generation the USA has a trend rate of TFP growth which is higher than that of the EU (Graph 4). This significant turning point results from a combination of a sharp downturn in the EU trend and an acceleration for the USA. Given the crucial importance of the evolution of TFP to long-run growth perspectives, this recent reversal in TFP fortunes for the EU bodes ominously for its future prosperity.

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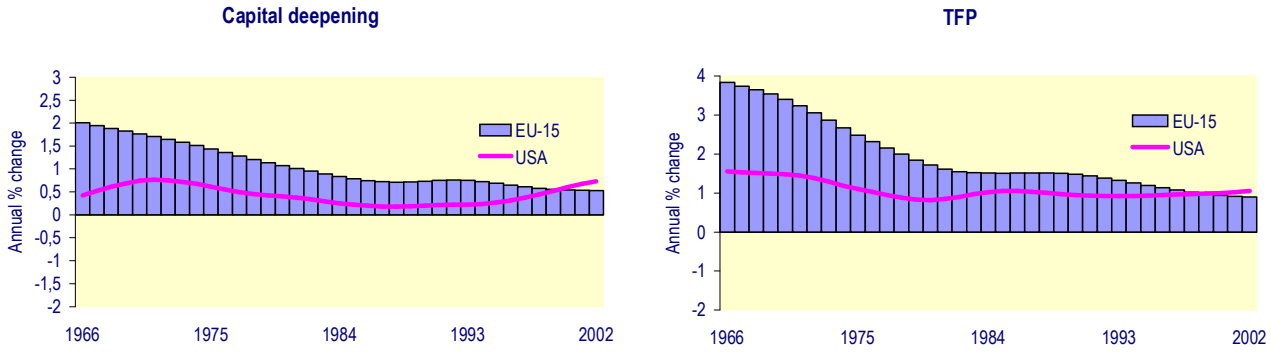
[89] The smaller capital-deepening component in EU labour productivity growth over the period 1996-2002 partly reflects the reversal of the unfavourable capital-for-labour substitution of earlier periods. In addition, a slowdown in the rate of capital substitution at a macroeconomic level does not of course automatically imply that firms are switching to more labour intensive forms of production. In fact in the case of the EU, the slower increase in capital/labour substitution to a large extent reflects an increase in employment in those industries which are more employment intensive, such as certain service industries. These employment increases in the generally non-capital intensive, more traditional, service industries can also explain a proportion of the apparent fall in EU labour productivity over the same period since these service industries have in the past been characterised by comparatively low productivity growth rates. However, while such employment patterns may be temporarily negative for productivity growth, they are nevertheless positive for GDP per capita.

[90] Various factors influence the investment to GDP ratio, with current and expected profitability and capital costs being the major driving forces. These factors are themselves determined by demand conditions, the availability of (skilled) workers, tax levels, expected rates of innovation etc. With improved international communications and reductions in transport costs, international locational choices for investors have increased and investment is undertaken in those regions which offer the most favourable (expected) ratio between capital productivity and capital cost. The US investment boom in the 1990's offers a good example of how investment opportunities in one country can attract substantial foreign direct investment. Falling ICT investment prices and high rates of innovation, as expressed by accelerating productivity and TFP growth rates, created an exceptionally positive investment climate in the USA in the 1990's which in turn led to a strong increase in US investment. These international investment trends were unfortunately not without repercussions for domestic EU investment rates (see Section 3).

[91] Demographic trends in the EU are also likely to affect the investment rate negatively. With an increasing dependency ratio, it is likely that domestic investment as a share of GDP declines, or remains constant in a situation of falling interest rates. There are several reasons for this to occur. First of all, a declining population requires less net investment in order to keep the capital/labour ratio constant. Secondly, a declining domestic labour force reduces the return prospects from domestic investment as well as the risk associated with over-investment. In a world with free capital mobility this effect is likely to be even stronger since firms can avoid pressure on domestic returns by investing abroad. It is also interesting to note that the falling trend in the investment rate is likely to be accompanied by a secular decline in interest rates, with falling borrowing costs in this case reflecting the lower returns from capital investment (due to expected decreases in labour supply and domestic demand reductions) rather than acting as a stimulus to undertake additional investment.

Graph 4 : Breakdown of trend labour productivity into capital deepening and TFP



Source: Commission services and GGDC.

Intra-EU differences in overall growth performances

Table 3 shows the large differences in overall GDP growth performances amongst the EU's 15 Member States.

- There are 3 broad groups of countries which can be delineated in terms of their overall growth performance since the early 1990s. The first group, comprising two of the largest Member States, namely Germany and Italy, stand out for their persistently poor outturns relative to the EU average throughout the 1990s. They collectively represent around 40 per cent of total EU15 output, thus their performance constituted a significant drag on the aggregate EU position. A second group, made up of Belgium, Denmark, France, Austria and the UK, grew close to the EU average. The final group of mainly small countries (Greece, Spain, Ireland, the Netherlands, Portugal, Finland and Sweden), managed to grow at a significantly faster pace than the EU as a whole, especially over the second half of the 1990s. For example, for the period 1996-2002, this latter group of EU countries grew on average by 3½ per cent, compared with 3¼ for the USA and 2¼ for the EU15 as a whole.
- For Greece, Spain, Ireland and Portugal, the trends for the 1990s are in part influenced by an element of catching-up. Each of these 4 countries had standards of living in the early 1990s which were significantly below that of the EU as a whole, with Greece and Portugal at around 70 per cent of the EU average and with Spain and Ireland at close to 80 percent.
- While a large number of the EU countries shared in the general EU upturn in the contribution to growth from labour, there were notably poor performances from countries such as Belgium, Germany, Greece and Austria. With regard to the contribution from labour productivity, the differences across countries were quite marked. From a contribution to average growth of only 0.8/1.0 per cent in Italy/Spain respectively, at the other end of the spectrum labour productivity added nearly 5½ percentage points to the aggregate Irish performance. Despite the wide variation in performances, a large number of the smaller EU countries, namely Belgium, Greece, Ireland, Austria, Portugal, Finland and Sweden had labour productivity performances which were higher than both the EU and US averages.
- Finally, if one excludes the catching-up countries which were coming from relatively low starting positions in the early 1990s, the most striking labour productivity performances came from Belgium, Austria, Finland and Sweden. However, amongst the latter, it is important to distinguish those countries which were unable to combine high rates of both labour utilisation and labour productivity (namely Belgium and Austria) and those which could (namely Finland and to a lesser extent Sweden). In addition with regard to Greece, Ireland and Portugal, whilst Ireland performed spectacularly well in relation to both employment and productivity growth rates, Greece and Portugal were only average in terms of their labour utilisation rates.

Table 3: Decomposition of average GDP growth rates

		1981-90	1991-95	1996-2000	1996-2002
Belgium	GDP	2.0	1.6	2.7	2.1
	Labour input in hours	-0.5	-0.1	0.1	0.5
	Labour productivity per hour	2.5	1.7	2.6	1.6
Denmark	GDP	1.6	2.0	2.7	2.3
	Labour input in hours	-0.3	0.1	1.2	0.8
	Labour productivity per hour	1.8	1.9	1.4	1.6
Germany	GDP	2.3	1.6	1.8	1.4
	Labour input in hours	0.4	0.9	0.0	-0.2
	Labour productivity per hour	1.9	0.7	1.8	1.6
Greece	GDP	0.7	1.2	3.4	3.5
	Labour input in hours	0.6	0.7	0.6	0.4
	Labour productivity per hour	0.1	0.6	2.8	3.1
Spain	GDP	2.9	1.5	3.8	3.3
	Labour input in hours	0.1	-0.4	2.9	2.6
	Labour productivity per hour	2.8	1.9	0.8	0.8
France	GDP	2.4	1.1	2.6	2.4
	Labour input in hours	-0.6	-0.4	1.2	0.9
	Labour productivity per hour	3.0	1.5	1.4	1.5
Ireland	GDP	3.5	4.6	9.3	8.3
	Labour input in hours	-0.7	1.0	3.9	3.2
	Labour productivity per hour	4.2	3.6	5.4	5.1
Italy	GDP	2.2	1.3	1.9	1.7
	Labour input in hours	0.3	-1.0	0.9	1.0
	Labour productivity per hour	2.0	2.3	1.0	0.7
Netherlands	GDP	2.2	2.1	3.6	2.8
	Labour input in hours	0.0	0.6	2.4	1.8
	Labour productivity per hour	2.2	1.5	1.2	1.0
Austria	GDP	2.4	2.0	2.7	2.2
	Labour input in hours	-0.2	-1.3	0.1	0.1
	Labour productivity per hour	2.6	3.4	2.7	2.1
Portugal	GDP	3.2	1.7	3.8	3.0
	Labour input in hours	-0.1	-1.2	0.7	0.7
	Labour productivity per hour	3.3	2.9	3.1	2.3
Finland	GDP	3.1	-0.6	4.7	3.7
	Labour input in hours	0.0	-3.6	1.7	1.1
	Labour productivity per hour	3.0	3.0	3.1	2.6
Sweden	GDP	2.2	1.3	3.2	2.7
	Labour input in hours	1.0	-1.3	0.9	0.6
	Labour productivity per hour	1.1	2.5	2.3	2.1
United	GDP	2.6	1.7	2.9	2.6
Kingdom	Labour input in hours	0.4	-1.4	1.2	1.0
	Labour productivity per hour	2.3	3.1	1.7	1.6

Source : AMECO, Groningen Growth and Development Centre (GGDC), OECD and ECFIN calculations.

Main points to be retained from Section 2

The EU15 as a whole and the USA have experienced significant breaks in the 1990s in terms of employment (measured in hours worked) and productivity. The EU has experienced sharp increases in the contribution of labour to growth and equally sharp reductions in the contribution from productivity, with the latter reflecting the dual impact of lower capital deepening and TFP growth. The opposite pattern emerged in the USA.

- In terms of labour input (i.e. employment * hours worked), following decades of negative contributions to growth, the 1990s, and especially the second half, has seen the EU display a strong recovery in its contribution from labour. At the same time, the opposite trend was emerging in the USA, although adequate account needs to be taken of the effect on these employment patterns of the downturn in US growth rates since 2000. Bearing in mind this latter qualification, the EU now has a labour contribution to growth which is very similar to that of the USA.
- In terms of productivity, again as with labour utilisation rates, the reversal of past trends in the 1990s in both the EU and the USA is remarkable. For example, for the first time in the post-World War II period, the EU is now on a trend productivity growth path which is lower than that of the USA. Since the mid-1990s, the EU has been incapable of arresting the long-run decline in its productivity performance whereas the USA has enjoyed a notable recovery in its secular trend, with productivity per hour growth rates in the USA starting to recover to the rates of growth last experienced in the 1960s. Thus the EU is facing a future of increasing divergence, as opposed to convergence, with respect to US living standards.
- At the individual EU Member State level, a much more nuanced picture emerges. In terms of labour productivity, 7 of the EU's smaller Member States had performances which were not only well above the EU average but were also higher than that of the USA. However, only 3 of the 7, namely Ireland, Finland and Sweden, were capable of combining both strong productivity growth and high labour utilisation rates.

Given the large divergences at both the EU/USA and the intra-EU levels, it is important to dig a little deeper to try to ascertain whether these divergences in labour productivity performances can be explained by firstly looking at differences in the industrial structure of economies (Section 3) or secondly, at a deeper level, by an analysis of the underlying determinants of productivity growth (Section 4).

3. Industry level analysis

The purpose of the present section is to look beneath the economy-wide trends to assess the broad structural changes which have occurred at the industry level in the EU and US economies over the period since 1980.[92] This analysis is needed to pinpoint the specific industries which are driving the EU-US productivity differentials. In particular the following key issues are addressed:

- Firstly, do divergences in labour productivity growth trends between the EU and the USA emanate from either structural employment shifts in the respective economies from low to high productivity industries or do they simply reflect higher productivity growth rates in specific industries (Section 3.1)?
- Secondly, are differences emanating from specific industries in the manufacturing or services sectors or are the EU-US productivity differentials more pervasive? In this regard, a key related question is whether the US economy is benefiting to a greater extent than the EU from the productivity gains associated with innovation in general and specifically from the adoption of IC technologies (Sections 3.2 and 3.3).

Industry Datasets

To address these issues this section draws on two separate, internationally comparable, DG Enterprise/GGDC[93] industry datasets which cover the period 1979-2001 and provide different levels of detail regarding the industrial structures of the EU and US economies:

- The "Industry Labour Productivity Database", which is used for the shift share analysis in Section 3.1 and for the wider analysis in Sub-section 3.2, includes a detailed breakdown of the total output of the USA and all of the EU's Member States at the greatest level of disaggregation which is presently possible i.e. a 56 industry decomposition. This dataset, which is an expanded version of the OECD's STructural ANalysis (STAN) database, contains a large number of variables for the 56 industries, including numbers employed and hours worked (which can both be combined to give overall labour utilisation rates) and most importantly, for the present study, labour productivity per hour figures.

[92] Anne 2 gives a short technical description of the basic methodologies applied in this section as well as providing information on other issues such as the handling of the data series used for the analysis.

[93] GGDC (Groningen Growth and Development Centre).

- The "Industry Growth Accounting Database", which is described in Section 3.3, and which permits a growth accounting analysis at the industry level similar to that given in Section 2 for the total economy. Due to space restrictions, Section 3.3 avoids any decomposition of labour utilization rates at the industry level into employment and hours worked and instead focuses solely on a decomposition of the hourly labour productivity trends described in Sub-section 3.2 into the contributions from capital deepening and TFP. In addition since the capital stock series at the industry level is further disaggregated into 6 different asset types, 3 of which are ICT-related assets, it is possible to calculate the contribution of the ICT and non-ICT parts of the EU and US economies to overall labour productivity growth. Due to data constraints, however, this second database is only available for the USA and 4 of the 15 EU Member States (i.e. France, Germany, the Netherlands and the UK). It also only disaggregates total output into 26 industries compared with the 56 industries in the "Industry Labour Productivity Database".

Both these datasets have a number of important advantages compared with the one used for the economy-wide analysis in Section 2. Firstly, using shift-share analysis and other techniques, these datasets can be used to give a highly disaggregated picture of industry trends. Secondly, they overcome one of the main criticisms levelled at carrying out international comparisons of productivity performances on the basis of official national accounts data, namely that, outside the USA and Canada, most other statistical offices underestimate the role played by IC technologies in recent output and productivity growth trends. Two issues in particular which may lead to an underestimation of the role played by IT are firstly, the fact that software is often excluded from investment expenditure in the national accounts (i.e. it is classified as a business expense in most EU countries and therefore excluded from final output) and secondly, the well documented problem of hedonic deflators. As stressed in the introduction, both these concerns have been addressed in the construction of the GGDC datasets, with US ICT industry deflators being applied to the equivalent industries in all countries and with ICT investment spending being defined in all countries as including software spending (software is in fact one of 3 ICT related assets, the others being computing and communications equipment).[94]

[94] This ICT investment breakdown applies only to the "Industry Growth Accounting Database".

3.1 Shift share analysis

Aggregate productivity is calculated as a weighted average of underlying industry productivity, with the weights being determined by each industry's share in overall employment.[95] Consequently, the change in an economy's productivity growth rate over a specific period of time is determined not only by the productivity growth rate of the individual industries but also by changes in the industry composition of employment. Aggregate changes in productivity are due to either the former, within-industry, effect or they reflect the latter phenomenon of structural shifts in resources between contracting / expanding industries. Shift-share analysis (see Annex 2 for a technical overview of this approach) is the most commonly used algebraic method for carrying out such a decomposition, with aggregate productivity growth capable of being broken down into the sum of the following 3 effects:

- *1. Intra-Industry Productivity Growth Effect:* equal to the sum of productivity growth in the individual industries in the absence of structural change (i.e. on the assumption that there are no changes in the employment shares of specific industries). This "growth" effect is the natural starting point for interpreting the shift-share decomposition since it provides the hourly labour productivity growth rate in a situation where the structure of the economy remains fixed. For example, if the "intra-industry growth" effect is smaller than aggregate productivity growth then the expectation would be that industries with higher productivity growth have increased their share in total employment.
- *2. "Structural" Change Effect*: equal to the contribution to overall productivity growth of a shift of employment resources from low to high productivity industries (i.e. the shift effect). When the structural change effect is both positive and increasing over time, this is indicative of a healthy process of restructuring occurring in an economy. Boosting overall growth in this manner is also suggestive that a favourable up-skilling process is occurring in terms of employment.

[95] The value added of all the different industries are aggregated using Törnqvist indices (based on average nominal value added shares) and, in combination with the employment levels (adjusted for hours worked), the hourly labour productivity estimates are calculated accordingly. For calculating the contribution of an individual industry to aggregate labour productivity growth, the share of the specific industry in total value added (in nominal terms) is used as weights (see Annex 2 for additional details).

- *3. Interaction Effect*: This is a residual term which captures the dynamic component of structural change.[96] It attempts to measure correlations in an economy between productivity and employment changes, with positive/negative efficiency gains interacting with the expansion/contraction[97] of specific industries. The interaction term is positive when the first two effects (i.e. the intra-industry plus the "structural" effects) are complementary (i.e. productivity growth is positive in expanding industries and negative in contracting industries). The interaction effect is, in turn, negative when the first two effects are substitutes (i.e. productivity growth is positive in contracting industries - a good example being the agriculture sector - and negative in expanding industries).

Based on this decomposition one can ask why the EU and the US economies differ in terms of their labour productivity growth rates, with a combination of three explanations being possible: firstly, differences in the average productivity growth rates of individual industries; secondly, differences in the reallocation of employment resources between industries; and finally, the initial starting conditions in both countries may not be uniform (i.e. a level effect which encapsulates the potential for catching-up).

The main points to be retained from the analysis are as follows (see Graphs 5a to 5c):

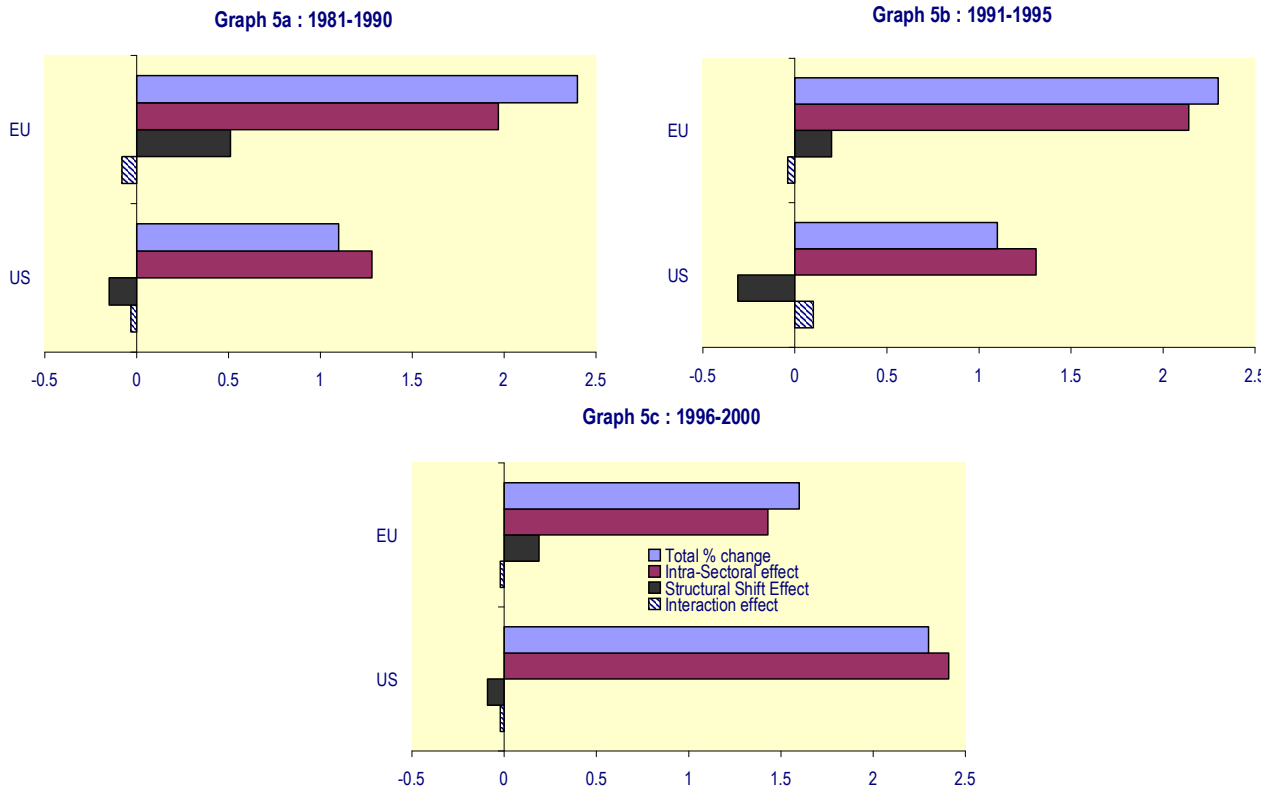
- Firstly, for all three periods the intra-industry growth effect dominates the outcome, accounting for between 80-95 per cent of aggregate productivity growth in the case of the EU and from 100-120 per cent of the change in the USA.[98]
- Secondly, the shift effect has been positive over the last 2 decades for the EU, compared with a consistent negative pattern for the USA. Thus the EU is still gaining from a shift of employment from low productivity industries such as agriculture to higher productivity jobs in manufacturing or services. For the USA, however, this process would appear to be completed with negative contributions from the shift term suggesting that workers are on average moving into lower productivity service industries. In overall terms, over the period 1980-2000, the EU has been able to use changes in the industry composition of employment as a mechanism for closing the productivity gap with the USA. However, the contribution from this "catching-up" mechanism has been declining over time, more than halving in fact between the 1980s and the 1990s, falling from a contribution of ½ a percentage point over the 1980-1990 period to less than a ¼ of a percentage point in the 1990s. In addition, the positive structural change effect was also offset by a small negative "interaction" effect on productivity. The EU is therefore becoming increasingly like the services-dominated US economy where employment shifts from manufacturing to service industries are often associated with declines in productivity growth. In these circumstances the only option for the EU, as has been the case for the USA over the last number of decades, is to generate productivity gains at the intra-industry level.
- Finally, the shift-share analysis for the USA suggests a surge of "pure" productivity gains from within the industries themselves, more than compensating for the negative effect from the reallocation of employment resources between industries. The extent of the surge is suggestive of the emergence of a new technological regime which is permeating a wide range of US industries and positively influencing their productivity performance. This new regime could, in part at least, be driven by the efficiencies being reaped from the use of ICT products and services and the wider changes associated with the diffusion and creation of ICT-specific knowledge. Isolating the wide-ranging contribution of IC technologies to aggregate productivity growth, in terms of both the production and use of ICT, is where we now focus our attention in Sub-sections 3.2 and 3.3.

[96] The sum of the structural change and interaction effects is sometimes used as a measure of the overall reallocation process in an economy. Nevertheless, this study takes the view that some additional insights can be derived from examining the shift and interaction effects separately. For example, some countries might be able to increase their employment share in fast growing productivity industries whilst in other countries fast productivity growth could be the result of low productivity firms exiting the market.

[97] Expanding or contracting in terms of employment or, in the case of the present analysis, employment as measured in terms of hours worked.

[98] Results from a similar analysis by the OECD (OECD 2003) for the non-farm business sector (i.e. the manufacturing plus private services sectors) confirms the importance of the intra-industry effect. For the services sector, while the net shift effect made an important contribution for a period of time in certain countries, due to the increased size of business services, this effect faded out in the 1980's. For the manufacturing sector, employment shifts across industries did not play a significant role in productivity trends (see also Van Ark (1996) and Employment in Europe (2003).

Graph 5 : Shift share analysis for EU + US : decomposition of hourly labour productivity growth rates (1981-2000)



Source: Commission services and GGDC.

3.2 Analysis of labour productivity trends at the industry level

The shift share analysis has established that most of the growth in labour productivity over the second half of the 1990s occurred within the industries themselves rather than due to a reallocation of resources between industries. Consequently, EU-US productivity growth differentials are overwhelmingly due to differences in the size of the productivity gains in individual EU and US industries. Using the "Industry Labour Productivity Database", this Sub-section firstly isolates the broad groups of industries (i.e. manufacturing and private services) which are driving the productivity differentials (Sub-section 3.2.1) and secondly assesses the specific role of ICT-producing and intensive ICT-using industries in determining overall productivity trends (Sub-section 3.2.2).

3.2.1 Overview of Labour Productivity Trends

Table 4 gives a quick overview of the industrial structure of the EU and US economies on the basis of an aggregation of the 56 industries into the standard four categories of primary production, manufacturing, private services and government services. In terms of productivity levels, Table 4 underlines the extent of the deterioration experienced by the EU over the second half of the 1990s, with the USA pulling ahead in virtually all areas of the economy. This compares with a situation in the early 1990s when the EU was making steady progress in all 4 categories in converging towards US productivity levels.

In terms of labour productivity growth rates, an aggregation of the 56 industries displays trends similar to those established in Section 2 on the basis of the economy-wide data, namely a sharp deterioration in EU labour productivity growth over the two halves of the 1990s and an acceleration for the USA. Consequently, while the use of hedonic deflators and equivalent definitions of what constitutes ICT investment expenditure did help, to a small extent, in reducing the pace of decline in EU labour productivity growth rates over the 1990s, these adjustments were insufficient to change the overall pattern. Graph 6 confirms the US dominance in productivity terms over the period 1996-2000, with the USA doing better in terms of manufacturing and private service industries and with the EU only ahead in the "rest of the economy" category (which includes primary industries and public services). When one looks in more detail at the trends for the manufacturing and private services industries (see Graph 7), one sees the extent of the transformation in relative performances, with the USA powering ahead

TABLE 4 : Overview of the sectoral composition + productivity levels of the EU and US economies (1981-2000)

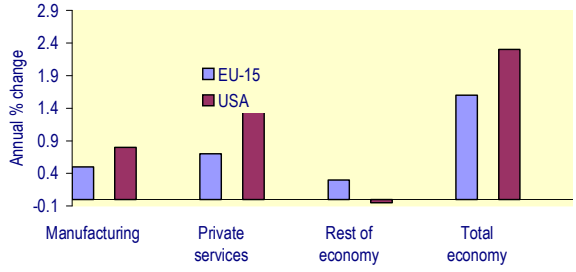
	Share of Total Output (Nominal)		Share of Total Employment (Adjusted for Hours Worked)		EU Productivity Level (US=100)
	EU	USA	EU	USA	EU
	Primary industries				
1981-90	.05	.05	.10	.04	47.8*
1991-95	.04	.03	.07	.04	63.8* *
1996-2000	.03	.03	.06	.03	58.1* **
	Manufacturing				
1981-90	.24	.20	.24	.19	78.9
1991-95	.21	.18	.21	.17	81.4
1996-2000	.20	.17	.19	.15	73.5
	Private services				
1981-90	.50	.52	.42	.49	82.9
1991-95	.53	.54	.45	.50	98.4
1996-2000	.55	.57	.47	.53	91.9
	Public services				
1981-90	.21	.23	.24	.28	72.4
1991-95	.22	.25	.27	.29	83.8
1996-2000	.22	.23	.28	.29	89.3
	Total economy				
1996-2000	**1**	**1**	**1**	**1**	**86.4**

*=1980 **=1995 ***=2000

Source : European Commission, DG Enterprise / Groningen Growth and Development Centre (GGDC), ECFIN calculations

over the 1990s as a whole in both areas, compared with persistent downward trends for the EU in both industry categories.[99]

Graph 6 : Contribution to total economy labour productivity growth from manufacturing, private services and the rest of the economy



Source: Commission services and GGDC.

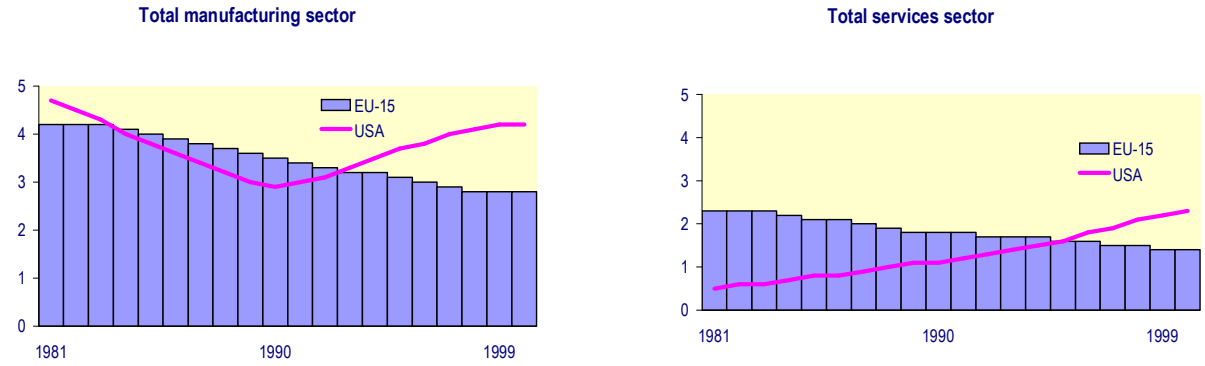
[99] Graph 7 also shows that average trend productivity growth in the manufacturing sector has always been higher than that of services in both the EU and the USA. While this is still the case, the recent surge in productivity growth in US service industries is suggestive that the latter industries could challenge manufacturing in the not too distant future. (For a further discussion on these issues, see Bernard and Jones (1996) and Triplett and Bosworth (2002)). If this were to occur it would have enormous implications for the overall growth performance of the US economy since the private services sector is over 3 times larger than that of manufacturing in terms of both output and employment shares. In addition, at least up until the mid-1990's, the manufacturing sector accounted for between 60-75 per cent of total US productivity growth despite representing only 15-20 per cent of total employment. Finally, Graph 7 shows that the EU has experienced a marked downward trend in productivity growth in both its manufacturing and service industries over both decades. The USA in contrast is characterised, in manufacturing, by a declining trend only up until the end of the 1980's followed by a strong recovery in the 1990's. For services the USA has been on a steady upward trend since the early 1980's and has now opened up a marked advantage over the EU in such industries, with US private services productivity growing from a pace of less than 1 percentage point, on an annual average basis, in the early 1980's to well over 2 per cent in the second half of the 1990's.

TABLE 5 : Overview of ICT-related industries 1996-2000					
	Share of Total Output (nominal)		Share of Total Employment (Adjusted for Hours Worked)		EU Productivity Level (US=100)*
	EU	USA	EU	USA	EU
1.Primary Industries (Less-ICT Intensive)	**.03**	**.03**	**.06**	**.03**	**58.1**
2.Total Manufacturing	**.20**	**.17**	**.19**	**.15**	**73.5**
(ICT-Producing)	***(.01)***	***(.02)***	***(.01)***	***(.02)***	***(46.3)***
(Intensive ICT-Using)	***(.06)***	***(.05)***	***(.07)***	***(.05)***	***(95.8)***
(Less-ICT Intensive)	***(.12)***	***(.10)***	***(.12)***	***(.08)***	***(82.7)***
3.Total Private Services	**.55**	**.57**	**.47**	**.53**	**91.9**
(ICT-Producing)	***(.04)***	***(.04)***	***(.03)***	***(.03)***	***(116.1)***
(Intensive ICT-Using)	***(.21)***	***(.26)***	***(.20)***	***(.25)***	***(79.7)***
(Less-ICT Intensive)	***(.30)***	***(.27)***	***(.24)***	***(.25)***	***(101.5)***
4.Public Services (Less-ICT Intensive)	**.22**	**.23**	**.28**	**.29**	**89.3**
Total Economy	**1**	**1**	**1**	**1**	**86.4**

*=2000

Source : European Commission, DG Enterprise / Groningen Growth and Development Centre (GGDC), ECFIN calculations.

Graph 7 : Trend labour productivity growth rates for the manufacturing and private services sectors : EU versus USA (1981-2000) (annual % change)



Source: Commission services and GGDC.

3.2.2 Specific Role of ICT-producing and ICT-Using Industries in Determining Overall Labour Productivity Trends

While Sub-section 3.2.1 has displayed the broad overall trends for labour productivity at the industry level, it is necessary to dig a little deeper to see the important role which IC technologies are playing in the substantial transformation of industrial structures in the EU and US economies. Building on the 4-way breakdown of industries given earlier in Table 4, and in order to isolate the increasing role being played by ICT in the respective economies, these 4 categories are further sub-divided in Table 5 on the basis of the ICT content of the different industries. The complete breakdown of the ICT intensity of all 56 industries into ICT-producing, intensive ICT-using and less intensive ICT-using industries is provided in Table 6.[100] This three-way ICT breakdown can also be used as a rough proxy for high, medium and low productivity industries in the EU and USA as a whole.

[100] This three-way categorisation of the 56 industries is based on the University of Groningen's Growth and Development Centre's ICT intensity breakdown for these industries - see also OECD (2000) "Measuring the ICT Sector"; and Sutton (2000).

Table 6 : ICT breakdown of all industries (ISIC REV 3)[1]

1. PRIMARY PRODUCTION (LESS INTENSIVE ICT USING INDUSTRIES)	2. NON-FARM BUSINESS SECTOR						3. GOVERNMENT SERVICES (LESS INTENSIVE ICT-USING INDUSTRIES)
	2A : MANUFACTURING			2B : SERVICES			
	ICT-PRODUCING MANUFACTURING	INTENSIVE ICT-USING MANUFACTURING	REST OF MANUFACTURING (LESS INTENSIVE ICT-USING INDUSTRIES)	ICT-PRODUCING SERVICES	INTENSIVE ICT-USING SERVICES	REST OF SERVICES /OTHER INDUSTRIES (LESS INTENSIVE ICT-USING INDUSTRIES)	
AGRICULTURE (01)	OFFICE AND COMPUTING EQUIPMENT (30)	CLOTHING (18)	FOOD, DRINK AND TOBACCO (15-16)	POST AND TELECOMMUNICATIONS (64)	WHOLESALE TRADE (51)	REPAIRS (50)	PUBLIC ADMINSTRATION AND DEFENCE (75)
FORESTRY (02)	INSULATED WIRE AND CABLES (313)	PRINTING AND PUBLISHING (22)	TEXTILES (17)	COMPUTER AND RELATED SERVICES (72)	RETAIL TRADE (52)	HOTELS AND RESTAURANTS (55)	EDUCATION (80)
FISHING (05)	SEMICONDUCTORS AND OTHER ELECTRONIC COMPONENTS (321)	MACHINERY AND EQUIPMENT (29)	LEATHER AND FOOTWEAR (19)		FINANCIAL INTERMEDIATION (65)	INLAND TRANSPORT (60)	HEALTH AND SOCIAL WORK (85)
MINING (10-14)	COMMUNICATION AND BROADCASTING EQUIPMENT (322)	OTHER ELECTRICAL MACHINERY (31 EX. 313)	WOOD PRODUCTS (20)		INSURANCE AND PENSION FUNDING (66)	WATER TRANSPORT (61)	OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES (90-93)
	RADIO AND TV RECEIVERS (323)	OTHER INSTRUMENTS (33 EX. 331)	PULP AND PAPER PRODUCTS (21)		ACTIVITIES AUXILIARY TO FINANCIAL INTERMEDIATION (67)	AIR TRANSPORT (62)	PRIVATE HOUSEHOLDS WITH EMPLOYED PERSONS (95)
	SCIENTIFIC INSTRUMENTS (331)	BUILDING AND REPAIRING OF SHIPS AND BOATS (351)	OIL REFINING AND NUCLEAR FUEL (23)		RENTING OF MACHINERY AND EQUIPMENT (71)	AUXILIARY TRANSPORT ACTIVITIES (63)	
		AIRCRAFT AND SPACECRAFT (353)	CHEMICALS (24)		RESEARCH AND DEVELOPMENT (73)	REAL ESTATE ACTIVITIES (70)	
		RAILROAD AND TRANSPORT EQUIPMENT (352+359)	RUBBER AND PLASTICS (25)		PROFESSIONAL BUSINESS SERVICES (741-743)	OTHER BUSINESS SERVICES (749)	
		MISC. MANUFACTURING (36-37)	NON-METALLIC MINERAL PRODUCTS (26)			ELECTRICITY, GAS AND WATER SUPPLY (40-41)	
			BASIC METALS (27)			CONSTRUCTION (45)	
			FABRICATED METAL PRODUCTS (28)				
			MOTOR VEHICLES (34)				

[1] ISIC rev 3 codes in brackets.

Source : Groningen Growth and Development Centre (GGDC).

Are the ICT-Producing manufacturing or the intensive ICT-Using service industries driving the EU-US productivity differentials?

Table 7 gives an overview of the total economy, broken down into the same 3 categories which were used for Graph 6, namely manufacturing, private services (both of which when combined form the non-farm business sector) and the "rest of the economy". These 3 groups of industries are in turn broken down into ICT-producing, intensive-ICT-using and less-intensive ICT-using industries. This latter 3-way breakdown is not however applied to the "rest of the economy" grouping since the 9 industries which are included in this category (i.e. primary industries and government services) are all classified as less intensive ICT-using industries.

In order to assess the relative importance of the different groups of industries to overall productivity growth, Table 7 gives firstly the productivity growth rates of each group, and secondly (using their respective nominal shares in total economy output as weights) their contribution to economy-wide labour productivity growth. As can be seen from the Table (which confirms the story given in Graphs 6 and 7), the non-farm business sector is where the divergences in EU-US productivity growth rates are emanating from. In fact, in terms of overall contributions to productivity growth, the non-farm business sector can explain virtually all of the change in aggregate productivity trends over the two halves of the 1990s for both the EU and the USA.[101]

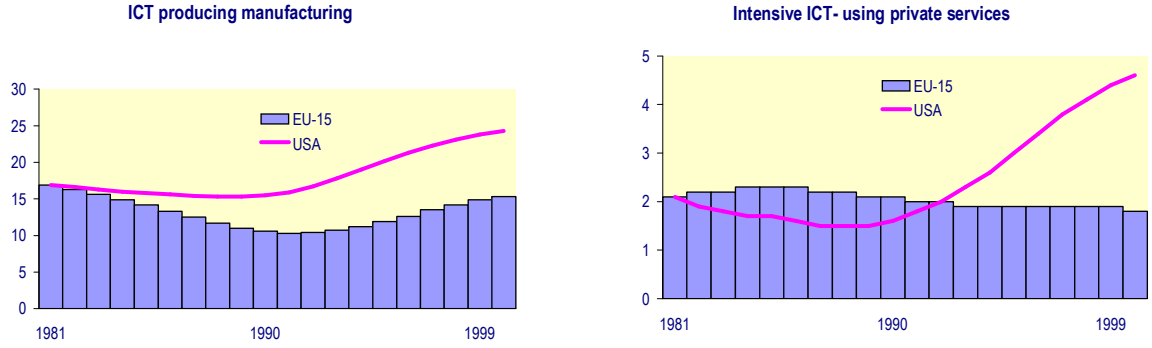
The key results from Table 7 are as follows:

- Firstly, at an overall level, despite having productivity growth rates which were often 3 to 4 times higher than that of services, the manufacturing sector, due to its smaller share in overall GDP, had a contribution to aggregate productivity growth in both the EU and the USA which was often only about the same as that of services. In addition, over the most recent 1996-2000 period, it is services which is by far the biggest contributor to total labour productivity growth, especially in the USA.

- Secondly, looking at the ICT based breakdown for manufacturing, the highest productivity growth rates have been achieved in the ICT-producing industries, reaching over 25 per cent in the USA and 17 per cent in the EU, on an annual average basis, over the second half of the 1990s (Graph 8). While these industries only account for between 1-2 per cent of EU and US GDP respectively, by virtue of their exceptionally high growth rates, they contributed 13 per cent (EU) and 30 per cent (USA) to overall productivity growth over the 1996-2000 period. For the intensive ICT-using and non-ICT (i.e. less ICT-intensive) manufacturing industries, which combined represent by far the largest share of the overall manufacturing sector, the EU has consistently outperformed the USA over the last 2 decades.

[101] This in fact is what one would have expected since the non-farm business sector accounts for roughly 75 per cent of total output in the EU and the USA.

Graph 8 : Trend labour productivity per hour in ICT-producing manufacturing and intensive ICT-using private services (annual % change)



Note : Scales are different for the ICT-producing manufacturing and ICT-using services graphs
Source: Commission services and GGDC.

TABLE 7 : Breakdown of total economy into 3 categories – 2 ICT categories (ICT producing + Intensive ICT-Using) AND 1 Non-ICT (other industries)

	Average % change in labour productivity per hour			Contribution to total change in labour productivity per hour (%)[2]		
	1981-90	1991-95	1996-2000	1981-90	1991-95	1996-2000
	Total economy (1 + 2 + 3)					
EU	**2.4**	**2.3**	**1.6**	**2.4**	**2.3**	**1.6**
USA	**1.1**	**1.1**	**2.3**	**1.1**	**1.1**	**2.3**
	1 + 2 Total non-farm business sector [1]					
EU	**2.7**	**2.5**	**1.7**	**2.0**	**1.8**	**1.3**
USA	**1.6**	**1.7**	**3.1**	**1.1**	**1.2**	**2.3**
	1. Manufacturing sector					
EU	**3.9**	**3.7**	**2.6**	**1.0**	**0.9**	**0.5**
USA	**3.6**	**3.6**	**4.6**	**0.8**	**0.7**	**0.8**
	1(a) ICT-Producing manufacturing industries					
EU	13.9	9.6	17.1	0.2	0.2	0.2
USA	16.2	16.4	26.0	0.4	0.4	0.7
	1(b) Intensive ICT-using manufacturing industries					
EU	2.8	2.6	2.0	0.2	0.2	0.1
USA	0.8	-0.6	1.4	0.1	0.0	0.1
	1(c) Rest of manufacturing (Less-intensive ICT using)					
EU	3.2	3.6	1.6	0.5	0.5	0.2
USA	2.4	2.6	0.6	0.3	0.3	0.1
	2. Private services sector					
EU	**2.0**	**1.9**	**1.4**	**1.0**	**1.0**	**0.7**
USA	**0.8**	**1.0**	**2.7**	**0.4**	**0.5**	**1.5**
	2(a) ICT-Producing service industries					
EU	4.1	4.8	6.8	0.1	0.2	0.2
USA	2.1	2.4	0.8	0.1	0.1	0.0
	2(b) Intensive ICT-Using service industries					
EU	2.2	1.8	2.1	0.4	0.4	0.4
USA	1.6	1.6	5.3	0.3	0.4	1.3
	2(c) Rest of services (Less-intensive ICT using)					
EU	1.7	1.7	0.2	0.5	0.5	0.1
USA	-0.2	0.2	0.3	0.0	0.1	0.1
	3. Rest of economy (primary industries + public services) (Less intensive ICT-using)					
EU	**1.6**	**2.0**	**1.1**	**0.4**	**0.5**	**0.3**
USA	**0.2**	**-0.3**	**-0.1**	**0.0**	**-0.1**	**0.0**

[1] Total economy excluding agriculture and government services.

[2] In terms of contributions to the change in labour productivity, the aggregate figures given in the table include the sum of the intra-industry, shift and interaction effects. However, since it is not possible to allocate the structural shift and interaction effects to specific manufacturing and service industries, the sum of the labour productivity contributions from these industries may not therefore equal the total change in labour productivity per hour at the aggregate industry level. The size of the residuals are however very small (in all cases not more than 0.1) since the intra-industry effect accounts for the bulk of the overall change in hourly labour productivity in both the USA and the EU as a whole. As shown in Table 9b, however, this conclusion does not apply to all of the individual EU Member States where these residuals (i.e. the combined effect of the shift and interaction terms) are somewhat larger and consequently Table 9b includes a correction for these effects.

Source : Commission services and GGDC.

- In addition, despite having productivity growth rates which were much lower than those of the ICT-producing industries, nevertheless given their higher share in EU GDP, these industries made, until recently, a higher contribution to overall productivity growth in the EU. For the USA, the ICT-producing industries have consistently outperformed the rest of US manufacturing over the period as a whole.

- Thirdly, in terms of private services industries, which account for 55 and 57 per cent of overall EU and US output respectively, the EU has consistently outperformed the USA in terms of ICT-producing services (i.e. mainly telecommunications), and indeed up until the mid 1990s in all areas of services. However, over the second half of the 1990s, the USA has pulled significantly ahead in ICT-using private services industries (see Graph 8). In terms of contributions to total productivity growth, since ICT-using services industries are substantially larger in terms of GDP than the ICT-producing services sector, they are crucial in determining the growth rate for services as a whole, especially in the USA. As Table 7 shows, ICT-using services contributed well over half of all US productivity growth in the second half of the 1990s. For the non-ICT (i.e. the less intensive-ICT-using) service industries, which collectively form the largest share of total services, the EU had been consistently outperforming the USA up until the most recent period.

- Finally, as Table 8 shows, within the ICT-producing and ICT-using categories, the 5 most important individual industries, in terms of contributions to economy-wide productivity growth, are semiconductors and other electronic equipment; telecommunications; wholesale trade; retail trade; and financial services. In 4 of these 5 industries (telecommunications is the exception), the EU has to radically improve its performance over the coming years in order to match the US position, with the 5 specific industries shown in Table 8 contributing 80 per cent of the US total productivity growth rate over the 1996-2000 period, compared with only 40 per cent in the case of the EU.

In overall terms, therefore, the story which has emerged from Table 7 and Graph 8 is one in which the USA has pulled ahead of the EU over recent years in terms of productivity growth rates. This is essentially due to the US superior performance in a wide range of ICT-producing and ICT-using industries. This conclusion applies to both the manufacturing and services sectors as a whole. In manufacturing, while EU productivity growth rates in ICT-producing industries are not dramatically different from those in the USA, unfortunately the size of the EU ICT-producing sector is much smaller than the equivalent sector in the USA, and the contribution to overall productivity growth is correspondingly smaller. With regard to services, which is the main source of the US productivity advantage over the EU, the USA appears to have benefited enormously from substantial investments in the intensive ICT-using service industries such as wholesale and retail trade and financial services. Finally, regarding the non-ICT part of the respective economies, the slowdown in the EU's productivity growth rate in both the "rest of manufacturing" and the "rest of services" categories is marked over the most recent period. These industries collectively still account for over 40 per cent of EU GDP. The USA has also experienced a slowdown in productivity growth in these, relatively less high-tech, manufacturing industries, whilst showing a marginal improvement in the "rest of services" category.

How do the individual Member States perform?

As with the aggregate analysis in Section 2, it is important to differentiate the overall EU performance from that of the individual Member States. As Table 9a shows, the deterioration in the EU's trend productivity growth rate is largely due to the performance of a number of the larger Member States, most notably Italy.

As with the analysis at the overall EU level, labour productivity trends in the individual Member States are determined largely by the non-farm business sector. Table 9b shows how the EU Member States have been performing over the second half of the 1990s, in terms of this crucial sector. Again, there is an extremely wide range of experiences, from zero productivity growth in the business sector in the case of Spain to over 8 per cent in the case of Ireland. Four EU countries, namely Greece, Ireland, Austria and Portugal, achieved business sector productivity growth rates which matched or even exceeded that of the USA over the second half of the 1990s. Within the total business sector of these countries, Austria and Portugal managed to achieve a reasonable balance between manufacturing and service industries. In Greece and Ireland, on the other hand, business sector productivity growth emanates predominantly from either manufacturing (Ireland) or private services (Greece).

TABLE 8 : Five most important industries from an EU + US Labour productivity perspective (1996-2000)[1]

	Labour productivity growth rate		Share of total Output		Contribution to total Labour productivity growth	
	EU	USA	EU	USA	EU	USA
	ICT-Producing Manufacturing Industries					
	1. Semiconductors and other Electronic Equipment					
1981-90	22.6	23.3	0.2	0.4	0.04	0.09
1991-95	35.6	38.2	0.1	0.6	0.05	0.22
1996-2000	57.3	52.9	0.2	0.9	0.10	0.46
	ICT-Producing Service Industries					
	2. Post and Telecommunications Services					
1981-90	5.0	1.0	2.1	2.8	0.10	0.03
1991-95	6.3	2.4	2.2	2.3	0.14	0.05
1996-2000	10.0	5.9	2.4	2.4	0.24	0.14
	ICT-Using Service Industries					
	3. Wholesale Trade					
1981-90	2.2	2.8	4.7	6.3	0.10	0.17
1991-95	3.3	2.9	4.9	5.5	0.16	0.16
1996-2000	2.0	8.3	5.0	5.6	0.10	0.47
	4. Retail Trade					
1981-90	2.0	3.1	4.7	6.9	0.10	0.21
1991-95	1.7	2.0	4.8	6.5	0.08	0.13
1996-2000	1.6	6.6	4.7	6.5	0.07	0.43
	5. Financial Services[2]					
1981-90	2.2	-0.7	4.7	4.7	0.11	-0.03
1991-95	0.8	1.7	5.5	5.9	0.05	0.10
1996-2000	2.9	5.0	5.4	7.1	0.16	0.35
	Total of above 5 Industries[3]					
1981-90	2.9	2.3	16.3	21.1	0.45 (19)	0.47 (43)
1991-95	2.7	3.2	17.5	20.8	0.48 (21)	0.66 (60)
1996-2000	3.7	8.3	17.6	22.4	0.67 (42)	1.85 (80)

[*] These are the five most important industries if one takes the average of the EU and US economies (note : the sixth most important industry is office machinery). There is a different ranking of course if one looks at the top 5 industries for the EU and the USA separately in terms of contributions to labour productivity growth. For the EU the 5 most important industries were telecommunications; financial services; electricity, gas and water supply; office machinery; and wholesale trade. Compared with the list shown in Table 8, it is interesting that the EU is producing strong productivity gains in recently liberalised industries such as the utilities. For the USA, the top 5 were semiconductors and other electronic equipment; wholesale trade; retail trade; financial services; and telecommunications.

[2] Financial services includes financial intermediation, insurance and pension funding and auxiliary financial services.

[3] Share of total labour productivity growth is given in brackets.

Source : European Commission, DG Enterprise / Groningen Growth and Development Centre (GGDC), ECFIN calculations.

Table 9a : Contributions to total EU-15 Labour productivity growth 1981-2000

	1981-90	1991-95	1996-2000
BE	0.09	0.07	0.07
DK	0.04	0.04	0.03
DE	0.54	0.59	0.56
EL	0.02	0.01	0.04
ES	0.21	0.13	0.03
FR	0.57	0.27	0.25
IE	0.03	0.03	0.06
IT	0.28	0.38	0.09
LU	0.01	0.00	0.00
NL	0.12	0.06	0.06
AT	0.06	0.09	0.08
PT	0.03	0.02	0.04
FI	0.04	0.06	0.03
SE	0.06	0.07	0.06
UK	0.32	0.45	0.29
EU-15	2.4	2.3	1.6

Source : Commission services & GGDC.

TABLE 9b : Hourly labour Productivity growth in the business sector - 1996-2000
(Contributions from manufacturing + private services)

	Total Business Sector[1]	Contribution from Manufacturing				Contribution from Private Services				Residual Term (Shift + interaction effects)[2]
		Total	ICT Producing	ICT Using	Rest	Total	ICT Producing	ICT Using	Rest	
BE	**2.8 (2.2)**	**1.1**	(0.1)	(0.3)	(0.8)	**1.6**	(0.4)	(0.2)	(1.1)	0.1
DK	**1.9 (1.4)**	**0.7**	(0.0)	(0.1)	(0.5)	**1.0**	(0.3)	(1.0)	(-0.4)	0.2
DE	**2.3 (2.0)**	**0.6**	(0.2)	(0.2)	(0.1)	**1.6**	(0.6)	(0.6)	(0.5)	0.1
EL	**3.1 (2.6)**	**0.4**	(0.0)	(0.2)	(0.2)	**2.4**	(0.3)	(0.9)	(1.2)	0.3
ES	**0.0 (0.5)**	**0.2**	(0.1)	(0.1)	(0.0)	**-0.2**	(0.1)	(0.1)	(-0.5)	0.0
FR	**1.3 (1.4)**	**0.8**	(0.2)	(0.2)	(0.4)	**0.5**	(0.3)	(0.3)	(-0.1)	0.0
IE	**8.4 (7.6)**	**7.3**	(3.4)	(1.4)	(2.4)	**1.8**	(0.2)	(0.7)	(0.8)	-0.7
IT	**0.6 (0.7)**	**0.3**	(0.1)	(0.1)	(0.1)	**0.1**	(0.2)	(0.4)	(-0.6)	0.2
LU	**1.6 (1.5)**	**0.4**	(0.0)	(-0.1)	(0.5)	**1.0**	(0.2)	(0.8)	(-0.1)	0.2
NL	**1.7 (1.3)**	**0.5**	(0.0)	(0.2)	(0.4)	**1.2**	(0.2)	(0.8)	(0.1)	0.0
AT	**3.1 (2.7)**	**1.3**	(0.2)	(0.3)	(0.8)	**1.8**	(0.1)	(0.8)	(0.9)	0.0
PT	**3.3 (3.0)**	**1.6**	(0.1)	(0.3)	(1.1)	**1.5**	(0.3)	(0.6)	(0.7)	0.2
FI	**2.1 (2.2)**	**1.5**	(0.4)	(0.2)	(0.5)	**0.7**	(0.3)	(0.7)	(-0.1)	-0.1
SE	**1.7 (2.1)**	**0.5**	(-0.2)	(0.1)	(0.6)	**1.2**	(0.2)	(0.8)	(0.1)	0.0
UK	**2.6 (2.2)**	**0.8**	(0.5)	(0.1)	(0.2)	**1.9**	(0.3)	(1.2)	(0.4)	-0.1
EU15	**1.7 (1.6)**	**0.7**	(0.3)	(0.2)	(0.3)	**1.0**	(0.3)	(0.6)	(0.1)	0.0
USA	**3.1 (2.3)**	**1.2**	(0.9)	(0.1)	(0.1)	**2.0**	(0.0)	(1.8)	(0.1)	-0.1

[1] **Hourly labour productivity growth rates in the total economy are given in brackets.**

[2] This residual term only applies to the totals for the manufacturing and services sectors and not the 3 sub-categories of each of the two groups (see note at bottom of Table 7 for additional information).

Source : European Commission, DG Enterprise / Groningen Growth and Development Centre (GGDC), ECFIN calculations.

3.3 What proportion of economy-wide labour productivity growth can be attributed to the effect of ICT (ICT investments and technical progress in ICT-producing industries)

Section 3.2 described the contribution of ICT-producing and ICT-using industries to overall labour productivity growth. Although this analysis suggests that the production and use of ICT technologies is playing an important role, it is not possible to infer how much of the productivity increases are directly linked to ICT investments in the economy and to innovation in ICT-producing industries. The present section, using the "Industry Growth Accounting Database" provides a quantification of the overall contribution of ICT to labour productivity trends via the investment and TFP transmission channels. This is done by calculating firstly, the contribution to capital deepening from investment in ICT and secondly by measuring the contribution to TFP growth from technical progress in ICT-producing industries in both the manufacturing and services sectors (see Annex 2 for details).

As explained at the start of Section 3, due to significant data constraints in terms of capital stock data for the respective industries, the EU average used for this exercise is made up of only 4 countries. These countries do, however, provide a reasonably representative picture for the EU as a whole since they include France, Germany, the Netherlands and the UK which collectively account for nearly 2/3 of EU GDP.

In order to reflect the respective contributions from the ICT and non-ICT parts of the economy to overall investment and TFP trends, Graphs 9 and 10 give a breakdown of labour productivity into the contributions from capital deepening and TFP. This decomposition shows:

- firstly, that whilst investment in ICT equipment contributed positively to labour productivity growth in the EU4 over the second half of the 1990s, the contribution was substantially less than that in the USA, and if anything the gap appears to be widening in favour of the USA.
- secondly, that non-ICT capital deepening has fallen significantly in the EU over the 1996-2000 period, with only part of the relatively poor investment performance due to the higher labour content of growth (with perhaps, as mentioned in Section 2, other factors such as locational investment considerations or adverse demographic trends playing a role). Over the same period the USA has experienced a small acceleration in its trend rate of non-ICT capital spending.
- thirdly, in terms of TFP, the contribution of technical progress in ICT-producing industries such as semiconductors and telecommunications equipment has been consistently higher in the USA since the early 1990s but the divergence with the EU is not as high compared with ICT investment spending due to the good performance of the EU in the telecommunications industry.
- finally, the contribution to TFP from the non-ICT-producing industries has shown a slight downward trend since the late 1980s in the EU, with the USA sharing this trend up until around the mid-1990s but with a clear upward pattern emerging over the last years of the 1990s.[102] This upward pattern may be suggestive of some positive growth spillovers from ICT investment, including both embodiment effects associated with a more modern capital stock and possible tangential gains in areas such as network externalities.[103]

In overall terms, from the ICT investment and TFP channels described above, it would appear that ICT was contributing roughly 60 per cent of US labour productivity growth at the end of the 1990s compared with around 40 per cent in the case of the EU-4.

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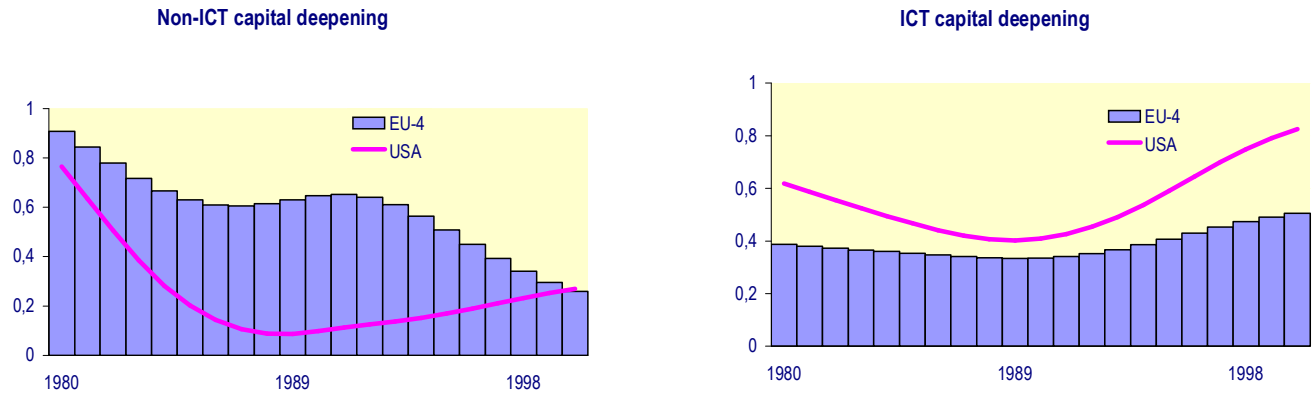
[102] Research by Baily and Lawrence (2001) and Oliner and Sichel (2002) would support this empirical finding.

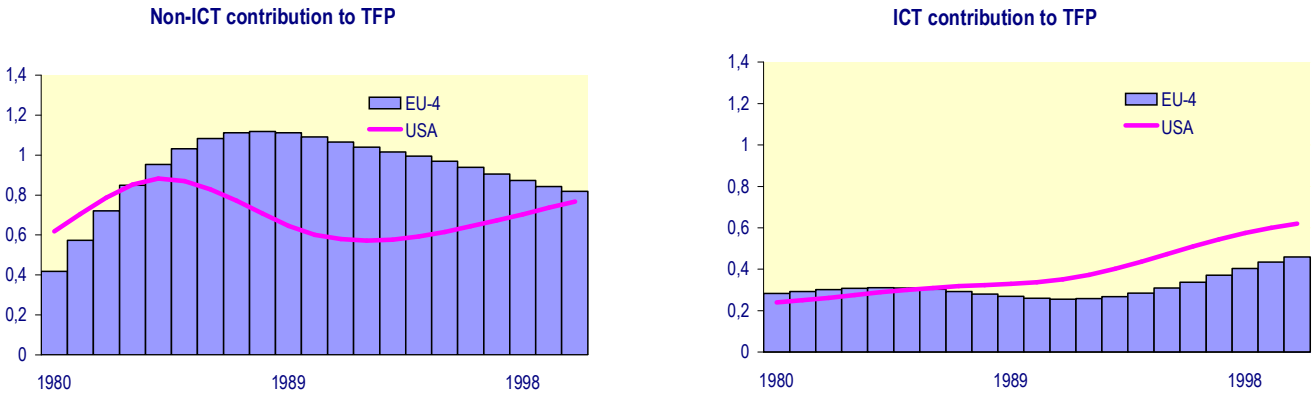
[103] In trying to assess spillover effects in ICT-using industries, researchers are confronted with 2 major difficulties, firstly measurement problems in a number of the intensive ICT-using industries, such as financial services; and secondly, identifying the long-run impact of innovative, ICT-based, businesses and markets, many of which are now only in the start-up phase of their operations. For a discussion of these issues see Coppel (2000); Fixler and Zieschang (1999); Gullickson and Harper (1999); and Moulton, Parker and Seskin (1999).

Graph 9 : Breakdown of trend capital deepening into ICT and non-ICT components



Source: Commission services and GGDC.

Graph 10 : Breakdown of trend TFP into ICT and non-ICT components



Source: Commission services and GGDC.

Main conclusions to be retained from Section 3

- Firstly, the industry analysis confirms the broad conclusion from the aggregate analysis in Section 2, namely that the USA has achieved a significant turnaround in its labour productivity performance over the second half of the 1990s whereas the EU's long-run trend of declining productivity growth has, if anything, accelerated over the same period.
- Secondly, the superior performance of the USA in ICT-producing manufacturing and ICT-using service industries is the source of the diverging productivity trends. While the ICT-producing manufacturing industries have been growing at a substantially faster pace than the associated ICT-using service industries, nevertheless it is the latter grouping which accounts for the largest part of the US upsurge in productivity. This higher contribution to growth from ICT-using service industries simply reflects their higher share in overall value added.
- The individual EU Member States show a high degree of dispersion in their respective performances, with four EU countries (Greece, Ireland, Austria and Portugal) all achieving labour productivity growth rates which matched or even exceeded those of the USA over the period 1996-2000.
- Finally, Section 3.3 concluded that the overall contribution to labour productivity growth from ICT investments and from technical progress in the production of ICT goods and services accounted for about 60 per cent of US labour productivity growth over the second half of the 1990s, compared with 40 per cent in the EU. If one was to apply these ratios to the aggregate labour productivity growth rates given in Section 2, this would translate over the second half of the 1990s into an ICT contribution to labour productivity growth of around 1 percentage point in the USA and 2/3 of a percentage point in the case of the EU.

4. Macro Determinants of Growth - An Analytical Framework

Following on from the aggregate and industry analyses in Sections 2 and 3, the present section builds on the insights gained so far in terms of explaining the relative growth performances of the EU and the US economies over the 1980s and the 1990s. While the highly industry-specific nature of the growth rate differentials in recent years cannot be disputed, it is nevertheless important to place these stylised facts into a more policy relevant context by examining the factors which have shaped the wider economic environment in both the EU and the USA over recent decades.

4.1 The basic productivity determinants

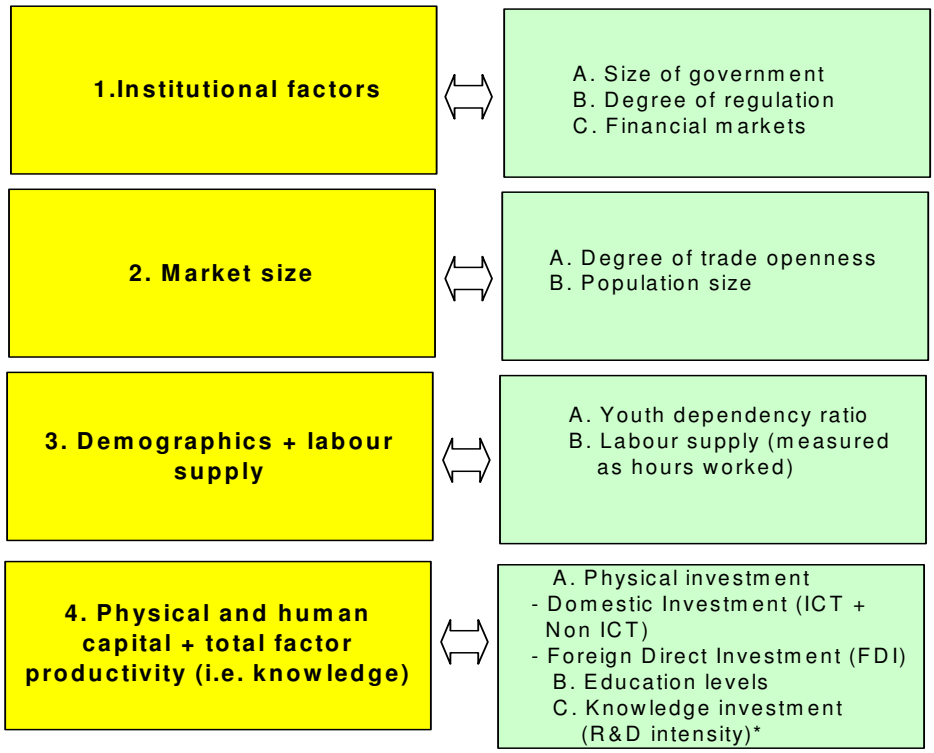
The achievement of a better understanding of the key determinants of productivity growth has been high on the research agenda of international organisations and the academic community for some decades now.[104] The present research represents an attempt to combine a detailed knowledge of these growth determinants (based on reviews of the literature and regression analysis) with the central policy concerns of European governments. It identifies five areas which are both quantitatively important for productivity and relevant in a European context i.e. the level of regulation; the structure of financial markets; the degree of product market integration; the size of knowledge investment; and the ageing of the labour force.

- *Level of Regulation*: In recent studies both the OECD (2003) and the IMF (2003) have stressed that levels of regulation are potentially crucial driving forces for efficiency gains. Given the EU's relatively weak performance on a range of different measures of regulation, the IMF study concluded that deregulating the EU economy to US levels could increase output by nearly 7 per cent and productivity by 3 per cent in the longer term (see Bayoumi et al. (2003)). The OECD study pointed to deleterious effects in terms of physical investment rates and to a particularly negative impact from regulation in a panel of OECD service industries.
- *Structure of Financial Markets*: In academic discussions a lot of attention has been given to the link between financial markets and growth (see, for example, Levine (1997)). Special emphasis is devoted to the question of the relative effectiveness of bank based or equity based financial systems. Could stockmarkets, for example, have special advantages in the commercial assessment of innovations or as vehicles for fostering international portfolio and direct investment? The question of financial market efficiency is also a central concern for the EU authorities, with the Financial Services Action Plan (FSAP) summarising a large set of policy initiatives aimed at improving the functioning of the EU's financial architecture.
- *Product Market Integration*: Related to the creation of the single market and EMU, the relationship between trade integration and productivity growth becomes relevant. Here again recent studies (see, for example Frankel and Rose (2000) and Alesina et al. (1998)) suggest significant gains from further integration. In this context, the initial benefits from increased trade openness amongst Euro area Member States are already beginning to emerge in the post-EMU environment.
- *Knowledge Investment*: With the striking impact of ICT, there has been considerable interest in analysing the effects of investments in knowledge and human capital formation. With Europe lagging behind not only in terms of ICT penetration rates but also with regard to other indicators of knowledge production (such as R&D investments and the share of high tech industries) the creation of knowledge capital has emerged as a central policy concern. Both the Lisbon process and the more recent EU growth initiative are concrete examples of ongoing policy programmes aimed at boosting the pace of innovation.
- *Ageing*: An unavoidable consequence of declining birth rates is an ageing of the labour force. While so far there has been little research carried out on the possible consequences of ageing for productivity, nevertheless there is a widespread suspicion that an older labour force will be less adept in creating and adopting new technologies. Given the magnitude of the demographic transition in Europe, it seems appropriate to explore the possible consequences for productivity of this "greying" phenomenon.

In order to integrate all these diverse aspects into a unifying framework, growth regressions are used to draw lessons from the growth experiences of OECD member states over the last 2½ decades. In a more forward looking perspective, estimated multipliers are employed to provide some tentative projections concerning the possible impact of specific policy measures. On the analytical side an attempt is made to integrate recent developments in endogenous growth theory into the specification. This burgeoning growth literature combined with the distinctive nature of recent growth patterns has underlined the importance of knowledge production for productivity growth. In

[104] See, for example, Bassanini, Hemmings and Scarpetta (2001).

Diagram 1 : Basic growth determinants



* Knowledge investment is defined in much wider terms in the analysis to include spending on higher education, software as well as R&D spending

broad terms growth theory isolates two productivity enhancing channels, namely capital deepening and technical progress which is deemed proportional to knowledge. By looking at how these basic growth elements affect knowledge and physical capital formation enables one to establish a more nuanced understanding of the channels through which they affect productivity. A detailed technical description of the model used as well as a discussion of the theoretical linkages is provided in Annex 1, which also contains the regression results.

It must be mentioned at the outset that we are far from a complete understanding of the determinants of productivity. The growth experience since the mid 1990s is a reflection of continuous structural changes. Any empirical study which draws on past data must be aware of these shifts. Special emphasis will therefore be devoted to the issue of understanding recent trends. In interpreting these trends two main questions arise, firstly how do the basic growth determinants affect physical investment and knowledge production, and secondly what is the relative importance of physical and knowledge capital formation for productivity growth.

How do the basic growth determinants affect investment and knowledge production?

When analysing investment one has to take into account the fact that its structure is changing in at least two important dimensions:

Firstly, the growth in the importance of more knowledge intensive forms of investment: The share of ICT investment in total investment has grown steadily over the 1990s, with the ICT share of non-residential gross fixed capital formation in the USA presently approaching 1/3. ICT investment itself has not only a larger knowledge share in terms of software and R&D spending but is also complementary to skilled labour. In addition, overall R&D spending (whilst still comparatively small in terms of overall GDP) is playing a more prominent role in many of the more advanced economies.

Secondly, the observed increase in the international mobility of capital: Technology, allied to globalisation and capital market liberalisation, has generated a huge increase in the volume of capital movements in general and FDI flows in particular. The growing importance of multinationals in determining worldwide investment trends is reflected in the fact that the stock of FDI assets have grown from around 5 per cent of world GDP in the mid 1980s to over 15 per cent at the end of the 1990s. In

order to capture these structural shifts, it is important not only to look at aggregate investment but also at specific investment categories such as ICT, FDI and R&D.

Determinants of physical investment

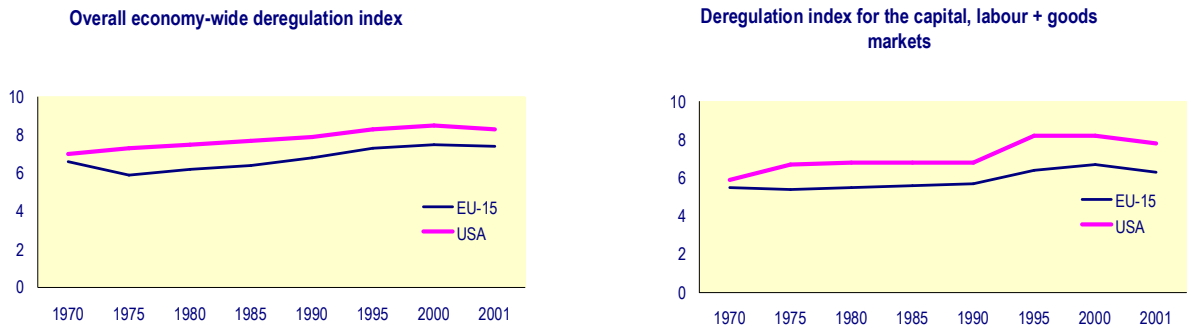
Amongst all the various growth determinants assessed in the regression analysis in Annex 1, regulation appears to be the most important driver of investment rates. The degree of regulation plays an especially important role for foreign direct investment but it is also a crucial driver for new forms of investment such as ICT. These results are consistent with a recent empirical study by Alesina et al (2003) which uses OECD regulatory indices for service industries. As discussed in Annex 1, these results are in accordance with theoretical priors. There is also some evidence that equity based financial systems are more favourable to physical investment. Again, FDI flows are positively correlated with a more equity based structure for financial markets. Finally, education appears to be an important factor for foreign direct investment. These results suggest that in an environment characterised by increasing international capital mobility, levels of regulation, financial market conditions and human capital endowments are important determinants for the attractiveness of a country as an investment location.

Determinants of R&D investment

The determinants of knowledge investment are different to those of physical investment. Firstly, R&D is less affected by the regulatory environment. What seems to be more important for R&D is market size as measured by openness and population size. The lack of importance of regulation for R&D could be due to the fact that entry barriers are less important for R&D activities which are typically concentrated amongst incumbent firms

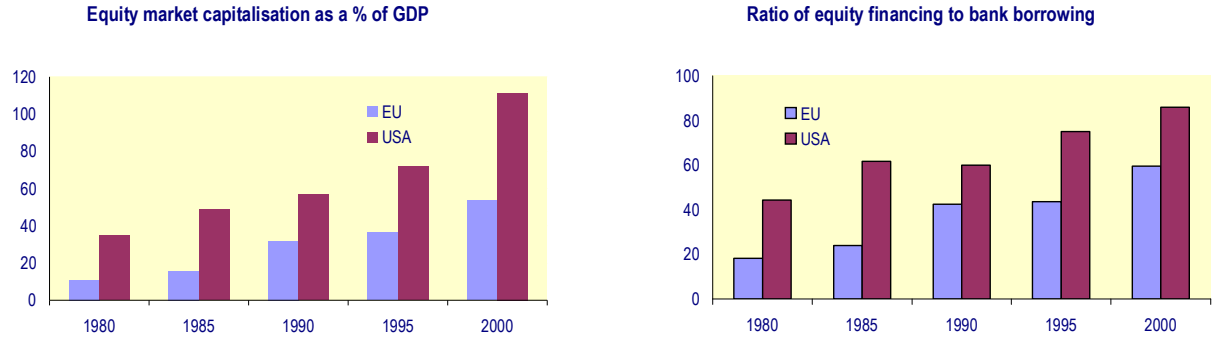
Also, theoretically the link between regulation and research intensity is less clearcut. Given the sunk cost nature of R&D activities, the prospects of more secure rents provided by product market regulations (for example in the form of higher protection against violation of property rights from new inventions) may act as an incentive for R&D.The sunk cost nature of R&D also makes it plausible that market size matters in that firms located in more open and/or larger economies will typically engage more strongly in R&D activities. Investments in R&D are usually more risky than in physical investments and therefore the attitude of all financial institutions towards the financing of such investments is important. More market based financing mechanisms, including equity markets and venture capital funds, tend to favour riskier investments. This is borne out in the empirical analysis where it is found that stock market turnover indices move more closely with R&D investment compared with bank credit measures. Whether this can be unambiguously interpreted in a causal sense is an open question. An alternative interpretation could be that stock markets simply value the returns from R&D investments more highly. This argument would be supported by the fact that R&D expenditures can equally well be explained by only concentrating on fundamentals such as market size, education and government involvement. In this case the role of education as a fundamental determining factor of R&D becomes more evident.

Graph 11 : Fraser institute deregulation indices



Source: Fraser institute.

Graph 12 : Financial market indicators



Source: World Bank, World Development Indicators (2002).

Knowledge Production: The Effect of R&D, Education, Market Size And Demographic influences

In addition to analysing the specific determinants of R&D investment (see Table A1), Annex 1 also assesses the role of R&D as one element in the overall knowledge production process in economies (Table A2). In this context, the empirical growth literature emphasises knowledge and the creation of knowledge via the investment activities of firms, households and the government in both R&D and education as crucial for enhancing the level of technology (i.e. TFP). As shown in Table A2, both R&D as well as education are significant drivers of total factor productivity.

Like in the case of R&D, only a limited role is found for deregulation in boosting the growth of knowledge.[105] ECFIN's results broadly occupy a mid-point between a 2003 joint CEPR and IFS study which reports a negative association between regulation and TFP and an OECD (Nicoletti and Scarpetta (2003)) study which finds a more positive effect of deregulation on TFP.

Trade openness/market size also appears to be especially important. However, it is interesting that this particular determinant only affects TFP growth via its impact on the level of R&D investment. This is suggestive that country size/scale effects bestow no particular efficiency gains in terms of other aspects of productivity growth.

[105] The fact that regulation is neither significant for R&D nor for TFP points in the direction that the link between regulation and moving the technology frontier is rather weak. Any gains from deregulation in terms of technological catching-up or from privatisations should therefore be interpreted more in terms of static efficiency gains and not with the dynamic gains needed for outward shifts in the technology frontier.

Another important feature revealed by these regression results is the impact of an ageing labour force on TFP. Since the mid 1970s the youth dependency ratio has declined in all OECD countries. This has led to a reduction in the inflow of young workers into the labour force and has increased their mean age. Little is known so far on the impact this might have on the creation and adoption of new ideas and technologies. The results reported in Table A2 suggest however that this process could have been one of the main contributors to the slowdown in productivity growth.

What is the relative importance of physical investment and knowledge capital formation for productivity growth?

The previous paragraphs have described how the basic determinants affect physical capital formation and the creation of knowledge. The present section looks at the relative contribution of these two factors to labour productivity growth when they are combined with two other factors, namely the growth in the employment rate and the potential for catching-up. The neoclassical growth model makes fairly precise quantitative predictions concerning these four factors, with Annex 1 showing that the estimated labour productivity growth contributions from the ECFIN model are very close to those predicted by the neoclassical model. The main results are as follows:

1. Physical investments and the impact of regulation:

- ***Physical Investment:*** A permanent 1 per cent point increase in gross fixed capital formation results in a 1.8 per cent long run effect on the level of labour productivity. This is equivalent to an annual average effect of 0.05 on the growth rate of labour productivity in the long run (i.e. over 30 years).

- ***Regulation:*** The implied change of moving to US levels of regulation, as measured by the Fraser index, would suggest a long run labour productivity effect of about 5 per cent (i.e. 0.15 on the long run growth rate of productivity).

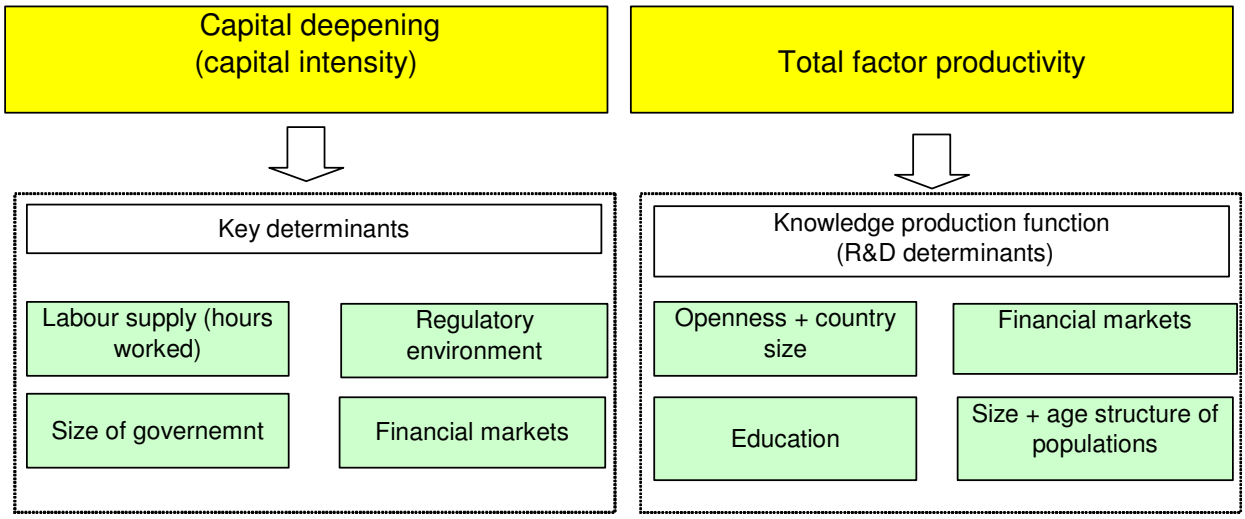
2. Knowledge investments (TFP effects):

- ***R&D***: A permanent increase in the share of R&D in GDP of 1 per cent point would increase the long run level of TFP by nearly 18 per cent (i.e. 0.6 on the long run growth rate of productivity).
- ***Education***: A permanent increase of 1 year in the average education levels of the labour force would lead to a long run level effect on TFP of close to 13 per cent (i.e. 0.45 on the long run growth rate of productivity).
- ***Ageing***: A permanent 10 per cent points decline in the youth dependency ratio would reduce the long run level of TFP by 6.8 per cent (i.e. 0.25 on the long run growth rate of productivity)
- ***Openness and market size***: A permanent 10 per cent points increase in intra-Euro area trade would result in a long run gain in TFP of 3 per cent (i.e. 0.1 on the long run growth rate of productivity).

3. Hours Worked: A permanent 1 per cent point increase in hours worked lowers the long run rate of productivity growth by about 0.25 per cent points.

4. Catching-Up: In terms of the speed of convergence, the results confirm the established literature result of a long run, annual, catching-up effect of roughly 2 per cent.

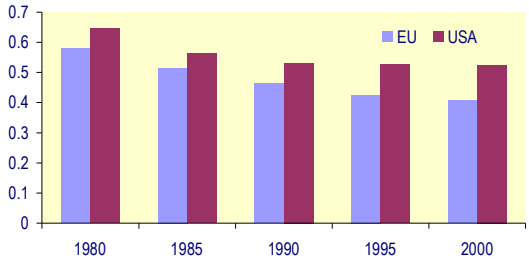
Diagram 2* : Labour productivity determinants (what are the key drivers of investment + total factor productivity)



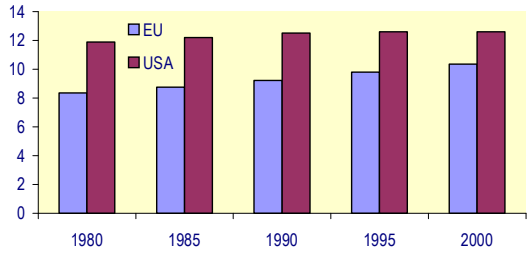
* This diagram gives an overview of the ECFIN productivity model in terms of the key determinants of capital intensity and TFP. The model specifies productivity growth as being generated by 4 distinct activities, namely the investment of firms in both physical and knowledge capital, investment of households in human capital and changes in labour supply. As discussed in the text and Appendix 1, the separate analysis of investment showed clearly that the variables used in the aggregate productivity regression affected different types of investment in very different ways. In addition, the separation into gross fixed capital formation and R&D also indicated both a physical investment and a TFP channel to labour productivity. Both components are manifestly closely linked, and interact with each other in influencing labour productivity, with knowledge investment simply being an input into the overall investment process in an economy. In overall terms, consistent with the neoclassical growth framework, the ECFIN model predicts that the level of labour productivity is influenced positively via knowledge production and the investment rate, and with a negative effect from growth in the labour input (as measured by hours worked). A fourth factor, to be considered, would be the potential for catching-up.

Graph 13 : Demographics and education

Youth dependency ratio



Average years of schooling



Source: Commission services, World Bank, De la Fuente and Doménech.

4.2 Practical applications of ECFIN's analytical framework

The present section provides a number of examples of how this framework can be used to further our understanding of past (Sub-section 4.2.1) and future (Sub-section 4.2.2) labour productivity developments.

4.2.1 Historical Analyses: Were the late 1990s exceptional in terms of ICT technologies and labour market trends?

Here we assess two questions which have emerged in the previous Sections. Firstly, how large a role did ICT technologies play in explaining the growth rate differentials which were experienced and secondly to what extent was the slowdown in productivity growth in Europe simply a reflection of the higher employment content of growth.

Role of ICT in the 1990s

Since the mid 1990s changed patterns and rankings of countries in terms of productivity/TFP growth have been increasingly observed. Relative productivity growth seems strongly related to the degree to which countries have been producing, or investing, in ICT. Given that the knowledge production function does not explicitly capture these ICT effects, how can we reconcile this with the observed developments? There are four possibilities:

Hypothesis 1: The knowledge generating factors as identified by the knowledge production function, namely R&D and human capital investment can explain the international TFP growth patterns since the mid 1990s.

Hypothesis 2: There is a large industry specific element which plays a role. Countries with high ICT industry shares have benefited from the positive productivity shocks taking place in these industries. Alternatively those countries which are high ICT users have benefited from technological spillovers.

Hypothesis 3: It is true that the ICT revolution was industry specific, but it was not confined to a specific country. With high capital mobility, those countries which offered attractive investment locations in terms of flexible labour and goods markets and/or young labour forces which were open to the adoption of new technologies, benefited most from the ICT boom.

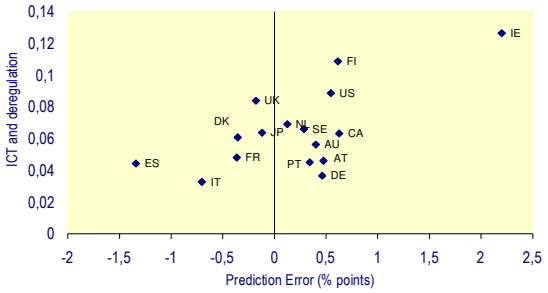
Hypothesis 4: Both industry specialisation (Hypothesis 2) as well as flexibility in the adoption of new technologies (Hypothesis 3) have interacted positively.

Assessing the 4 hypotheses (see Table A2.1)

The empirical analysis conducted in Annex 1 is based on explaining the prediction errors for the late 1990s of the knowledge production function (i.e. did the model under- or over-predict TFP per hour growth rates over the period and what can explain these prediction errors). It turns out that hypothesis 4 offers the best explanation for the cross country variation of prediction errors. As can be seen clearly from Graphs 14 and 15, there is a strong relationship between the ICT production share of a country (which is the best measure of its degree of industry specialisation), when interacted with either the regulatory burden or the age of the labour force, and the size of the deviation of actual TFP growth from the predicted growth rate.[106] This supports the interpretation whereby countries, some of which are in the EU, which have low regulatory burdens and a comparatively young labour force (creating favourable conditions in terms of technology adoption), have been better able to exploit the technological developments occurring in the mid-1990s compared with other countries and have consequently gained in terms of higher TFP growth. In relative terms, with a strong correlation between the ICT production share and TFP growth, the analysis also indicates that industry specialisation (Hypothesis 2) is probably more important than the degree of regulation and the age of the labour force (Hypothesis 3) in explaining the TFP prediction errors. Finally, the clear patterns emerging for these prediction errors also leads one to reject Hypothesis 1.

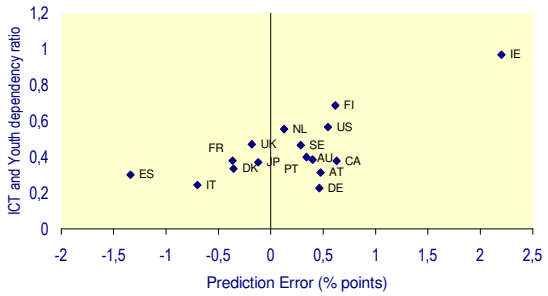
[106] The predicted growth rate of TFP would be the rate expected on the basis of the R&D and educational inputs in the corresponding country.

Graph 14 : TFP prediction error correlated with ICT production share and deregulation



Source: Commission services.

Graph 15 : TFP prediction error correlated with ICT production share and youth dependency ratio



Source: Commission services.

Link between Hours Worked and Productivity Developments

In explaining growth patterns over the second half of the 1990s, an assessment of the short and long run effects on labour productivity of a significant boost to employment (as measured in hours worked) is important to assess the extent to which the present downturn in EU labour productivity is a permanent or a short run phenomenon. Since the mid 1990s the EU has been experiencing a trend change in labour input. While in the 1970s, 1980s and early 1990s the growth rate of the labour input was negative on average, a positive labour input growth was observed over the period 1996-2002 of 0.9 per cent on an annual average basis. According to the estimates presented in Table A4, this increase in employment growth (when compared to a hypothetical zero baseline growth) has had the effect of slowing down EU labour productivity growth by about a ¼ of a percentage point per annum over the period in question.

4.2.2 Future Scenarios: Boosting EU labour productivity via two specific reform initiatives linked with the Lisbon Strategy

This section focuses on the effects of policy actions in both the TFP and capital accumulation areas aimed at boosting future EU labour productivity growth. The simulation presented here focuses, for illustrative purposes, on measures aimed at achieving the specific Lisbon target of making Europe the most competitive, knowledge based, economy in the world by 2010. Realising this ambition will require the implementation of far reaching structural reforms in a large number of the Member States. Two supply side initiatives have received a lot of media attention, namely deregulation and boosting the knowledge economy. In both cases, for simplicity, the USA will be used as the benchmark:

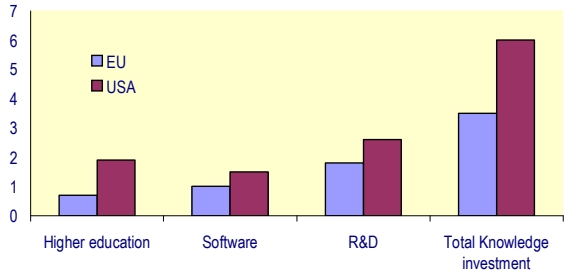
- *Regulatory Reform:* Due to significant negative effects from the regulatory framework on investment, policy makers should consider putting a greater emphasis on regulatory changes in their reform agendas. The earlier Graph 11 provided, on the basis of Fraser Institute indices[107], a quick overview at the EU level of the existing differences with the USA. The graph presented both an economy-wide deregulation index as well as one relating specifically to the capital, labour and goods markets. It is assumed that EU-US differences in terms of the overall economy-wide index are eliminated between now and 2010. As shown in Annex 1, even a relatively rapid deregulation towards US levels would not lead to sufficient productivity gains over the next 7 years to close the present efficiency gap of roughly 10 per cent with the USA. Even our more favourable results (when compared to the IMF WEO (2002)) would only give a boost to the level of labour productivity of less than 0.2 annually up until 2010 under the condition that reforms are implemented quickly (see Table A5). A major reason why this would not be sufficient is - according to this analysis - the

[107] The OECD has compiled various regulatory indicators, for example measuring legal barriers to entry or administrative burdens for startups. Unfortunately these indicators are normally only available for a single year (1998) and therefore they cannot be used to explain changes in economic performance since the mid 1970s. The Fraser institute index has the advantage of having a time dimension. It is, however, possible to compare the Fraser and OECD indicators by correlating them with each other at least for the year in which both are available. In fact both indicators (see CEPR-IFS Study (2003), pp. 64) are highly negatively correlated, which should be expected since the Fraser index measures the degree of deregulation whilst the OECD indicators measure regulation. The maximum correlation is found for the OECD "administrative burdens on startups indicator" (-.57), which suggests that the Fraser index is indeed a reasonable measure for entry barriers.

limited dynamic efficiency gains of deregulation. This suggests that deregulation must be accompanied by measures which increase knowledge production.

- *Knowledge Production*: The second element of this illustrative "Lisbon" package is action to boost TFP growth. On the TFP side, action is needed to boost investment in the knowledge economy, in terms of higher spending on third level education, software and R&D.[108] With respect to R&D, the focus should not be on boosting public R&D spending directly, but on creating the conditions which will promote an endogenous increase in research spending.[109] The empirical analysis has identified three main channels through which this could be achieved, namely higher product market integration, education and more efficient financial markets. Market size seems to be a crucial determinant for R&D, since the development of new products typically involves large sunk costs. Since research activities are human capital intensive, education is an essential requirement for any R&D activity. Finally, more equity based financial structures seem to have promoted the "riskier" forms of investment, such as R&D, more strongly than bank based systems.

Graph 16 : Investing in the knowledge economy : EU versus USA : 1998 (% of GDP)



Source: OECD.

Key Results Of "Lisbon Strategy" Simulation

The effect of introducing such a large package of supply side reforms over the coming years would be to significantly boost EU potential growth rates, on average by between ½ to ¾ of a percentage point over a 5-10 year horizon. However, even if one assumes a no-policy change scenario in the USA, there is no question of the EU overtaking the USA over the timescale laid out by the Lisbon agenda. Apart from the time it will take from the implementation of reforms to the appearance of visible effects, there are two further obstacles to reaching the productivity target, firstly the need to integrate the predominantly low-skilled part of the EU's potential labour force to reach the Lisbon employment target of 70 per cent and secondly the continuous drag on productivity induced by Europe's ageing labour force. This "Lisbon" simulation highlights the extent of the challenge facing EU governments in their efforts to boost the supply side potential of their respective economies

5. Summary and concluding remarks

Summary

This paper has examined the evidence at both the aggregate and industry levels to assess the hypothesis that a new growth pattern has emerged in the USA and a small number of the EU's Member States since the mid 1990s. More specifically, the objectives of the study were twofold:

- Firstly, to establish the stylized facts concerning growth and labour productivity, using a growth accounting approach at the aggregate and industry levels; and
- Secondly, to exploit a new framework for productivity analysis to derive policy lessons from the post-1995 growth experience which, in the context of the Lisbon policy strategy, can be harnessed to boost growth and convergence in the EU as a whole over the medium to long term.

Stylized facts

EU employment and productivity growth patterns have diverged sharply over recent years. Compared with the first half of the 1990s, the period 1996-2002 has witnessed a significant increase in the contribution of labour to EU GDP growth but unfortunately these gains have been largely offset by a reduction in the contribution from labour productivity. By comparison, over the same timeframe, the USA has enjoyed a combination of strong employment increases allied to an acceleration in labour productivity.

Even allowing for the fact that employment and labour productivity trends in the EU may be negatively correlated[110], the reversal of past productivity patterns in

[108] See OECD (2001); and Guellac and Van Pottelsberghe (2001). For a discussion on recent trends in R&D intensity, see OECD (2000) "Science and Technology Outlook".

[109] The wide variation across industries in the expected returns from R&D activities suggests that direct forms of support to specific industries should be avoided in favour of a more market-based, tax credit, approach, except in instances where potentially large social benefits can be credibly predicted.

[110] ECFIN estimates that roughly a quarter of the slowdown in EU labour productivity growth over the second half of the 1990's can be attributed to the higher employment content of growth. However, no policy trade-off should be implied from this negative correlation, with action on both the employment and productivity fronts capable of being taken on a simultaneous basis. Labour market reforms aimed at boosting employment rates only lead to a temporary reduction in measured productivity growth, with no negative implications for the long-run productivity growth of the existing workforce. In addition, a higher employment rate implies an unambiguous increase in GDP per capita.

the 1990s relative to the USA has nevertheless been striking. For the first time in the post-World War II period, the EU is now on a trend productivity growth path which is lower than that of the USA. Since the mid-1990s, the EU has proved incapable of arresting the long-run decline in its productivity performance whereas the USA has enjoyed a notable recovery in its secular trend. Productivity per hour growth rates in the USA have in fact started to recover to the rates of growth last experienced in the 1960s. While accepting that the present productivity per hour level differences between the EU and the USA are still only of the order of around 10 per cent[111], on the basis of an extrapolation of present trends and policies, and mindful of the ongoing imperative to boost employment rates, the EU as a whole looks destined to experience a significant widening in its productivity gap relative to the USA over the coming years.[112]

What explains the deterioration in the EU's labour productivity trend relative to the USA at the total economy level?

The most important point to underline in terms of aggregate productivity trends is that although a number of the EU countries have performed well over the second half of the 1990s, the EU as a whole has a productivity problem relative to the USA. While the sources of the deterioration in EU labour productivity are difficult to disentangle, from a purely growth accounting perspective the 1 per cent point decline in labour productivity experienced over the period 1996-2002 compared with the first half of the 1990s appears to emanate from the following factors:

- Firstly, roughly 50 per cent of the decline can be attributed to a reduction in the contribution from capital deepening. Within this category, whilst investment in IC technologies was contributing positively (but not as positively as in the USA), the rest of investment performed poorly. The smaller non-ICT capital-deepening component in EU labour productivity growth appears to be due firstly to a reversal of the unfavourable capital/labour substitution of earlier periods and secondly to a more worrying downward trend in non-ICT investment rates generally (which may be linked to locational investment considerations or to adverse demographic trends). In terms of the capital/labour substitution factor, this can be seen as the flip-side of the more employment intensive growth pattern experienced over the period. As noted earlier, a move towards full employment may entail a temporary reduction in measured productivity growth, but this should not be regarded as a trade-off in any sense.
- Secondly, the remaining 50 per cent of the decline in labour productivity growth emanates from a deterioration in terms of total factor productivity. This probably should be seen as the greatest source of concern for policy makers since changes in total factor productivity are generally attributed to a more efficient resource utilisation emanating from enhanced market efficiency; from technological progress resulting from investments in human capital, R&D and information technology; or from the natural catching-up process of the less developed EU countries through increased business investment in general. Again, as with the capital deepening channel, there has been a positive contribution to EU TFP growth from ICT (but again less than in the USA although the differential is not as great as with ICT investment). Consequently, the non-ICT contribution to TFP has fallen more than TFP as a whole.

What have we learned from the industry analysis?

The industry decomposition added some significant new details in terms of our understanding of the sources of the EU-US labour productivity differentials. It focussed in particular on trying to decompose the overall change in productivity into the effects which can be associated with the ICT and non-ICT parts of the economy.[113] It also showed at the individual EU country level that it was the deterioration in the productivity performance of a number of the larger Member States, most notably Italy, over the second half of the 1990s, which was responsible for the deterioration in the overall EU performance.

ICT Part of EU and US economies (ICT-Producing and ICT-using Industries)

As with the aggregate analysis, the industry breakdown showed that ICT has indeed been a significant driver of

[111] This 10 per cent figure underestimates the differential since the EU has still a long way to go to reach US employment rates, which will involve the integration of a significant proportion of low skilled workers which will have negative implications for measured labour productivity, at least over the short to medium term.

[112] At the individual EU Member State level, a much more nuanced picture emerges in terms of the EU's performance relative to the USA. In terms of labour productivity, over the period 1996-2000, it turns out that 7 of the EU's smaller Member States had performances which were not only well above the EU average but were also significantly higher than that of the USA. 3 of the 7, namely Ireland, Finland and to a lesser extent Sweden were also capable of combining strong productivity growth with high labour utilisation rates.

[113] This decomposition into ICT and non-ICT industries was based on the GGDC's ICT intensity breakdown of all industries. In total 25 of the 56 industries are classified as either ICT-producing or heavy ICT-using industries, with 31 in the non-ICT part of the respective economies. In terms of shares of value added, in the year 2000, ICT intensive industries represented 37 per cent of US value added compared with 32 per cent for the EU.

labour productivity trends in both the USA and the EU. Accurately measuring the overall contribution from ICT is difficult however since it is only possible to directly measure the effect of two of the transmission channels from ICT to productivity growth, namely the effect emanating from a sharp increase in ICT investment as a share of total investment[114] and secondly the contribution from technical progress in ICT-producing industries to overall TFP growth. The effect of the third transmission channel (i.e. positive growth spillovers from ICT investments, including both embodiment and network externalities) cannot be directly measured and consequently is the subject of much controversy. On the basis of an assessment of the first two channels, it would appear that around 60 per cent of US labour productivity growth at the end of the 1990s can be attributed to ICT with a contribution of roughly 40 per cent in the case of the EU.

Non-ICT part of EU and US economies

The industry analysis re-affirmed the earlier conclusion that ICT is only part of the story behind the rising US and declining EU labour productivity trends. Given that ICT has been contributing to both capital deepening and TFP in the EU, the deterioration in EU productivity over the two halves of the 1990s has therefore occurred in the non-ICT, more traditional, industries. Since these industries accounted for around 70 per cent of total EU output in the year 2000, it is a source of deep concern that both their capital intensity and overall efficiency patterns appear to be deteriorating. In addition, these are the parts of an enlarged EU economy which are facing the greatest competitive challenges from globalisation. By contrast, for the USA, the non-ICT industries showed an improving trend for both capital deepening and TFP (but not as dramatic as for the ICT-related industries), with some commentators suggesting that part of the improvement in non-ICT TFP growth may be due to positive spillover effects from ICT investments in other industries.

Most important industries from a labour productivity perspectives

In the ICT and non-ICT parts of the US and EU economies there are a total of 56 different industries but from a labour productivity growth perspective, just 5 of these industries dominate the overall patterns, with all of these industries in the ICT-producing and ICT-using areas of the respective economies.[115] Of these 5 industries, the USA outperforms the EU in 4, namely in one ICT-producing manufacturing industry (i.e. semiconductors and other electronic equipment) and in 3 ICT-using service industries (i.e. wholesale trade; retail trade; and financial services). On a more encouraging note, the EU is dominant in one ICT-producing service industry, namely telecommunications. It is interesting to point out that whilst productivity in ICT-producing manufacturing industries has been growing at a significantly faster pace than the associated ICT-using service industries, it is the latter group of service industries which accounts for by far the greatest proportion of the US upsurge in productivity.[116] Some caution may therefore need to be exercised given the well-documented measurement issues in a number of these service industries.

What role could policies play in future productivity patterns? A 'Lisbon strategy' scenario.

Having established the stylized facts from the aggregate and industry analyses, the logical next step was to place these results into a more policy relevant context. This is particularly important given the diverse experiences of the EU's individual Member States, with many of the latter outperforming the USA in terms of labour productivity over the period being discussed. The key policy question addressed was whether all the EU countries that experienced high productivity growth and the USA shared certain common characteristics which could explain their superior performance. More specifically what were the channels via which the more fundamental factors driving growth (i.e. institutions, trade, market size, education and labour supply/demographics) affected investment and total factor productivity (TFP) in these countries and how did these latter two factors interact to generate labour productivity growth.

The productivity model which is developed looks at these issues and specifies productivity growth as being generated by 4 distinct activities, namely the investment of firms in both physical and knowledge capital, the investment of households in human capital formation and changes in labour supply.[117] Using this model, the analysis shows that EU-US productivity differentials can in fact be related to some fundamental structural differences at the individual country level, with five areas being identified as being quantitatively important and relevant in an EU context, namely the level of regulation, the structure of financial markets, the degree of product market integration, the size of knowledge investment and the ageing of the labour force.

[114] For example in the year 2000, ICT investment represented 30 per cent of all non-residential gross fixed capital formation in the USA.

[115] If one examines the performance of all 56 industries, the extent of the deterioration in the EU's performance over the two halves of the 1990's is striking, with 44 of the 56 industries showing a downward trend in their productivity performances over the second half of the decade.

[116] This apparent contradiction is explained by the higher share of ICT-using service industries in overall value added.

[117] The neoclassical growth model makes fairly precise quantitative predictions concerning these 4 factors, with the estimated labour productivity growth contributions from the ECFIN model being very close to those predicted by the neoclassical model.

The "Lisbon Strategy" simulation at the end of the paper, whilst explicitly concentrating on regulatory reform and the knowledge economy, implicitly was an attempt to highlight the importance of all these five factors in determining the EU's long run growth performance and for its ambitions to outperform the USA in terms of potential growth rates (thereby establishing itself as the most competitive, knowledge-based, economy in the world):

- In terms of boosting investment via regulatory reform, the "Lisbon Strategy" simulation showed that even a relatively rapid deregulation towards equivalent US levels would not lead to sufficiently large productivity gains over the next 7 years to close the present 10 per cent efficiency gap with the USA. Whilst moving to US levels of regulation would lead to a 0.15 increase in the long-run (i.e. over 30 years) rate of productivity growth, the ECFIN analysis stresses that any gains from deregulation in terms of technological catching-up or from privatisations of state monopolies should be interpreted more in terms of static efficiency gains and not with the dynamic efficiency gains needed to achieve an outward shift of the "technology frontier". This suggests that deregulation, whilst crucial for investment, on its own would be insufficient to meet the EU's "Lisbon" ambitions and must therefore be accompanied by concerted efforts aimed at boosting the production of knowledge.
- In terms of the second element of the "Lisbon" package, namely action to boost TFP growth (i.e. the knowledge economy), the recent empirical growth literature emphasises knowledge and the creation of knowledge via the investment activities of firms, households and the government in both R&D and education as being essential for enhancing the level of technology in an economy. The paper points to long run productivity gains from investments in both education and R&D.[118] With respect to R&D, the paper stresses that the focus should not be on boosting R&D spending directly, but on creating the framework conditions which would promote an endogenous increase in research spending. The empirical analysis in this paper identified two main channels through which this could be achieved, namely higher product market integration (e.g. completion of the single market programme) and an investment environment which ensures the development of a more active risk capital market. However, disentangling the different transmission channels and even the direction of causality is extremely difficult. For example, while, on the one hand, a certain degree of imperfect competition may be necessary to cover the costs of knowledge intensive forms of investment such as R&D, on the other, there is increasing evidence against the view that firms enjoying significant market power plough back excess profits into higher rates of R&D and innovation. Rather it appears that a lack of competition tends to provide little incentive for firms to pursue technological innovations, slows down its diffusion and impedes a higher variety and quality of goods and services being delivered to consumers.

Consequently, in assessing the combined effect of introducing the overall package of supply side reforms described in the "Lisbon" simulation, (i.e. deregulation, product market integration, human capital development and an investment climate conducive to the channelling of financial resources to R&D and other high risk investment domains) it is important to underline the uncertainties involved. However, on the assumption that the quantitative relationships established in the regression analysis hold, this package of supply side reforms would boost EU potential growth rates by roughly ½-¾ of a percentage point annually over a 5-10 year horizon. While this would undoubtedly represent a significant turnaround in the EU's present economic fortunes, given the extent of the present gap in performance, this package of reforms would still not be sufficient for the EU to overtake the USA in productivity terms over the timescale laid out for the Lisbon agenda. Apart from the time which will need to elapse between the implementation of reforms to the appearance of visible effects, there are two further obstacles to be overcome in reaching the Lisbon-imposed productivity target, firstly the temporary trade-off faced in attaining the parallel employment target of 70 per cent and secondly the continuous drag on productivity induced by Europe's ageing labour force.

Concluding remarks

At the moment, EU GDP per capita is at around 70 per cent of the US level, with roughly 1/3 of the gap due to productivity differentials and 2/3 due to a lower labour input (i.e. a lower employment rate and hours worked compared with the USA). Consequently, improving the EU's productivity performance and raising employment are both fundamental to an increase in the long-term growth potential of the EU economy. This study has concentrated on the first aspect of this dual policy path by isolating the key drivers explaining the productivity differences between the EU and the USA and by suggesting a range of policy initiatives aimed at closing the EU's productivity gap over the coming years.

The optimistic view of recent EU productivity trends is that part of the explanation for the poor performance

[118] For example, a permanent increase of 1 year in the average education levels of the labour force would lead to a 0.45 percentage point gain on the EU's long run rate of productivity growth. R&D is even more potent, with a permanent increase in the share of R&D in GDP of 1 percentage point leading to a 0.6 percentage point increase in the long run rate of productivity growth.

could be adjustment lags, with perhaps the basis for future growth already firmly established due to the labour, capital and product market reforms which have already been introduced. Under this view the EU may now simply be in a transition phase whereby some of the negative effects of those reforms (e.g. a temporary decrease in productivity due to labour market changes) are visible, whilst the gains to be reaped in the future are not. The more pessimistic view (which is the one largely supported by the analysis in the present paper) is that a large number of Member States have as yet failed to recognise the extent of the reforms which need to be introduced given the challenges posed by an acceleration in the pace of technological progress, by globalisation (most recently in terms of the growing tradability of large parts of the service economy) and finally from the steady greying of EU populations.

Whilst based on a different set of indicators to those used for the present analysis, this paper's more pessimistic viewpoint would appear to be borne out by the 2003 Spring Report. Realising the difficulties of measuring progress in structural reform, the Commission and the Council devised a set of structural indicators which have become one of the main tools for assessing progress in achieving the Lisbon objectives. This year the Spring Report presented a simple but very informative exercise counting the frequency with which each Member State was amongst the three best or three worst performing Member States in the EU on each indicator. The results document that certain countries appeared again and again amongst the top three Member States, most notably Denmark, Sweden and Finland. It is important to note that these are precisely the same countries that had already undertaken deep and successful reforms well before the launch of the Lisbon strategy. On the other hand, the major Euro area Member States, such as Germany, France and Italy, came out as clear laggards with respect to structural reforms. Consequently, as underlined by the analysis in the present paper, the strong productivity growth performances of a small number of EU Member States demonstrates that there is nothing inherently wrong with the policy framework established by the Lisbon reform strategy. Timely and thorough implementation of the different reform measures would therefore appear to be the real Achilles heel of this process.

To conclude, the issue of whether recent EU productivity trends are likely to be permanent or transitory was raised at the start of this study. While it is still premature to speculate as to the likely answer to this question, what can be said is that the outcome will depend on the policy choices which governments make in the policy domains outlined earlier. The present paper confirms the importance to the EU's long run productivity performance of a comprehensive reform strategy aimed at reducing the regulatory burden, further integrating markets, promoting human capital investment and enhancing the innovation potential of the economy. Implementation of such a wide-ranging reform agenda would create a more flexible, dynamic and investment-friendly business environment which together with better functioning markets, and more risk-oriented financing mechanisms, will ultimately be reflected in a significant increase in the EU-15's underlying labour productivity growth rate.

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Annex 1: Analytical Framework

In the framework for the empirical analysis presented in this annex an attempt is made to combine standard growth regressions (see, for example, Mankiw et al. (1992)) with some new developments in endogenous growth theory. Standard growth regressions treat technical progress as exogenous and they therefore miss a large part of productivity. The endogenous growth literature makes an attempt to explain technical progress as the result of human capital formation both undertaken at the household (see, for example, Lucas (1992)) and the firm level (see, for example, Romer (1990)) in the form of education and training (for households) and in the form of R&D spending (in the case of firms). This literature regards the level of technology as being (at least partly) created by a knowledge production function (see Jones (2002)).

1. THE MODEL: Output is produced via a conventional neoclassical production function. For reasons of analytical convenience and in order to be in conformity with most of the literature we assume a Cobb Douglas technology

$$Y = K^{\alpha}\left(L * A\right)^{1-\alpha} \tag{1a}$$

Output is produced with capital (*K*) and labour (*L*) input which is measured in hours. Technical progress is labour augmenting. The level of technology is given by the variable A. The level of technology must be regarded as a summary indicator of both the knowledge accumulated in the economy and the level of efficiency in which factor inputs are used in the production process. Knowledge production is described below. With this formulation hourly labour productivity can be decomposed into a capital intensity effect and a technology component by reformulating equation (1a) as

$$Y/L = \left(K/L\right)^{\alpha} A^{1-\alpha} \tag{1b}$$

Labour productivity is increased either by capital deepening (*K/L*) or by the accumulation of knowledge (*A*), with α and (1-α) being their corresponding elasticities. Both physical and human capital represent stocks which can be increased by corresponding investment activities. Physical capital (we express both physical and human capital in per hour terms) evolves according to the following capital accumulation equation

$$\dot{K}_L = I/L - (\delta + n)K_L \quad \text{where } K_L \equiv K/L \tag{2}$$

where δ is the depreciation rate and n is the growth rate of hours worked. Crucial for physical capital is investment. In the case of knowledge capital we follow the literature and specify a knowledge production function:

$$\dot{A} = B\left(\frac{RD}{Y}\right)^{\gamma}\left(EDU^{\kappa} Ydeprat^{\psi}\right)A^{\phi} \tag{3}$$

Knowledge is increased by the investment activities of households and firms. It is a positive function of the research intensity of firms as expressed by the R&D to GDP ratio (*RD/Y*) and the level of educational attainment (*EDU*) of the labour force. We correct the average level of education for the time elapsed since the knowledge was created by correcting for the age structure of the labour force. A simple index for this is the youth dependency ratio (*Ydeprat*). Under the assumption that human capital depreciates over time one would expect a younger labour force to have a higher capacity to create and absorb new ideas and technical developments.

The variable *B* captures other factors that could potentially affect efficiency. With an eye towards the variables of interest in this study, namely regulation, structure of financial markets and market size, one can argue that all of them have a potential effect on efficiency. For example, more deregulated markets which are open to foreign competition improve average efficiency by forcing low productivity firms to exit. It is however unclear whether reducing monopoly rents will also increase a firm's incentives to innovate simply because potential rents from the innovation will be lower. Increased competition via more openness may be more successful since increased market size could compensate for higher competition. Market size (i.e. scale effects) can have additional efficiency effects if there are increasing returns to production.

Likewise the structure of financial markets can affect efficiency. It has been argued recently in the literature (e.g. Levine (1992,1997)) that equity based systems may be more efficient in terms of risk sharing, information acquisition and in terms of providing management incentives. However, in contrast to this view Shleifer and Vishny (1986) regard stock markets as having detrimental effects on corporate governance.

For empirical testing we formulate the following simple specification for the efficiency term in the knowledge production function

(4) $$B = REG^{\chi} OPEN^{\phi} POP^{\varphi} FIN^{\kappa}$$

where efficiency becomes a function of measures of regulation (*REG*), market size proxied by openness (*OPEN*) and population size (*POP*) and a set of financial market indicators (*FIN*). A more precise definition of these variables will be given in the following Section.

Finally, the question arises of whether an increase in the level of investment in human capital will permanently increase the growth rate of knowledge ($\phi = 1$) or whether the marginal product of knowledge capital is declining ($\phi < 1$). Jones (1995) argues forcefully that the stylised facts of declining TFP growth rates and rising human capital investments over the last decades is clearly more consistent with the second view.

As shown by eqs. (2) and (3), both physical and knowledge capital are driven by physical and R&D investment activities correspondingly. Thus, eventually the factors influencing investment in both forms of capital will determine the growth rate of labour productivity. Since we are interested in how regulation, the structure of financial markets, market size as well as the qualification levels of the labour force influence investment rates we postulate the following equation

(5a) $$I = iy(REG, OPEN, POP, FIN)Y$$

and

(5b) $$RD = rdy(REG, OPEN, POP, FIN)Y$$

Economic theory provides various justifications for these variables as possible predictors of investment rates.

***Regulation*:** The level of regulation affects investment in various ways. First, to the extent to which regulation prevents entry, it lowers competition which in turn enables firms to earn higher marginal returns which lowers investment. Regulation can also affect the investment costs of existing firms and increases capital costs which in turn requires higher returns and leads to lower investment rates. Blanchard and Givazzi (2002) provide a theoretical framework for a discussion of these effects.

***Financial Markets*:** Another potentially important aspect affecting investment rates is access to finance. Allen and Gale (2000) see a special advantage of stock markets in the assessment of innovations. This suggests that stock markets should be favourable to new forms of investment (or investment undertaken by new firms) as well as R&D investment. Wachtel (2001) regards stock markets as a vehicle for fostering international portfolio and direct investment. Other authors have a more critical attitude towards stock markets, for example Levine and Zervos (1998) see improved liquidity as having negative effects on savings rates and therefore on investment.

***Market size (Population, Openness)*:** By endogenising knowledge capital, scale effects become more important. This should not have direct effects on the aggregate investment to GDP ratio but it is likely to have effects on the allocation of investment to different types. The endogenous growth literature (see Romer (1990)) especially stresses the sunk costs associated with R&D. Therefore bigger markets associated with larger national economies and more open borders should be positively correlated with R&D activities. Size effects have played a prominent role in the recent growth literature, since the size/growth link is stressed in the first generation of endogenous growth models (see Jones (2001)). There is of course a large literature which deals with the effect of openness on productivity growth, but only recently Alesina et al. (2000) have tried to look systematically into the effects of openness and country size on productivity.

Education: Since education affects the efficiency of labour it affects output and investment in the same direction and with the same intensity. Therefore it does not affect the investment rate as such. However, the composition of investment may be affected in the sense that more knowledge intensive forms of investment (ICT, software, R&D) may be complementary to the human capital endowment in the respective economy. Education may also play a role in attracting foreign direct investment.

After having established investment equations one can determine the dynamic adjustment of labour productivity to changes in fundamental economic determinants via the impact of physical and knowledge investment on their respective capital stocks. The long run level of productivity is given by

(6) $$\ln\left(\frac{Y}{L}\right)^{*} = \ln(A^{*}(..)) + \frac{\alpha}{1-\alpha}\left(iy(..) - (n + \delta + \pi)\right)$$

where $A^*(..)$ and *iy*(..) are functions which are defined by equations (6) and (3). Since it takes time for (permanent) changes in investment to increase the stock of physical capital and knowledge, the dynamic adjustment of labour productivity to new investment levels is characterised by a process of convergence. Given the technological assumptions, with declining marginal products of physical and human capital, countries with low levels of human and physical capital endowments should grow faster. A summary measure of both forms of capital is of course labour productivity itself. The labour productivity growth regressions can be written as follows

$$\dot{y}_l = \lambda(y_l^* - y_l) \text{ where } y_l \equiv \ln\left(\frac{Y}{L}\right) \tag{7}$$

2. EMPIRICAL ANALYSIS AND RESULTS: The model specifies productivity growth as generated by 4 distinct activities, namely the investment of firms in both physical and knowledge capital, investment of households in human capital and changes in labour supply. The neoclassical model also weighs the contributions of these individual factors by the output elasticities of physical capital, labour and TFP. However in this section we want to go beyond pure growth accounting and ask how productivity growth at the aggregate level may be linked to the fundamental factors presented in Section 4, namely institutions, market size, demographic trends and education. The framework presented above allows for the direct estimation of these effects. It also allows us to distinguish between an investment and a TFP channel. The empirical analysis is based on a panel of 21 OECD countries over the period 1975 to 2000[119]. Growth regressions have become a standard analytical tool for structural economic analysis. Nevertheless it is important to point out some caveats, namely omitted variables and endogeneity. Firstly, the empirical analysis probably leaves out some important factors. In order to reduce the likelihood that the variables used in the regression could be interpreted as proxies for unobservables, all regressions are run with country fixed effects. Not all variables used in the regressions can be regarded as strictly exogenous. Some of the indicators used in these regressions could be endogenous. In particular this holds for the financial market indicators. We try to minimise this problem by using beginning of period values instead of period averages[120].

As discussed in Section 4, the economic determinants most relevant for this study are the degree of regulation, financial markets, market size and the human capital endowment of the labour force. Empirical proxies for these variables must be selected. It is difficult to obtain internationally comparable figures of regulation. In this study we use the Fraser index which has the advantage of being available over the whole sample period[121]. In addition we use the share of government consumption and the degree of openness as possible indicators for government involvement and regulation. Unlike with a direct regulation index the results which are obtained with the two latter indicators are more difficult to interpret. Government consumption could also be negative for other reasons. For example, it could represent crowding out effects, but there could also be a bias due to the way in which a government's contribution to GDP is measured. Similarly a positive effect of openness could indicate both higher competition but also market size effects.

The structure of financing is captured in the regressions below by two indicators, the "volume of bank credit as a share of GDP" and an index of stock market capitalisation. In order to reduce possible problems of endogeneity with these two indicators we again use beginning of period values instead of period averages.

For modelling the effects of market size we follow Alesina et al (2000) and use three variables, namely openness, population size and the product between the two. The last variables capture possible non-linearities, for example that the degree of openness may be less important for large as opposed to small economies.

As a human capital indicator of the household sector we use the average years of schooling of the adult population. The data are from De la Fuente and Domenech (2001). In order to allow depreciation of human capital we use the youth dependency ratio as an additional regressor.

Following the framework outlined above we first present results on investment rates (eqs. (5a) and (5b)). In a second step we estimate the parameters of the knowledge production function (eqs. (3) and (4)) and finally we estimate the contributions of physical and knowledge capital to labour productivity growth (eqs. (6) and (7)).

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[119] Data series for the different variables used in the analysis were available, starting in the mid-1970's, for all of the EU countries, with the exception of Greece and Luxembourg. Outside the EU, comparable series were assembled for the US, Australia, Canada, Iceland, Japan, New Zealand, Norway and Switzerland. Since we are interested in medium term trends the analysis removes business cycle effects by using 5 year averages.

[120] GMM panel data estimators have been suggested (see Caselli et al. (1996)) for dealing with the endogeneity problem. However, with persistent time series, instruments can be weak and results can be severely biased in relatively small samples (see Bond et al (2001)).

[121] The OECD regulation indices are usually only available for the 1990s.

TABLE A1 : INVESTMENT REGRESSIONS					
	Gross Fixed Capital Formation	**Foreign Direct Investment**	**ICT Investment**	**R&D Expenditure**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
1. Government Expenditure	- [1)]	- [1)]	- [1)]	1.18**	0.95**
2. Degree of Regulation	0.29**	3.32**	0.86**	-0.20	-0.04
3. Bank Credit	-0.01	-0.68**	0.16	-0.07	-
4. Stock Market Capitalisation	0.03*	0.48**	0.13**	0.15**	-
5. Openness	-3.35**	1.93	1.09	3.21*	6.87**
6. Openness x Size	0.79**	0.16	-.44	-0.71	-1.86**
7. Population Size	0.97*	0.49	1.99**	1.78**	1.72**
8. Education	-0.05**	0.53**	0.002	0.02	0.13**
9. Growth of working age population	-0.04	0.13	-.001	0.06	-0.02
Countries / Observations	21/89	21/85	21/61	21/89	21/100
R2**	0.77	0.79	0.81	0.93	0.92

Panel regression with country fixed effects

***/**/* indicates significance at the 1/5/10% levels.

1) Government consumption is excluded from regressions (1) to (3). Collinearity between government consumption and deregulation tends to make both regressors insignificant when used simultaneously. Only results with deregulation are reported here since this indicator slightly outperforms government consumption in the regressions.

Source : Commission services.

2.1 INVESTMENT: This section analyses how the investment of firms is affected by the basic growth determinants. We are especially interested in the economic determinants of physical investment versus R&D. However, one should keep in mind that within fixed capital formation important changes have taken place, with investment in ICT becoming a more important investment category. In order to understand the structural changes within aggregate investment it is therefore useful to also look at individual investment categories such as ICT. Important shifts are also occurring along another dimension. With increasing international capital mobility, foreign direct investment is becoming much more important. In a forward looking analysis it therefore seems essential to explore the specific determinants of these ICT and FDI investment categories.

Key Results from Regression Analysis: The most important result is that for all physical investment categories we find that regulation has a negative effect on investment rates. In contrast to this R&D expenditures are not affected by regulation. The first result is in conformity with the theoretical priors. There are various possible explanations for the latter result. Firstly, entry barriers may be less of a problem since R&D is probably highly concentrated amongst large incumbent firms. Secondly, certain forms of protection may actually be beneficial for R&D activities which yield risky returns. So far there is little empirical work on the relationship between investment and regulation. A more recent empirical study by Alesina et. al. (2003) which uses OECD regulatory indices tends to support the results on physical investment rates and also finds a significantly negative impact of regulation in a panel of OECD service industries. The regression results also indicate that more stock market based financial systems tend to be more favourable to both physical and knowledge investment. It appears that equity markets are an important determinant of foreign direct investment. Giving the rising importance of international capital mobility, these results suggest that the structure of financial markets may play a more important role in the future than they have played in the past. Kappler and Westerheide (2003) found similar results for a panel of OECD countries with different control variables. A certain degree of ambiguity however remains concerning the importance of the structure of financial markets. A comparison of columns (4) and (5) shows that adding indicators of financial structure does not really improve the fit of the regression. In the absence of financial market indicators the level of education, which is an intuitively plausible explanatory variable, becomes significant. These two regression results taken together could also be interpreted as indicating that stock markets simply place a high value on the human capital endowment of firms. A causal interpretation running from the structure of financial markets to R&D expenditure would not be correct. This leads directly to a discussion of the role of education for different types of investment. Education is negatively correlated with aggregate physical investment rates but tends to be positively correlated with human capital

investment. This should not be interpreted as suggesting that education is bad for physical investment. This correlation rather captures structural changes from low skilled-heavy industry production structures, with high levels of physical investment to high skilled-low capital intensity service sector production structures with low levels of physical investment. Also in the case of FDI, education is significant and positive. Internationally mobile capital seems to seek low regulation and high education environments.

2.2 KNOWLEDGE PRODUCTION: This section looks at the quantitative importance of knowledge investment measures (i.e. education and R&D investments) for TFP growth. The results are presented in two steps. Column (1) gives the standard specification of the knowledge production function, while columns (2) and (3) present slightly augmented versions where we ask whether institutional features affect the efficiency of knowledge accumulation[122]. As can be seen from column (1) all three variables have the correct sign and except for education they are significant.

Adding additional regulatory indicators improves the fit of the regression. Trade openness, corrected for country size appears to be especially important, whilst the regulatory indicator is not significant. It is interesting to observe that market size does not have an impact on TFP growth beyond its effect on R&D investment.

This suggests that there are no particular efficiency gains in production due to country size, i.e. increasing returns in production is not present in this dataset. Market size effects are largely confined to R&D investment itself (see Table A1).

Another interesting result is the strong negative effect of government consumption on TFP. However, one must be careful when interpreting this result. The way government production is measured in the national accounts could be a possible explanation for this result. Countries with a higher government share could have systematically underreported GDP, since the capital services of the government sector are not reported. Whatever interpretation is the correct one, government consumption appears to be an important control variable. This can be directly seen by looking at the consequences for the impact of education on TFP, which now becomes significant. Since there is a positive correlation between education and government expenditure, the exclusion of government consumption biases the effect of education downwards. Adding financial market measures to the regression in column (4) does not improve the fit but instead makes all the explanatory variables insignificant. This suggests that financial market measures are highly correlated with the remaining explanatory variables.

Table A2 : TFP / Knowledge Production Function

	TFP	TFP	TFP	TFP
	(1)	(2)	(3)	(4)
1.Youth Dependency Ratio	0.076**	0.073**	.048*	0.062
2. R&D Expenditure	0.025**	0.022**	.033**	0.009
3. Education	0.005	0.007	.009*	0.01
4. Deregulation		0.04	.03	0.03
5.Government Consumption			-.06**	
6. Openness		0.40**	0.25*	0.24
7. Openness x Size		-.13**	-.09*	-0.07
8. Population		0.05	.05	0.03
9. Bank Credit				-.004
10. Stock Market Capitalisation				0.003
11 TFP(-1)	-0.01	-.04*	-.07**	-.0.056*
Countries/Observations	21/97	21/97	21/97	21/88
R2**	.31	.40	.45	.34

(1): panel regression with country fixed effects

***/**/* indicates significance at the 1/5/10% levels.

Source : Commission services.

[122] All regressions have country and time fixed effects. The latter are meant to make the regressions more robust against common time trends in both the explanatory variables and TFP.

The correlation is especially high with R&D expenditure and regulation. Unfortunately our analysis does not allow us to shed light on the direction of causality. Theoretically it could go in both directions. More market based financial systems could both exert pressure to increase efficiency and provide easier funding for R&D investments. But equally well the correlation could simply reflect the fact that stock markets place a high value on regulatory reforms and R&D investments.

A specific feature of these results is the insignificance of direct measures of regulation as an explanatory factor for TFP growth. The results on regulation and TFP reported here lie somewhere in the middle between a recent joint CEPR and IFS (2003) study which reports a negative association between deregulation and TFP and an OECD (Nicoletti and Scarpetta (2003)) study which finds a positive effect of deregulation on TFP. However, the results presented by the OECD are not clearcut and are open to some interpretation. The study finds that productivity gains are mostly associated with privatisations and not with levels of regulation in general. The study also finds that deregulation mostly facilitates technological catching-up but that there is little evidence that it leads to outward shifts in the technological frontier. Whether productivity gains from privatisations can be interpreted as true dynamic efficiency gains is also questionable in the light of the CEPR-IFS study which also finds productivity gains from privatisations (in network industries for example) but these are associated with reductions in employment. Thus the effect of privatisations could be temporary productivity improvements related to a reduction of economic slack in previously publicly owned companies. The fact that regulation is neither significant for R&D nor for TFP points in the direction that the link between regulation and moving the technological frontier is rather weak and an interpretation in terms of static efficiency gains is probably more appropriate.

Is the second half of the 1990s a special period for TFP growth? The second half of the 1990s differs from previous periods in various respects. First of all, some countries, in particular the USA, managed an acceleration in the rate of technical progress and secondly technological convergence of the EU relative to the USA came to a halt. It is by now well understood that technological developments related to the production and use of ICT are likely to be a major contributing factor. In this section an attempt is made to relate the estimates from the knowledge production function to the technological developments in the late 1990s[123]. In a very stylised manner one can formulate the following hypotheses.

Hypothesis 1: The knowledge generating factors as identified by the knowledge production function, namely R&D and human capital can explain the international growth patterns since the mid 1990s. If this hypothesis is correct, then we would expect to see no systematic variation of the regression residuals with variables relating to hypothesis (2) to (4)

Hypothesis 2: There is a large industry specific element which plays a role. Countries with high ICT industry shares have benefited from the positive productivity shocks taking place in these industries. Alternatively those countries which are high ICT users have benefited from technological spillovers. If this hypothesis is correct then one would expect the ICT production share or, in the case of spillovers, the ICT investment share to be significant.

Hypothesis 3: It is true that the ICT revolution was industry specific, but it was not confined to a specific country. With high capital mobility, those countries which offered attractive investment locations in terms of flexible labour and goods markets benefited most from the ICT boom. Alternatively it is sometimes argued that an ageing labour force would be less willing to adopt new technologies. If this is correct, then both measures of deregulation and the youthfulness of the labour force should be positively correlated with the residual.

Hypothesis 4: Both industry specialisation (hypothesis 2) as well as flexibility in adopting new technologies (hypothesis 3) have interacted positively. In this case one would expect ICT production shares and measures of deregulation and youthfulness of the labour force to interact positively.

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[123] We use the knowledge production function without controls (except for country dummies) for country specific efficiency changes (column (1) in Table A2) in order to assess how much the knowledge inputs can account for changes in TFP growth in the late 1990s.

The following Table, which summarises our analysis of the TFP residuals for 19 OECD countries over the period 1996-2000 is intended to shed some light on the relative importance of these 4 hypotheses. The most significant relationships are found for the interactions of ICT production with either demographic or regulatory indicators. This suggests that both industry specialisation as well as favourable conditions in terms of technology adoption have been important factors for TFP growth in the late 1990s. Industry specialisation does seem to play the dominant role as expressed by the high correlation between the ICT share and TFP growth[124]. There is little evidence of spillover effects from investment on technology which goes beyond the pure investment effect. Implicitly these results reject hypothesis (1). Notice, however, that the results are sensitive to outliers. Ireland and Spain constitute positive and negative outliers in the second half of the 1990s. Removing the two countries makes the result less signifcant. However, it does not change the ranking of the individual hypotheses.

2.3 COMBINING THE EFFECT OF PHYSICAL AND KNOWLEDGE CAPITAL FORMATION ON PRODUCTIVITY GROWTH: The previous two sets of regressions have shown how the basic productivity growth determinants affect physical capital formation and the creation of knowledge. This section looks at the relative contribution of these two factors to productivity growth when they are combined with two other factors, namely the growth of hours worked and the potential for catching up. As indicated above the neoclassical growth model makes fairly precise quantitative predictions concerning these four factors conditional on the choice of the output elasticity of capital and labour, which have been set to 0.35 and 0.65 respectively. This follows the standard practice of using the wage share for calibrating the output elasticity of labour (α) in the production function. A comparison of column (1) - which gives the theoretically predicted coefficients - and column (2) - which gives the estimated coefficients - shows that the estimated growth contributions of these four factors seem to be close to the predicted contributions of the neoclassical model. These results are robust to instrumenting investment in order to control for possible endogeneity (see column (3)). The last column tests whether the individual growth determinants have an independent effect on labour productivity growth not adequately captured by our theoretical framework. As can be seen when looking at column (4), no significant effect of the individual growth determinants can be detected if one accounts for the impact of these factors on either TFP or physical capital formation

TABLE A2.1: EXPLAINING THE RESIDUALS OF THE KNOWLEDGE PRODUCTION FUNCTION (1996-2000)

	coeff	R**2	coeff	R**2	coeff	R**2
1. ICT Production	0.26***	0.40	0.13	0.11	-0.09	0.09
2. ICT Investment	-0.10	0.00	0.18	0.02	0.12	0.02
3. Deregulation	0.40*	0.15	0.25	0.01	0.15	0.07
4. Age of Labour Force	0.08**	0.27	0.04	0.07	0.02	0.03
5. ICT & Regulation	3.02*	0.44	1.67	0.16	1.09	0.12
6. ICT & Age of Labour Force	0.46***	0.53	0.29*	0.18	0.19	0.15

***/**/* significant at the 1/5/10% levels.
Source : Commission services.

[124] Countries with high ICT production shares combined with relatively low levels of regulation (on the basis of the Fraser Institute measure), such as Ireland, Finland and the US, have outperformed countries like Spain and Italy with low ICT shares and above average levels of regulation. There is however another group of European countries consisting of Germany, Austria and Portugal which showed TFP growth rates above the rates predicted by their knowledge investment efforts despite below average performances in terms of the combined effect of ICT production shares and regulation. This could possibly be explained by their relatively timid efforts to increase the employment content of growth via labour market reforms. While the contribution of labour force growth to growth has increased in the EU as a whole between the first and the second half of the 1990s, it declined in Germany and Portugal, with Austria having a zero employment contribution to growth over the 1996-2000 period.

TABLE A3 : PRODUCTIVITY GROWTH REGRESSIONS (WITH CONTROLS FOR TFP)

	(1)[1]	(2)	(3)	(4)
1.Initial Income Level	-0.036	-0.045**	-.042**	-0.037**
2. Hours Growth	-0.019	-0.017**	-.016**	-0.017**
3. TFP Growth (implied long run)[2]	0.036	0.044**	0.041**	0.036**
4a. Investment Rate	0.019	0.017**		0.006
4B. Investment rate (predicted)[3]			0.017**	
5. Education				-0.001
6. Youth Dependency Ratio				0.001
7. Degree of Regulation :				
7a) Government Size				0.006
7b) Regulation Index				0.019
8. Stock Market Capitalisation				0.001
9. Bank Credit				-0.003
10 Openness				0.006
11Openness*Population				-0.001
12 Population				0.000
Number of Countries / Observations		21 / 91	21/88	21 / 88
R2**		0.63	0.58	0.67

1) Coefficients as implied by the neoclassical growth model with an output elasticity of labour equal to .65.
2) Coefficients estimated from Table A2, column (3) are used to calculate A*.
3) Predicted investment rate from Table A1, column (1).

***/**/* indicates significance at the 1/5/10% levels.
Source : Commission services.

3. WHAT DO THESE RESULTS IMPLY QUANTITATIVELY?: The estimates reported in the Tables above can be translated and interpreted in terms of short, medium and long run multipliers and therefore can give an indication of the magnitude of the effect of certain policies or exogenous shocks. Table A4 gives the estimated productivity growth contributions of investment in knowledge, physical investment and labour input growth. The most striking result is the large difference in the R&D multiplier relative to the physical investment multiplier. This is a fairly common result which can be found in many other studies (see, for example Grilliches (1994), Helpman and Coe (1995) or Jones et al. (1995)). The results found in the literature suggest that the social rate of return of one unit of money spent on R&D is in the range between 25 per cent and 100 per cent. This implies that a permanent increase in the share of R&D in GDP of 1 per cent would increase the growth rate of GDP in the range between 0.25 per cent and up to 1 per cent. The results reported in the Table suggest that over a period of 25 years the average growth effect of an increase in the R&D share from currently about 2 per cent in the EU to 3 per cent could increase growth by 0.6 per cent. However, extreme caution should be exercised when interpreting these results. One has to ask why the share of R&D spending is so low (only about 10 per cent of physical investment spending) when returns are so high? First of all, the average return compensates for substantial risks associated with R&D investment. Therefore these numbers say very little about the return that can be expected from concrete knowledge investment projects. A somewhat easier question to pose is the following: how can we explain why certain countries have a high R&D share and other countries have a low share? A look at Table A2 suggests that R&D activities require certain framework conditions. By looking at the cross-country variation of R&D spending across OECD countries one can identify clearly the following determinants, namely the level of education of the labour force and market size (proxied by openness and country size). Another possibly important variable is the structure of financial markets. If one takes these determinants into account, it is not that surprising that countries like Finland, Germany, Japan, Sweden, Switzerland and the USA manage to consistently have R&D shares above 2.25 per cent These factors also provide a good explanation why countries such as Italy, New Zealand, Portugal and Spain have R&D shares of only 1 per cent or less. This suggests that any successful strategy to increase R&D spending in the second group of countries must be accompanied by measures to increase human capital endowments and by further efforts to better integrate their economies into the world market.

A permanent increase in the growth rate of hours worked, whilst keeping the investment rate as well as TFP constant, has negative effects on labour productivity. Roughly speaking, an increase in the growth rate of hours by 1 per cent lowers productivity growth by about 3 per cent points in the first 10 years. The results also give a possible explanation for the trend decline in TFP and labour productivity in OECD countries.

With the fall in the birthrate in the 1970s all OECD countries have experienced a decline in the youth dependency ratio and an increase in the average age of the labour force. If it is the case that human capital depreciates then one would expect ageing of the labour force to have an effect on productivity. As our regression results suggest, this is

TABLE A4: MEDIUM AND LONG RUN EFFECTS OF KNOWLEDGE, PHYSICAL INVESTMENT AND LABOUR FORCE GROWTH ON PRODUCTIVITY (LEVEL EFFECTS)

	5 YEARS	10 YEARS	LONG RUN
1. Knowledge Increase in TFP by 1%	0.2	0.4	1.0
2. R&D Expenditure Share Increase by 1% point	5.3	9.1	17.7
3. Physical investment Increase of Investment to GDP ratio by 1% point	0.4	0.7	1.8
4. Hours worked Permanent increase by 1% point	-1.5	-2.6	-7.1
5. Youth dependency ratio Decline by 10% points	-2.0	-3.5	-6.8

Source : Commission services.

indeed the case. The Table below gives the results of a decline in the youth dependency ratio which is of the order of magnitude of the decline which actually occurred in OECD countries from the mid 1970s to the mid 1980s. These numbers are fairly large and would imply a decline in the growth rate of labour productivity of -0.3 per cent per annum in the last 15 years. When interpreting these numbers one must keep in mind that there is an offsetting effect on productivity growth induced by a decline in hours worked.

These results also give some indication of the effects of specific policy measures:

Education: The results reported here confirm the positive effects of education spending on productivity growth which are reported in the separate study on education and growth which is included in the present Review. Compared to the numbers quoted there, the long run effects are somewhat higher.

Openness: One interesting foreign trade development is the increased openness of countries belonging to EMU. The estimates suggest that the increase in the total trade of EMU member states between the first and the second half of the 1990s may have increased productivity growth by about 0.04 per cent points per year.

Regulation: The results on deregulation that we obtain from the growth regressions are comparable to previous results obtained by the IMF (see Bayoumi et al. (2003) and WEO (2002)). The implied change of moving to US levels of regulation as measured by the Fraser index used in the regression would suggest an increase in long run labour productivity of about 5 per cent. The IMF study implies a long run labour productivity effect of about 3 per cent. Both in the IMF study and in the ECFIN regressions the positive effect is generated via an increase in the investment rate.

TABLE A5: EFFECT OF SOME POLICY MEASURES ON PRODUCTIVITY (LEVEL EFFECTS)

	5 Years	10 Years	Long run
1. Years of Education (Increase by 1 year)	0.5	1.4	12.8
2. Increased openness (Equivalent to the increase in Euro Area trade between 1991-1995 and 1996-2000)	0.2	0.5	0.9
3. Moving to US levels of regulation	0.9	1.6	4.6

Source: Commission services.

Annex 2: Industry analysis: Data and methodological points

INDUSTRY LABOUR PRODUCTIVITY DATABASE: This database has been assembled by a team led by B. van Ark at the Groningen Growth and Development Centre (GGDC) for DG Enterprise. It consists of an industry dataset that covers the period 1979-2001 for the 15 EU Member States and for the USA. Disaggregation into 56 industries is provided on the basis of the ISIC rev. 3 classification. The primary variables included are nominal value added, industry deflators, employment and hours worked per employee[125]. Constant value added and hourly productivity series are then derived (see Table B for a complete list of the hourly labour productivity growth rates of all 56 industries over the last two decades).

Three methodological points need to be underlined:

- Firstly, the discussions on the emergence of a new productivity pattern linked to ICT industries ("new economy" era) have been associated with the statistical problem of correctly estimating price indices when the quality of the product is increasing rapidly (the typical case being for computer prices and other IT products). *Hedonic deflators* - based on the pricing of essential characteristics of the product - can help to overcome this and are applied by the US and a few European statistical offices. Following van Ark's approach, ECFIN have uniformly applied US deflators (instead of national ones) to sensitive industries (industries 30 to 33 incl. in the ISIC rev. 3). These are derived using a double deflation procedure (both input and output).

- Secondly, the current best practice for GDP calculations is to use chained indices like the Fisher or Törnqvist indices[126]. These indices avoid the usual problem associated with fixed-based indices (i.e. composition drift), and this is even more important when price indices vary a lot. It is, for example, a known property that the combination of the use of a Laspeyres price index and strongly declining prices (like in the IT industry) would overestimate the (value added and) productivity gains. In this study, and again following van Ark's approach, we have used Törnqvist aggregation procedures throughout. That is, the deflator of a group of industries is calculated as the geometric mean of the component industry deflators, using average nominal value added shares[127]. Or, in terms of changes in deflators (P_t) we have:

$$\Delta \ln P_t = \sum_i \tfrac{1}{2}\left(\frac{Y_{i\,t}}{Y_t} + \frac{Y_{i\,t-1}}{Y_{t-1}} \right) \Delta \ln P_{i\,t}$$

For these two main reasons, the aggregate measures used in this study will often not correspond to official series of value added or labour productivity (see Table A for a comparison)[128].

- Finally, the EU-15 total is aggregated on the basis of Euro exchange rates applied to nominal values, whilst all international comparisons are made following the conversion of the constant price series into PPS, using (fixed) 1995 conversion rates. All exchange rates are taken from ECFIN's AMECO database.

SHIFT SHARE ANALYSIS OF LABOUR PRODUCTIVITY GROWTH (SECTION 3.1): Relating the productivity growth of the overall economy to the productivity growth of the constituent industries' implies taking into account the simultaneous changes to the allocation and volume of the production factor (i.e. labour in the case of labour productivity). In the decomposition, the most important part is of course dependent on the productivity growth at the industry level that we can aggregate using the (fixed) beginning-of-period labour volumes. Another effect then involves displacements of resources amongst industries of varying productivity levels, which would result in overall productivity changes, even in the context of unchanged productivity at the industry level[129]. And finally the interaction effect would then account for labour reallocation effects amongst industries with varying productivity growth rates (typically negative, when an increase in productivity is associated with a decrease in labour use).

Formally we note, for the individual industries and for the overall economy, that (hourly) labour productivity is output (Y) divided by labour input (L):

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[125] Information on compensation is also included but is not used in the present study.

[126] Laspeyres indices are still however often used to calculate aggregate value added in volume.

[127] This formula also corresponds to the first-order approximation of a Fisher index.

[128] An additional explanation for the difference can be found in the series of 'Hours worked per Employee'. The series in the "Industry Labour Productivity Database" do not always match those at the aggregate level that were used for the analysis in section 2 (source for the series at the aggregate level: GGDC and The Conference Board, Total Economy Database, July 2003, http://www.ggdc.net).

[129] An historical example is the surge in overall productivity accompanying the labour force movement from the low productivity agriculture sector to the higher productivity manufacturing sector, i.e. the "Denison effect".

$$LPH_{i\,t} = Y_{i\,t} / L_{i\,t}$$

$$LPH_t = Y_t / L_t = \sum_i Y_{i\,t} \Big/ \sum_i L_{i\,t}$$

The second identity is only correct when we can use simple summation to aggregate output, that is when output is expressed in nominal terms (or with the use of a fixed-based index). In this case as well, labour productivity can be written as a weighted sum of the intra-industry productivity values:

$$LPH_t = \sum_i LPH_{i\,t} \frac{L_{i\,t}}{L_t},$$

This gives, in difference terms:

$$\Delta LPH = \sum_i \Delta (LPH_i) \frac{L_{i\,t-1}}{L_{t-1}} + \sum_i LPH_{i\,t-1} \Delta\left(\frac{L_i}{L}\right) + \sum_i \Delta (LPH_i) \Delta\left(\frac{L_i}{L}\right)$$

Dividing by LPH_{t-1} to get the growth (percentage change) and rearranging the terms we get:

$$\frac{\Delta LPH}{LPH_{t-1}} = \sum_i \frac{\Delta LPH_i}{LPH_{i\,t-1}} \frac{Y_{i\,t-1}}{Y_{t-1}} + \sum_i \frac{LPH_{i\,t-1}}{LPH_{t-1}} \left(\frac{L_{i\,t}}{L_t} - \frac{L_{i\,t-1}}{L_{t-1}} \right) + \sum_i \frac{1}{LPH_{t-1}} (\Delta LPH_i) \Delta\left(\frac{L_i}{L}\right)$$

- The first component is the *intra-industry effect*: i.e. the sum of industry productivity growth rates, weighted by the initial (nominal) output shares.
- The second component is the *shift effect*: i.e. the sum of changes in input shares, weighted by the relative productivity level (i.e. the ratio of industry productivity to average productivity). This effect could also be written and decomposed as the sum of industry labour input growth rates, weighted by initial output shares, *minus* total labour input growth.
- The sign of the residual (*interaction*) component is usually negative (in the economy there is a majority of industries where the productivity change and the labour input change have opposite signs). It may however be positive when beneficial restructuring of the economy occurs (in this case most of the industries enjoying productivity growth are at the same time attracting more resources).

The decomposition described above would strictly hold only in the case of (discrete) percentage changes. The logarithmic approximation (used throughout the study) entails an error of a magnitude often comparable to the interaction effect. We have however defined the intra-industry effect and the shift effect analogously to the discrete case. A corresponding decomposition for the continuous time assumption can be found in Nordhaus (2002), who has also shown that when "old-fashioned" price index methods are used (i.e. not the Törnqvist method, as explained above), one should add to the decomposition an additional term accounting for the drift in prices.

SPECIFIC INDUSTRY CONTRIBUTION TO TOTAL LABOUR PRODUCTIVITY PER HOUR (LPH) GROWTH (SECTION 3.2):
To calculate the contribution of specific industries to overall LPH growth, we take advantage of the fact that the intra-industry effect is the dominant effect, and that, for the period and countries under consideration, the shift (and interaction) effects are minimal.

The figures in the Tables should therefore be understood in the following way:

- The contribution to labour productivity per hour (LPH) growth from any group or sub-group of industries are calculated using a method compatible with the Törnqvist price index.
- The contribution to LPH growth from any group or sub-group of industries includes therefore the possible reallocation effects amongst industries belonging to that group or subgroup.
- The contribution from individual industries can clearly not include any reallocation effects. They are simply the product of that industry's productivity growth rate and of the (nominal) value added share of that industry at the beginning of the period.
- As a result, the contribution to LPH growth from a group or subgroup of industries would only equal the sum of the contributions of the component industries, if there were no changes in the volume of labour input. Conversely, any differences, apart from rounding and approximation, suggest a shift effect.

ICT CONTRIBUTION TO LABOUR PRODUCTIVITY GROWTH (CAPITAL DEEPENING AND TFP) (SECTION 3.3): This Sub-section relies on a different data set, the "Industry Growth Accounting Database", which has also been assembled by the GGDC for DG Enterprise. Disaggregated data on capital, allowing for a complete growth decomposition into labour, capital and TFP contributions is only available for 5 countries (the USA, Germany, the UK, France and the Netherlands) and for a 26-sector decomposition of total output. The time span of the data is unchanged (1979-2001). In addition, information on ICT related investment (software, computing and communications equipment) and on labour quality is also available at the industry level in this dataset.

Based on this information set, a comprehensive measure of the ICT contribution to overall productivity growth can be tentatively derived, that would encompass both the TFP growth linked to ICT production, and the diffusion of ICT to the rest of the economy through investment in ICT capital. The accounting equation for productivity growth becomes[130]

$$g(Y/L) = (1-\alpha)(1-\eta)\left[g(K_{nonICT}) - g(L)\right] + (1-\alpha)\eta\left[g(K_{ICT}) - g(L)\right] + g(TFP_{ICT\ ind})\frac{Y_{ICT\ ind}}{Y_{tot}} + g(TFP_{other\ ind})\frac{Y_{tot} - Y_{ICT\ ind}}{Y_{tot}}$$

with $g(Y/L)$, $g(L)$, $g(K_{nonICT})$ and $g(K_{ICT})$ denoting the growth of, respectively, output, hourly labour input, non-ICT capital and ICT capital. α is the wage share and η the share of capital expenditures devoted to ICT investment.

The second term is the part of capital deepening coming from investment in ICT capital (defined as software, computing and communications equipment).

The third term in the equation measures the contribution to technical progress stemming from ICT industries. For this database "Electrical and Electronic Equipment; Instruments" and "Communications" are the two ICT producing industries (out of a total of 26 industries). Their contribution is weighted on the basis of nominal value added taken from the "Industry Labour Productivity Database", using matching industries with codes 30 to 33 and 64 (ISIC rev. 3 classification).

Summing up these components, we can obtain a ratio showing the importance of ICT (both the productivity gains linked to ICT production and to the diffusion of ICT investment throughout the economy) to overall, economy-wide, productivity growth. Since the absolute figures that can be derived for labour productivity growth on the basis of this limited dataset are different from those obtained from the official national accounts data used in Section 2, we have applied the ratio of ICT's contribution to labour productivity growth at the industry level to the official productivity figures given in Section 2.

[130] Using standard conventions and assumptions and a modified production function to include ICT capital: $Y = L^{\alpha}\left(K_{ICT}^{\eta} K_{nonICT}^{1-\eta}\right)^{1-\alpha} A$

Table A : US + EU Hourly Labour Productivity : A comparison of the aggregates from the economy-wide and industry datasets

	USA		EU	
	National Accounts	Industry aggregate- Total Economy	National Accounts	Industry aggregate- Total Economy
1981-1990	1.4	1.1	2.2	2.4
1991-1995	1.0	1.1	2.4	2.3
1996-2000	1.6	2.3	1.6	1.6

Source : Commission services and GGDC.

Table B: Hourly Labour Productivity Growth Rates - USA and EU15
1981-2000 (Average annual % change)

	1981-90		1991-95		1996-2000	
	USA	**EU**	**USA**	**EU**	**USA**	**EU**
Agriculture	4.6	4.9	2.2	5.2	10.4	4.2
Forestry	8.2	4.1	-9.7	3.2	4.6	2.9
Fishing	-1.2	2.0	-11.3	1.4	12.8	0.3
Mining and quarrying	4.4	3.4	5.1	13.0	0.4	3.4
Food, drink & tobacco	0.6	2.7	3.6	2.6	-6	0.4
Textiles	3.4	2.9	2.1	3.1	2.6	2.2
Clothing	3.1	2.7	4.6	2.3	4.3	2.4
Leather and footwear	3.4	4.5	0.2	3.1	3.3	0.9
Wood & wood products	2.3	-3.0	-0.9	2.6	2.9	2.6
Pulp, paper & paper products	1.9	3.9	-0.1	3.4	1.7	3.2
Printing & publishing	-1.1	2.6	-2.9	2.1	0.7	2.2
Mineral oil refining, coke & nuclear fuel	9.4	-4.8	5.5	5.2	4.5	-1.1
Chemicals	4.8	5.4	3	6.4	2.4	4.2
Rubber & plastics	3.9	2.8	4.3	2.7	4.7	1.5
Non-metallic mineral products	2.3	3.5	2.3	3.1	1.2	1.7
Basic metals	0.3	4.6	3.6	6.1	2.1	1.9
Fabricated metal products	2.0	2.4	2.9	2.5	1.0	1.1
Mechanical engineering	-0.3	2.1	0.3	2.8	-0.1	1.3
Office machinery	27.5	26.3	28.5	28.0	53.4	48.1
Insulated wire	4.5	5.9	2.4	7.4	5.5	-1.4
Other electrical machinery	0.7	3.0	1.1	1.3	-1.3	2.1
Electronic valves and tubes	23.3	22.6	38.2	35.6	52.9	57.3
Telecommunication equipment	19.7	20.3	4.8	5.1	0.6	1.4
Radio and television receivers	9.4	11.8	-5.3	-0.8	-5.7	-5
Scientific instruments	2.4	2.5	-4.7	-3.1	-4.9	-7
Other instruments	4.7	6.0	2.3	6.8	7.1	5.4
Motor vehicles	0.8	4.4	3.8	3.3	1.2	1
Building and repairing of ships and boats	4.3	5.4	-4.4	1.8	2.6	1.2
Aircraft and spacecraft	1.2	4.9	-1.1	3.4	1.5	1.6
Railroad and other transport equipment	4.7	3.6	-2.4	4.6	3.2	3
Furniture & miscellaneous manufacturing	3.1	1.8	1.1	1.3	3.6	1.8
Electricity, gas and water supply	1.3	3.3	1.8	3.7	2.3	6
Construction	-0.4	1.8	0.4	1.0	-0.1	0.2
Sales and repair of motor vehicles[1]	-0.1	1.7	-2.4	2.2	-1.8	0.8
Wholesale trade and commission trade[2]	2.8	2.2	2.9	3.3	8.3	2.0
Retail trade[2] and repairs[3],	3.1	2.0	2	1.7	6.6	1.6
Hotels & catering	-0.8	-0.7	-1	-0.6	0.2	-0.8
Inland transport	1.5	2.7	1	3.1	1.2	2.3
Water transport	0.4	3.8	0.7	5.7	2.9	2.4

Continued next page

Table B: Hourly productivity growth 1981-2000, USA and EU-15 - Average annual % change
(continued)

	1981-90		1991-95		1996-2000	
	USA	**EU**	**USA**	**EU**	**USA**	**EU**
Air transport	1.2	3.7	2	9.0	4.6	5.0
Supporting transport activities	-0.9	3.4	-0.8	3.6	4.6	1.6
Communications	1.0	5.0	2.4	6.3	5.9	10
Financial intermediation	0.1	2.4	1	1.0	3.9	4.8
Insurance and pension funding	-5.1	2.7	2.5	1.1	1.1	-0.7
Auxiliary financial services	1.1	1.1	3.1	0.4	9.9	0.2
Real estate activities	0.2	-0.8	1.6	-0.1	1.2	-0.5
Renting of machinery and equipment	-1.5	2.2	8.2	2.9	4.3	2.3
Computer and related activities	5.8	0.7	2.4	1.1	-5.8	2.4
Research and Development	3.3	3.5	0.0	-0.4	1.3	-0.9
Legal, technical and advertising	-1.2	0.3	-0.9	0.4	-0.3	0.8
Other business activities	0.3	-0.3	-0.7	0.8	-0.1	-1.2
Public administration	0.7	1.0	0.2	1.3	0.9	1.0
Education	-0.2	0.1	0.3	1.0	-2.4	0.4
Health and social work	-1.7	0.3	-1.8	1.2	-0.3	0.8
Other services	0.2	0.3	0.6	0.7	-2.1	0.3
Private households with employed persons	2.5	-4.6	2.3	-0.5	0.7	-0.1
Total economy	1.3	2.3	1.1	2.3	2.3	1.7

	1991-1995		1996-2000	
	USA	EU	USA	EU
Number of Industries experiencing a productivity deceleration	27 (48%)	23 (41%)	21 (38%)	44 (79%)
Number of Industries experiencing a productivity acceleration	29 (52%)	33 (59%)	35 (63%)	12 (21%)

Source: Commission services and GGDC.

3. EDUCATION, TRAINING AND GROWTH

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EDUCATION, TRAINING AND GROWTH

1. Introduction

At the Lisbon Summit in March 2000, EU leaders made education a central part of their strategy for the Union to become the world's most competitive and dynamic knowledge-based economy by 2010. In particular, they set the objective of a 'substantial annual increase in per capita investment in human resources', as well as more specific targets such as a halving of the number of early school-leavers not in further education or training. Education ministers have since agreed further benchmarks, for instance on participation in lifelong learning.[131]

The previous chapter in this Review looked at drivers of productivity growth and highlighted the importance of investment in knowledge-related factors – in particular R&D and education. This chapter looks in more detail at education. Though there has always been awareness of the important role of education in growth, the formal study of this role has been inhibited in the past by the lack of empirical data and perhaps also by the lack of coherent theories of endogenous growth. Improvements in both these areas in recent years have led to a better, though still by no means complete, understanding of the contribution of education to economic growth.

The chapter begins by reviewing the recent economic literature to see how much of an impact on growth could be expected from the additional investments called for by Lisbon. It then looks at the available evidence on specific areas of education and training to see where investments might be targeted for higher returns. Finally, the chapter takes a first look at the quantitative impact of increased investment on average educational attainment in the labour force and at the implications for expenditure on education.

The chapter focuses mainly on the benefits of education in terms of higher earnings and national income. There is evidence in the literature that education leads to a whole range of other benefits, including greater citizenship, lower crime, reduced welfare dependence, increased social inclusion and better health.[132]

To the extent that improvements in these areas have a positive impact on growth, they are already partly covered by the macroeconomic analysis described in Section 2.2. Moreover, factors such as reduced welfare dependence are conditional on a positive impact of education on aggregate employment which, as we shall see, cannot be taken for granted. Thus, these additional benefits should not be exaggerated. Nevertheless, it seems quite clear that education leads to substantial improvements in private and especially social welfare over and above its impact on wages and national income. It is important to take these benefits into account in public decision-making, even though they may be more difficult to measure in monetary terms.

2. The contribution of education to economic growth – a brief review of the recent literature

There are several excellent recent surveys of the economic returns to education and its contribution to economic growth.[133] This section is therefore

[131] See "European benchmarks in education and training: follow-up to the Lisbon European Council", Communication from the Commission, COM 629 (2002).

[132] See, for instance, Venniker (2000).

[133] See, among others, Card (1999), de la Fuente and Ciccone (2002), Harmon et al. (2003), Krueger and Lindahl (2001), Psacharopoulos and Patrinos (2002), Sianesi and Van Reenen (2003), Temple (2002) and Topel (1999).

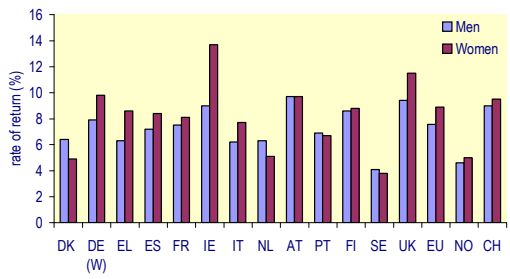
confined to a brief review of the main findings, with a focus on key European results.

We shall first discuss the private returns to education, or the individual rewards that a person who invests in an extra year of education may look forward to. Section 2.2 then discusses the macroeconomic returns, or the benefits of an extra year of average attainment for the economy as a whole.

2.1 Private returns

The private rate of return to investment in education reflects the trade-off that individuals are supposed to make between the costs of investing and the benefits they expect to receive. The main cost to consider is employment income forgone while studying (opportunity cost), although direct costs, such as tuition fees, maintenance and repayment of loans are also relevant. The main benefits are increased earnings, a higher probability of employment and any income received during studies such as grants and income-conditional loans as well as any income from part-time employment.

Graph 1 : Private returns to schooling, ca. 1995



Source : Harmon et al (2001).

Graph 1 shows estimated returns to schooling in 15 countries.[134] These range from around 5 per cent in the Nordic countries to upwards of 10 per cent in the UK and Ireland.

The EU average of around 8 per cent implies that the average EU employee (earning €33,750 in 2003) who chooses to invest an extra year in full-time education could expect a payoff of €2,700 per year in extra wages thereafter. An individual who would otherwise have earned the average wage but instead invests in a four-year degree course could expect increased earnings of close to €500,000 over a 40-year working life.[135]

The raw estimates of private returns need to be adjusted for several factors: the fact that working life is finite, the direct costs of education (such as tuition fees), any direct benefits (such as financial grants), income taxes, the possibility of employment during studies and a higher probability of employment after studies. De la Fuente (2003) estimates that private returns are, if anything, even higher once these factors are taken into account. He estimates a private return of 9.67 per cent for the EU as a whole.

The interpretation of these figures is not quite as straightforward as the foregoing discussion suggests. The fact that people with higher levels of education tend to earn more does not necessarily mean that education has a causal effect on earnings. Some of the complications are discussed in Box 1. Suffice it to say here that there is nevertheless widespread agreement in the literature that private returns to schooling are indeed broadly of this magnitude.

Of course, the attractiveness of an investment depends on risk as well as expected return. Risk is harder to quantify since, while it is easy to show that people with similar levels of education may have quite different salaries, it would be difficult to distinguish variance in the returns to education from other sources of variance in earnings. Therefore, it is difficult to make a precise comparison with other private investments, but returns of close to 10 per cent certainly appear favourable at first sight compared, for example, to equities.

In a world of perfect markets, of course, individuals would be able to borrow to finance investment in education and eliminate any risk through insurance. In practice, for several reasons, these markets are missing. The fact that estimated private returns appear high may indicate that some individuals are deterred from making worthwhile investments in human capital, which suggests a possible case for policies to ease credit constraints and reduce the risk faced by individuals.

In most countries, the estimated returns to education for women exceed those for men. The reasons for this are not fully understood, though the difference – more than a percentage point at the EU level – might partly reflect relative under-investment in female human capital, at least among older women. In other words, the availability of high returns suggests that worthwhile opportunities for investment in women's education have not been fully exploited, perhaps partly owing to factors such as the role of women in the family and gender discrimination, particularly in older generations.

[134] Returns are estimated using a common specification and national survey data supplied as part of a European Commission-funded research project on Public Funding and Private Returns to Education ('PURE'). See Harmon *et al.* (2001, 2003) for more details.

[135] An 8 per cent annual return compounded over four years gives a total return of 36 per cent which, multiplied by the average wage and by 40 working years gives €486,000 (without reinvestment).

Box 1: The private rate of return to investment in education

The key to calculating the private returns to investment in education is an estimate of the relationship between educational attainment and earnings. This is usually obtained from econometric studies of the determinants of individual wages, with years of schooling (or a better measure of attainment, if available) included as an exogenous variable. The estimated rates of return in the Graph 1 correspond to r in the following equation:

$$\log w_i = rS_i + g(x_i)\beta + u_i$$

where w_i is earnings (usually gross), S_i is years of schooling, x_i is age or years of labour market experience with functional form $g(\cdot)$ (often quadratic), β is a parameter and u_i is a disturbance term. The subscripts i refer to individuals, the estimation usually being carried out using large social survey or census datasets. A vector of other variables thought to influence earnings (such as IQ, race etc.) might also be included, though the figures reported come from a parsimonious specification including only years of schooling and potential experience (age minus age on leaving education).

The two main potential problems with this approach are ability bias and measurement error. First, if people with higher ability tend to reach higher educational levels, it may be ability rather than education that actually causes higher earnings. Secondly, survey evidence is prone to a degree of measurement error, which will tend to lead to an underestimation of the impact of education. Since these effects work in opposite directions, OLS estimates of the equation above may be reasonably accurate. According to Card (1999), the best available evidence suggests that any upward bias of OLS estimates of private returns is indeed small. This is based on studies of large numbers of identical twins, where ability bias is arguably less of an issue and where self-reported attainment can be corroborated by asking twins to report their siblings' attainment as well as their own.

Under-employment of well-educated women may also mean that those who do remain longer in employment tend to be relatively successful, which would imply higher estimated returns.[136]

2.2 Macroeconomic returns

A conceptually similar trade-off to the one individuals are supposed to make when deciding whether to invest in education operates at the macroeconomic level. Increased investment in human capital results at first in a smaller labour input, as people stay longer at school rather than working, and therefore reduced production and consumption. The stock of human capital then increases, which raises future productive potential. The economy is rewarded for sacrificing current consumption, and perhaps some investment in physical capital, in the form of higher output, consumption and welfare in future years.

A key question for policy-makers is then whether the macroeconomic reward is higher than the private returns. If so, this would indicate the presence of external benefits, which might be grounds for encouraging investment.

Until recently, it would have been difficult to find broad agreement among economists on the scale of the macroeconomic returns to investment in education. Many have argued that the social returns should in theory be a good deal higher than the private returns, owing to external benefits.[137] For example, it seems quite plausible to argue that a higher level of education might well enhance the productivity of one's colleagues as well as oneself.

Others, however, pointed out that education does not necessarily have a causal impact on productivity just because it has a causal impact on earnings. In particular, if education serves mainly as a signal of ability rather than something that actually enhances productivity, then the macroeconomic returns could be lower than the private returns. On the other hand, in some countries, the estimated private returns may be understated because wages do not reflect productivity (perhaps because of wage compression or equalisation across regions with widely varying productivity), which could partly explain the relatively low estimates for some countries (Graph 1). In this case, macroeconomic returns might well be higher than private returns.

The main empirical approach to estimating macroeconomic returns to investment in education has been cross-country regressions to explain economic growth. Temple (2002, p. 72 ff.) provides an excellent survey of this literature. To summarise very briefly, some papers, particularly ones that used the initial stock of human capital as an explanatory variable, found a very large – implausibly so – positive impact on growth. Then a number of high-profile papers in the mid-1990s

[136] Since returns are estimated only for people in employment. Further research is required to confirm the reasons for apparent gender differences in returns to education, as well as to disaggregate estimated returns by age group in order to determine whether significant differences remain for younger generations.

[137] The terms 'macroeconomic' and 'social' returns are often used interchangeably in the literature. This is not strictly correct, since education may lead to social welfare benefits that are not reflected in higher GDP, as noted in the introduction.

found that the *change* in educational attainment over time had – equally implausibly, for many – little or no impact on growth.

A further difficulty in the case of human capital was the poor quality of the available data on educational attainment and enrolment. Even if one accepted that the stock of human capital could be proxied by average years of schooling in the adult population, it was difficult to obtain series that were consistent over time and comparable among countries. This situation has markedly improved in the past few years thanks to the work of several researchers, notably de la Fuente and Doménech (2001, 2002), Cohen and Soto (2001) and Barro and Lee (2001).

Improved data quality has led to clearer results. Recently, something of a consensus has been established around the proposition that an increase in average years of schooling does indeed have a sizeable impact on productivity growth, implying a social rate of return broadly comparable to the private returns discussed in the previous sub-section.

Much uncertainty remains, however. The data improvements in question consist in essence of subjective judgements about the reliability of different sources, interpolation for missing years and so forth. The data may still contain a significant amount of noise. In some cases, the results are further adjusted for likely remaining measurement error.[138] Finally, it is worth remembering that 'years of schooling' do not cover important parts of formal education (such as pre-school and most of adult education), let alone the uncharted but nonetheless important areas of informal learning (see Section 3.6).

Moreover, it would be an exaggeration to speak of a complete consensus. Some authors continue to stress methodological problems, the wide variance in published results and the large margin of error surrounding many estimates of the macroeconomic returns (see, for instance, Pritchett, 2003).

For this chapter, we use the results of a study undertaken for the European Commission (de la Fuente, 2003), which is itself partly based on the results of several recent studies (including the three papers cited above as well as Bassanini and Scarpetta, 2001, and Jones, 1996). The benchmark estimates are reported in Table 1. Like the figures on private returns, these must be adjusted for several factors in order to arrive at the true social return: direct and opportunity costs of education, possible additional benefits in terms of employment (see Section 2.4), and welfare benefits that do not show up in the form of higher GDP.

A number of studies, some recent, have produced significantly higher estimates of the impact of education on productivity. Some suggest that an extra year of schooling might lead to a permanent increase in the rate of GDP growth of one percentage point or more – in other words, a large endogenous growth effect.

There are several problems with estimates that go much beyond the benchmarks presented. First, a large permanent impact on GDP growth is basically inconsistent with the data – while attainment has increased a lot in recent decades, GDP growth potential has remained fairly constant or even declined (Jones, 2002). Secondly, there remains a strong suspicion of reverse causation or bias due to omitted variables. Thirdly, many of the studies use large datasets including developing countries, where the potential for using education to catch up with the world technological frontier is relatively high.

Nevertheless, the results presented are still consistent with the notion that education influences innovation, invention and the diffusion of new ideas, and therefore has a longer-run impact on GDP growth as well as a more immediate direct effect on the level of GDP. The impact of education on technical progress should be picked up by the growth regressions described. As described in Box 2, the baseline α_H parameter in Table 1 is taken as a maximum for the direct effect. Studies that find a higher value for α_H are then interpreted as evidence of an additional, longer-run rate effect.

The benchmark 'rate effect' in Table 1 was chosen so that education accounts for no more than a reasonable share of cross-country differences in total factor productivity. While some might argue for a higher rate effect, it must be remembered that several alternative explanations of TFP differences – such as transport and communications infrastructure, investments in information and communication technologies, research and development spending, and workplace organisation – are frequently put forward. Doubtless, education contributes to technical progress through some of these channels, but it cannot on its own account for all of it.[139]

[138] See de la Fuente (2003, p. 51). Several different datasets are taken and a measure of their signal-to-noise ratio obtained by looking at the covariances between them. The same growth equation is estimated using each dataset and a relation between the estimated signal-to-noise ratio and the estimated coefficients is observed. This is then used in effect to extrapolate to the hypothetical case of zero measurement error.

[139] Chapter 3 looks in more detail at the broader determinants of productivity growth and, as far as education is concerned, arrives at results of a similar magnitude to those presented in Table 1.

Table 1 : Benchmark estimates of the social returns to education

Parameter	**Value**	**Source and interpretation**	**Implied productivity impact of an extra year's schooling in the EU**
α_H 'minimum'	0.394	Elasticity of output per worker with respect to average years of schooling. Raw coefficient from de la Fuente and Doménech (2002)	4.1%
α_H 'baseline'	0.587	Same, but adjusted for likely remaining measurement error (see footnote 8).	6.2%
γ 'rate effect'	0.2%	Impact on growth of total factor productivity (imputed from studies that find $\alpha_S >$ 0.587)	+ 3.1 % in the long term

Source : de la Fuente (2003).

Box 2: The macroeconomic rate of return to investment in education

The key to measuring the macroeconomic or social returns to education is an estimate of the response of output to changes in the stock of human capital. This is usually obtained by estimating a production function using cross-country data. A common choice is the neo-classical production function in Cobb-Douglas form augmented to include human capital:

$$Y = AK^{\alpha_K} L^{\alpha_L} H^{\alpha_H},$$

where Y is output, A is total factor productivity (TFP), K is the stock of physical capital, L is employment, H is average years of schooling or some other proxy of the stock of human capital, and the αs are the relevant output elasticities. The choice of the functional form is not neutral: in this case, it implies a constant response of output to a given percentage change in years of schooling. This means that the estimated absolute impact of an additional year of schooling varies inversely with years of schooling – a point that should be kept in mind when making cross-country comparisons.

This specification also leaves open the question of whether education might affect the rate of technical progress, independently of its direct effect on productivity. An alternative specification based on Lucas (1988) allows explicitly for human capital externalities and thus endogenous growth:

$$Y_j = AK_j^{\alpha_K} H_j^{\alpha_H} H_a g,$$

where the subscripts j refer to firms, H_a is the average level of human capital across all firms and g represents the externality effect. As long as g is greater than zero, the average level of human capital in the economy has an impact on a firm's output over and above the direct impact of the firm's own employees' education. Empirical testing of this type of model would require firm-level data.

Another possibility is to keep the first specification but to add a second equation that captures the impact of education on aggregate TFP, or on TFP relative to the world frontier, in addition to its direct impact on output. De la Fuente and Ciccone (2002, appendix, p. 87 ff.) discuss such an approach, but note that results are mixed in studies where this is attempted. In practice, most empirical studies estimate a single equation that is expected to capture both the direct effect and any longer-term 'rate' effect. The problem is then how to distinguish between the two, and also how to decide whether very large measured effects are genuine or might result from reverse causality or omitted variable bias.

De la Fuente (2003) adopts a pragmatic approach. He sets a maximum direct effect of α_S = 0.587 (the result of de la Fuente and Doménech, and towards the maximum value of α_S consistent with constant returns to 'broad' capital, i.e. $\alpha_S + \alpha_k = 1$). He then assumes that studies finding a larger α_S must be picking up either external benefits of education that would show up in TFP growth, or reverse causation. Results implying that education explains more than the total of TFP differences among countries are rejected as implausible. De la Fuente selects the benchmark of 0.20 per cent for the rate effect since this implies that education explains about one third of differences in TFP.

It may then be asked which particular aspects of human capital are likely to promote technical progress the most. Would it be more important, for instance, to raise general skill-levels so that all can apply new techniques, or should policy-makers focus on specific skills in order to stimulate the generation of new techniques? We will return to this issue briefly in the context of tertiary education in Section 3.5.

To sum up, while the selected benchmarks are still optimistic according to some observers, and come within a wide margin of error, they are at least plausible. Taken at face value, they suggest that an extra year of schooling in the adult working-age population might increase productivity by between four and nine per cent in the medium-to-long term.

Aside from the data issues mentioned above, there are several strong caveats. Perhaps the most important are, first, the calculations above are made on the basis of a representative individual of average attainment, whereas returns are likely in practice to differ among different individuals. Secondly, the returns to investment in education may diminish as average years of schooling increase. Thirdly, the calculations above are retrospective; returns may be higher or lower in the future. Some of these points will be elaborated on in the following sections.

2.3 The importance of quality

There is some evidence to suggest that the quality of schooling may be just as important as quantity. Quality in this context usually refers to levels of achievement in internationally comparable tests of mathematics, science and reading skills.[140] More generally, the quality of schooling systems might be defined with respect to any institutional feature that enhances the academic, economic and social capabilities of students.

Unfortunately, the available estimates of the impact of quality are less precise than estimates of the effect of years of schooling reviewed in the previous sub-section. Both Hanushek and Kimko (2000) and Barro (2001), for instance, find strong evidence of a causal link between labour force quality (measured by test scores) and growth. Indeed, the impact appears to be larger than the impact of years of schooling, which itself declines and becomes less significant when quality variables are included in the regressions. The problem is that the estimated impact of quality seems implausibly large: an improvement of one standard deviation in science and maths skills seems to translate into a permanent increase of real annual GDP growth of one percentage point. Hanushek and Kimko put this down to omitted variables, but state that they are unable to specify the precise cause or magnitude of the over-estimation.

From this brief review, we conclude that estimates of the growth impact of quality are still too tentative to yield consensus benchmark estimates. Nevertheless, the evidence clearly suggests that quality might be at least as important as the quantity of schooling. A one standard deviation improvement in student performance could have as much impact on growth as a standard deviation in average attainment (about 1.5 years among EU Member States). Moreover, since the scope for increasing the quantity of schooling may not be unbounded, quality takes on added importance as potentially the key margin for future expansion.

2.4 Employment effects

The analysis of returns to education described in Section 2 implicitly assumes that, when people invest in human capital, they will realise the benefits by being employed subsequently. In addition, it is usually assumed that people receive no work income while they are in full-time education.

Allowing for employment effects could make a significant difference to estimated returns. First, if an individual is not in employment, then the return on investment in human capital (at least in terms of GDP) will be zero. Even the potential value of the investment is liable to decline with time spent outside the labour market. Secondly, however, if education increases the probability of employment (including the probability of remaining in employment), then this could significantly increase returns. Thirdly, if people are able to work and study at the same time, the opportunity cost of education may be reduced, which also increases the rate of return.

Data from the Labour Force Survey (Table 2) show that the level of education is strongly correlated with an individual's probability of employment. The level of education is classified according to the International Standard Classification of Education (ISCED) adopted by UNESCO and last revised in 1997. In 2002, the overall employment rate in the EU-15 was 64.6 per cent, but ranged from 49.4 per cent for those with only lower-secondary attainment or below (ISCED[141] 0-2) to 70.5 per cent for those with upper-secondary level (3-4) and 82.8 per cent for those with tertiary education (5-6).[142]

[140] Such as the Third International Mathematics and Science Study (TIMSS) or the OECD Programme for International Student Assessment (PISA).

[141] The International Standard Classification of Education adopted by UNESCO, revised in 1997.

[142] See also Barceinas et al. (2001) for a useful discussion and some estimates of the impact of education on unemployment probabilities in Spain.

Table 2 : Employment by age and education (ISCED level), EU-15, 2002

	0-2	3-4	5-6	*total*
15-19	19.6	42.3	n.a.	23.5
20-24	58	55	61.7	56.6
25-29	63.3	74.9	82.4	74.1
30-34	65.5	80.7	88.1	78.5
35-39	66.8	82.6	89.1	79.4
40-44	67.8	83.5	90.9	80
45-49	66	82.8	91.3	78.5
50-54	58.9	77.3	87.6	71.6
55-59	43	60.6	74.8	54.8
60-64	20.7	25.8	42.7	24.3
total	49.4	70.5	82.8	64.2

Source : Commission services, LFS.

Causality is likely to run both ways. Individuals who are more likely to be employed have higher expected returns to education and thus may be more inclined to invest.[143] But an increase in an individual's level of education is also likely to raise the probability of employment. In terms of labour supply, low productivity and therefore low wages make employment less attractive compared to other options. Moreover, there is evidence to suggest that the structure of labour demand has shifted in recent decades in favour of intermediate and higher-level skills.[144]

Even if an increase in the level of education raises an individual's probability of employment, it does not necessarily follow that an increase in average attainment will lead to higher aggregate employment. If increased education leads to an increase in productivity that is evenly distributed across the population, then wages should increase in proportion, leaving labour demand unchanged. Moreover, if an increase in the average skill level leads firms to upgrade their production methods and technology, the relative demand for skills may be little changed. To the extent that the value of alternatives to employment (such as home-production or social security benefits) increases with average wages, the impact on labour supply will also be limited. Thus, in a simple labour demand and supply framework, an increase in the average level of education may have little impact on the employment rate.

On the other hand, increases in the education and training of particular groups could influence aggregate employment. Increased attainment among the low-skilled relative to the higher-skilled would serve to counteract the impact of skill-biased technical change. Large increases in tertiary participation without a proportionate rise in the qualifications of the low-skilled might have the opposite effect.

In the past, education, in combination with broader social and cultural developments, almost certainly played a substantial role in raising female labour force participation. Clearly, since young women are now at least as well educated as young men, this cannot be expected to continue (except insofar as pre-school education for children facilitates mothers' participation). But lifelong learning could conceivably play a similar role in future in the case of older workers (again, in combination with cultural factors as well as necessary reforms in other areas).

Thus, there are reasons to be optimistic that education may have a positive employment impact in the long run, although this cannot be taken for granted. In the short-to-medium term, increased upper-secondary and tertiary enrolment is clearly liable to have a negative effect on labour force participation. Although full-time education is not incompatible with part-time employment, many students choose not to work or are unable to find a job. Thus, EU leaders should not necessarily expect increased investment in education to help much in attaining the employment rate targets set for 2010.[145]

3. The Lisbon objective – how and where to increase investment in order to maximise the impact on growth?

3.1 Introduction

Given the objective of 'a substantial increase in investment in human resources', the question for policy-makers is where, how and by whom these extra investments should be made. A comprehensive answer to this would require information on the relative returns of different stages (e.g. pre-primary, tertiary) and types (e.g. academic, vocational) of education, ideally differentiated according to characteristics of participants (e.g. low-skilled, younger, older). However, as Sianesi and Van Reenen (2003, p. 181) point out, 'the available literature is still only tentatively and marginally able to provide reliable findings that could shed some light on such relevant issues'.

Nevertheless, this section aims to gather the available evidence as to where the returns to investment might be relatively promising, and also where resources for increased investment might be available. This information may then be combined with the results of

[143] This is akin to the 'ability bias' discussed in Box 1, but with the important difference that there is unlikely to be an offsetting measurement error, since there is relatively little scope for error in measuring whether someone is employed or not.

[144] See, for instance, Gregg and Manning (1997); Acemoglu and Pischke (1999).

[145] From a purely technical point of view, measures to encourage student employment could help, even if the typical part-time student job makes a relatively minor contribution to output. Only one hour of paid work per week is required to qualify as 'employed' in the labour force survey.

Section 4 in order to study the possible growth impact of meeting the Lisbon objectives.

Although somewhat more detailed than the previous section, the review of the evidence presented here remains at a rather general level. Partly for reasons of space and partly for the lack of economic evidence, many more detailed, but nonetheless important, issues are not addressed. For example, the choice between different types of upper-secondary education – from traditional academic qualifications to more vocational courses or modern apprenticeships – may have a key bearing on the economic effects of increasing enrolment. Nonetheless, a comparison of likely returns in the main broad areas of education and training should still be of interest to economic policy-makers.

3.2 Pre-school education

The available evidence, albeit mainly from the US, suggests that pre-school education is potentially an area of relatively high returns. Evaluations of model programmes (such as the Perry pre-school programme – relatively expensive and with relatively few participants) have found substantial long-term benefits, in the form of higher test scores, graduation rates and earnings, as well as lower crime and welfare dependence.

The evidence is less conclusive in case of large publicly-funded programs, such as Head Start. Early benefits in terms of test scores seem to fade away, according to some studies. However, Garces et al. (2002) argue that this may be due to the lack of well-designed evaluations, and produce some evidence of long-term benefits. Short- and medium-term benefits in the form of childcare, reduced needs for (costly) special education and reduced grade repetition offset 40 to 60 per cent of the costs. Thus, if long-term benefits are even a fraction of those of the model programs, Head Start clearly pays for itself.[146]

All of these US programmes target children from disadvantaged backgrounds, who might otherwise be relatively ill-prepared for school. There is some evidence that the benefits in terms of cognitive and social skills are greatest for children whose mothers had the least education (*ibid*).

The evidence from outside the USA is scarcer. Nevertheless, Boocock (1995) surveys studies from 15 countries, including France, the UK, Germany, Sweden and Ireland. These tend to broadly confirm the US findings: that pre-school programmes can have strong positive effects on children's school readiness and subsequent academic performance, and that children from disadvantaged backgrounds are likely, if anything, to benefit more.

It seems reasonable, therefore, to consider a year of pre-school as at least comparable to a year of compulsory or further education in terms of its economic impact. Alternatively, to the extent that it improves educational outcomes, pre-school attendance might be regarded as a factor contributing to the quality of school education.[147]

There may also be positive effects on female employment, in so far as the availability of good quality childcare facilitates mothers' employment.

Pre-school education appears to be a good candidate for public support, at least as far as children from disadvantaged backgrounds are concerned, given the likely market failures in the form of liquidity constraints and imperfect information on future benefits.

3.3 Primary and lower-secondary education

Within the framework described, one would expect the social returns to investment in basic education to be relatively high, since the direct costs are low compared to higher levels of education, while the opportunity cost ought to be low for those below working age. Since the case for free and compulsory basic education appears to be almost universally accepted, we will not dwell on the balance between private and social returns here.

However, the scope for increasing investment in terms of persons is of course negligible, since participation in primary and lower-secondary education is already virtually universal in the EU.

Indeed, the number of school-age children is actually declining at present. This raises an important efficiency issue. In principle, falling student numbers might be expected to free up resources which could be used for investment in other areas of education. In practice, the more likely outcome may be an increase in expenditure per student, at least in the short to medium term (see Box 3). If this is so, an important issue for education policy-makers is how to ensure that increased spending per student leads to genuine quality improvements. Alternatively, in systems where lower- and upper-secondary education are integrated, the fall in the number of lower-secondary pupils may make it possible to increase upper-secondary participation at limited financial cost.

The key margin for future expansion in basic education appears to be quality. The types of policies that might lead to quality improvements – and thus potentially large economic benefits – are discussed in Section 4.4.

[146] See Currie (2001).

[147] Although children from countries with traditionally high pre-school enrolment do not necessarily perform well in comparable tests, whereas some of the best performing countries in the PISA study have relatively low pre-school enrolment (see Graphs 4.4 and 4.7).

3.4 Upper-secondary education

Upper-secondary participation is also very high, but there remains significant scope for further expansion. EU leaders set a specific target at Lisbon to halve the share of 18-24 year-olds with at most lower-secondary education and not in further education or training.

Socially, this group is clearly of high significance. In evaluating the economic returns to investment, the question of heterogeneity arises. If in fact it is educational outcomes (in terms of skills and capabilities) that are important for growth, rather than simply the number of years spent in school, then expanding enrolment to take in those with lower abilities may be subject to diminishing returns.[148]

On the other hand, some of the microeconomic evidence suggests that this may not be a practical concern. Quasi-experimental evidence (based on exogenous changes in schooling due, for example, to a change in the legal school-leaving age) suggests that the returns to staying longer at school may be higher for those from disadvantaged backgrounds.[149] This is not necessarily inconsistent with the previous point. It may be, for instance, that some able young people are discouraged from staying on at school for reasons to do with their background. In any case, the available evidence does not confirm that extending upper-secondary participation would yield below-average returns.

A significant reduction in the share of early school-leavers would serve to improve the credentials of the lowest-skilled relative to the rest of the labour force. As argued in Section 2.4, this might be expected to have a favourable long-term impact on employment and unemployment, as well as productivity.

3.5 Tertiary education

Tertiary education is probably where the greatest margin for increasing investment in education in terms of persons is to be found, at least in the near future. The individual contemplating whether or not to continue studying at tertiary level is quite close to the average agent to whom the calculations on returns to schooling apply. On the face of it, therefore, we would expect marginal returns to be quite close to the benchmark results presented in Section 2, although some of the literature suggests that returns to tertiary education may be higher.[150]

However, these calculations are retrospective. They do not necessarily apply to future increases in average attainment. Krueger and Lindahl (2001) estimate returns to schooling (across a broad range of countries) with a quadratic specification and find not only that returns are diminishing, but that they are actually *negative* beyond about 7.5 years. This can be safely ruled out if one accepts the results of studies confined to OECD countries, where average attainment is well above 7.5 years. Moreover, as the knowledge-based economy continues to develop, the returns to education might increase.

Nevertheless, the possibility of diminishing returns remains a genuine concern. First, there is the theoretical possibility that participation might reach the point where it becomes imperative to have a tertiary degree as a signal of ability, even if that degree does little to enhance productivity. Concerns about 'over-education' are probably overdone at present since, even if some graduates are in non-graduate jobs, all the evidence suggests that the growth in demand for graduates has if anything outpaced the growth in supply. Blöndal et al. (2002), for example, show that the average wage premium for those with tertiary education has tended to rise since the early 1980s. However, there is no guarantee that this state of affairs will continue.

Furthermore, if signalling does not lead to excessive participation, it might still affect the type of course chosen, particularly where longer, academic programmes command a higher status than other tertiary courses.

Secondly, if a rapid increase in tertiary participation is encouraged by governments, complementary inputs – in particular, physical capital and technical progress – may not be able to keep pace. Hence, the returns to human capital might fall.

The balance between private and social returns is an important issue in tertiary education. As we saw in Section 2.2, the overall evidence suggests that private and social returns may be broadly comparable. The argument turns partly on the extent to which education may be of special significance for technical progress. A greater supply especially of high-level skills, it might be argued, is likely to facilitate innovation and its diffusion. More specifically, certain subjects and skills may need to be promoted, either to increase the supply of researchers or to fill supposed skill shortages.

Some of these arguments assume, at least implicitly, that policy-makers can speed up the reaction of the supply of skills to changes in demand, or that they have superior or advance knowledge of changing demand. This might be partly true. Romer (2000) has suggested that the US system is biased towards the liberal arts and that reforms and improved information about the prospects of natural science and engineering graduates would be conducive to growth. Since governments spend a lot of money subsidising private-sector research and development, it could be argued that they have some responsibility to tackle informational imperfections that might inhibit the supply of commercial researchers. Nevertheless, there is no clear evidence of systematic and durable misallocation of human resources on the supply side.

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[148] See Sianesi and Van Reenen (2003) p. 194.

[149] See Card (1999) for a survey.

[150] See Gemmell (1996).

As discussed in Section 2.2, there is evidence that education influences long-term technical progress, but the size of this effect is very imprecisely estimated. Gemmell (1997) concludes that the limited evidence 'is suggestive of a small externality effect, at best, associated with higher education but a greater weight of evidence is required before firm conclusions can be stated'. Furthermore, we are far from understanding the nature of this effect. The argument that policy should seek to promote natural sciences and engineering, for example, is mainly a theoretical one. It could also be argued that having well-educated people across all occupations, most of which are in services and have little to do with natural sciences and engineering, is the important thing.[151]

In any event, the relatively high participation rate in tertiary education in the USA compared to the EU is one possible explanatory factor behind relatively high productivity growth in the USA in recent years. Even if education does only affect the level of GDP, rather than its long-term growth rate, the expansion of tertiary education may still offer an important means of catching up with the USA in terms of GDP per capita.

On the basis of the available evidence, it is not unreasonable to continue justifying subsidies to tertiary education on the grounds of presumed external benefits. It might also be argued that public resources are better focused on specific areas where a clear, albeit theoretical, link with technical progress can be made. On the whole, in the absence of clear evidence, policy in this area must be partly a question of judgement. A prime example of a specific investment that seems likely to foster progress is the establishment, as part of EU research funding initiatives, of exchange programmes and multinational networks of researchers, designed to promote cooperation and greater diffusion of ideas.[152]

What does seem relatively clear is that there are high apparent private returns to tertiary education, which might be sufficient to secure a further increase in participation without additional public funds. This is a relevant point given *de facto* constraints on public resources, which mean that, in order to maximise overall investment in education, public investment would have to be focused on areas where private funds are unlikely to be forthcoming.

The present system of tertiary education funding in most EU countries – free or low cost access repaid in part by progressive taxation – is one reason why private investment is limited compared, say, to the USA (see Table 5). Moreover, the system is regressive, benefiting those from affluent backgrounds at the expense of the less well-off, who are much less likely to attend university even if access is free. The available evidence suggests that family background and environmental factors, not funding constraints, are the key influences on college attendance (OECD, 2001). Alternative funding schemes may be superior in terms of equity as well as efficiency.[153]

3.6 Adult education and workplace training

The finiteness of working life means that the private rate of return to schooling is slightly lower than the figures reported in Section 2.1.[154] Returning to the example given in Section 2.1, with a salary of €33,750 and an annual pay-off of €2.700, the actual rate of return is 7.6 per cent with a working life of 40 years, rather than 8 per cent with an infinite time horizon. In the context of adult education, this detail becomes significant. For example, the rate of return on a similar investment with a lifetime of 20 years is only 5 per cent. In the framework outlined, late investment clearly implies lower returns.

However, this framework is not fully adequate for the purpose of evaluating investments in lifelong learning. First, it takes no account of depreciation; yet, while some skills may last a lifetime, especially if regularly practised, some are soon forgotten while others become obsolete. Secondly, some skills (management training, for example) build on other skills and experience, or recent technological developments, and can therefore only be acquired later in life. Thirdly, continuous learning or retraining may play a crucial role in maintaining human capital already acquired. For these reasons, it cannot simply be concluded that the older people get, the less economic sense it makes to invest in their education and training, although there is likely to be an element of truth in this.

One argument in favour of adult education and training is that the opportunity cost may be relatively low, since

[151] Moreover, the education system in the EU is already highly focused on science and technology. Around 26 per cent of graduates in the EU graduate in mathematics, science and technology, compared to only 17 per cent in the USA. However, the USA has a significantly higher share of people actually working as researchers in the labour force (8.7 per 1000 people compared to 5.4 in the EU). See European Commission (2003).

[152] See also "The role of the universities in the Europe of knowledge", Communication from the Commission, COM (2003) 58.

[153] See, for instance, García-Peñalosa and Wälde (2000), who show that a free access system financed by a graduate tax tends to outperform financing by an income-contingent loan scheme in achieving efficiency and equity targets, while both these schemes fare much better than systems of free access financed from general taxation.

[154] In the finite case, the private rate of return can be represented as r in the following equation: $I = \sum_{t=1}^{H} \frac{w}{(1+r)^t}$, where I is the initial investment (direct plus opportunity cost), H is remaining years of working life and w is the annual increment in salary due to the investment.

participation does not necessarily imply giving up full-time employment. Clearly this is only true up to a point. To the extent that training substitutes for working hours, there is still likely to be a significant opportunity cost in terms of output. If training substitutes for leisure, there may be a cost in terms of welfare, even if this does not show up in GDP, although that may be partly offset in some cases by the consumption benefits of education.

In the case of workplace training, the evidence on private returns is mixed,[155] as well as references in OECD (2003a). Many studies have found that participation in training has a positive effect on earnings, though the estimated rate of return is often smaller than in the case of schooling. On the other hand, some studies in both the USA and Europe have found very high returns to participation in short-duration courses, but much lower returns to longer courses (although Pischke (2001) shows that this may be because individuals with high earnings growth have a higher propensity to participate in short courses). Several pieces of evidence suggest that firms benefit as well as (and perhaps even more than) employees, even where the training provided is of a general nature.[156] For instance, the estimated direct impact of training on firm productivity tends to be higher than the impact on wages, while trained employees seem to receive a higher premium for their skills at subsequent employers than at the present one.

The existence of high returns does not necessarily mean that encouraging an increase in training will yield similarly high returns. In the absence of market failures, employers would presumably invest in training up to the point where the benefits equalled the cost of capital, so that a further increase in training would yield only a normal return. In competitive labour markets, employees themselves would have an incentive to invest in skills that are of use to many firms, though inability to finance training may be an obstacle.

However, in imperfectly competitive labour markets, training provision is likely to be sub-optimal (Acemoglu and Pischke (1999). Wages in practice do not fully reflect productivity, partly on account of various labour market institutions that tend to reduce wage dispersion. Workers' incentives to invest even in general skills are reduced, since they will not receive the full productivity benefits in the form of higher wages. Employers, on the other hand, have an incentive to hire relatively skilled workers and even to offer some general training, since they are able to pay wages below marginal product. But, unless training is fully contractible, the firm and worker will not take into account the benefits to each other. Nor will the firm take into account the possible benefits to other firms if trained workers leave. These externalities are likely to result in under-provision.

Various co-financing mechanisms designed to top up employers' and/or individuals' training resources with public funds could help. Tax incentives or subsidies can reduce the marginal cost of training and help to ease credit constraints faced by individuals. However, there is also scope for policy failure. It is difficult to ensure that firms or individuals use subsidies for genuine training that is truly additional and of good quality. Regulation and monitoring of standards (by government and/or social partners) can help to improve information. While this might work well in some cases,[157] the regulation of eligible types of training clearly entails costs in terms of administration and loss of flexibility, and is unlikely to fully overcome the additionality problem.

Unfortunately, the history of training incentives is scattered with examples of large deadweight losses which mean that the returns on public investment, if any, have been considerably less than hoped for. The OECD (2003a) provides a useful overview of some of these initiatives, including the mistakes made and lessons learned. Examples include lump-sum subsidies that have no impact on training incentives; subsidies for particular groups of workers that lead mainly to substitution of training for other groups; a lack of accreditation leading to low-quality training or even fraudulent use of funds; and the potentially high costs of administering applications for training grants.

Finally, the evidence strongly suggests that 'learning begets learning' (Heckman, (2000)). Those who leave school or college relatively well-qualified also tend to receive more education and training later in life. As far as work-related training is concerned, OECD (2003a) provides some evidence that this may be in large part due to lower demand from the lower-skilled, rather than a reluctance to supply on the part of employers. Still, factors such as low literacy appear to lead to reduced supply of training.

These findings have two important implications for the analysis of returns to education. First, since schooling and subsequent education and training are correlated, the measured impact of the former may partly pick up the effects of the latter. In other words, part of the apparent beneficial effect of schooling on growth may be due to adult education and training, not to mention informal learning and on-the-job training.[158] Secondly, the fact

[155] See, for instance, Dearden *et al* (2000), and Pischke (2001).

[156] Some research suggests extremely high returns: Ballot (2003), for instance, finds that, where training accompanies innovation, estimated rates of return on 'training capital' may amount to several hundred per cent.

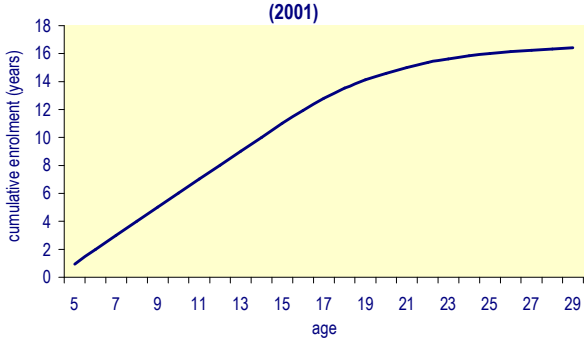
[157] The German apprenticeship scheme is a commonly-cited example, albeit in initial rather than continuing vocational training. Still, some criticise its lack of flexibility while others argue that the particular set of institutional circumstances necessary for it to function would be difficult to replicate in other countries. Wolf (2002) has a useful brief discussion.

[158] Adult education and training is only included in the attainment figures used to estimate returns to schooling if

that initial training inequalities are likely to diverge suggests that perhaps the greatest contribution the public sector can make in this area is to ensure a high-quality initial education for all, enabling new skills to be assimilated and thereby stimulating both the demand and supply for lifelong learning.

We conclude that, despite the fact that adult education and training occurs later in working life, it is reasonable to regard the returns as broadly comparable in magnitude to those from traditional schooling, and possibly higher in some cases. However, this does not necessarily mean that policies to increase adult education and training would yield similar returns. Any such conclusion would be strongly conditional on a radical improvement in policy design and evaluation.

Graph 3 : Cumulative enrolment in the EU, ages 5-29 (2001)



Note : cumulative enrolment is the sum of net enrolment rates, i.e. the number aged x who are enrolled dividedby the population aged x.
Source : Commission services.

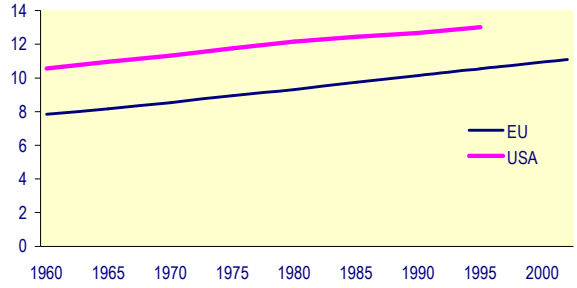
4. Policy simulations

4.1 Data snapshot

With some idea of the possible impact of an extra year of education on growth, we now turn to the more technical question of how much average attainment is likely to grow by in the coming years.

Graph 2 shows average years of schooling in the population aged 25-64 over the past four decades. This is the variable used in the growth regressions described in Section 1. Over the past 30-40 years, average years of schooling have tended to grow linearly at the rate of about 0.8 per decade in the EU as a whole (compared to 0.7 in the USA, with a slight slowdown apparent since about 1980).

Graph 2 : Average years of schooling in the EU and US, 1960-2002



Notes and source: see table A.1. The figure for EU 1995 is estimated.

it leads to an increase in the individual's attainment according to the ISCED classification.

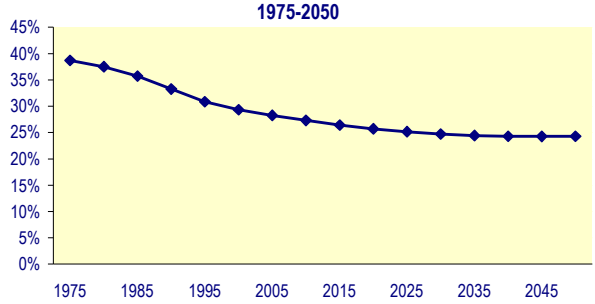
Graph 3 illustrates the pattern of enrolment in the EU by graphing age against cumulative enrolment. Initially, the graph is a line with almost 45° slope, reflecting the fact that between the ages of 5-15, enrolment is virtually universal. Thus, by the age of 15, cumulative enrolment is almost 11 years. From the age of 16 onwards, the slope begins to fall off. Thus, the main scope for increasing years of conventional schooling – in the meaning of the studies discussed in Section 1 – lies in upper-secondary and tertiary education.

After 29 (not shown), the curve almost flattens out. Average enrolment rises only another 0.7 years between the ages of 30 and 65, to reach an estimated total expected enrolment (or school life expectancy) of 17.1 years.

Even in upper-secondary and tertiary education, there may be limits to increased participation. The EU Education Council recently set a benchmark stating that, by 2010, 85 per cent of 22-year-olds should have completed upper-secondary education. In some countries, education is already compulsory up to the age of 18. In tertiary education, the position of the United States suggests some scope for further increases in participation in most EU countries. Beyond this, it is unclear whether tertiary participation will become saturated, or whether it can continue to grow. According to the UNESCO figures (Table 4), tertiary enrolment as a share of population aged 20-29 declined in the USA in the late 1990s, though that may have been partly a cyclical effect.

Graph 4 shows the decline in the share of the population aged under 25 over the last few decades and projected into the future. This, together with the likely saturation of secondary and perhaps tertiary participation, means that the increase in average attainment due to higher attainment of the youngest age groups is likely to decline. Thus, it cannot be taken for granted that average years of schooling will continue to follow the steady trend depicted in Graph 2 indefinitely.

Graph 4 : Share of population aged under 25, 1975-2050



1999 baseline population projections for 2005 onwards.
Source : Commission services.

Graph 5 shows that there remains some scope for increasing participation in pre-school education in some countries. Early child education and care is not counted in the measures of years of schooling used in the growth regressions described in Section 2.2. Nevertheless, since the available evidence suggests that early child education and care may be associated with even higher returns than traditional schooling, it is important to take it into account. The Barcelona Summit in 2002 set a target to provide childcare by 2010 to at least 90 per cent of children between 3 years old and the mandatory school age and at least 33 per cent of children under 3 years of age. While the latter target seems ambitious from the Graph, it should be noted that the majority of care for under-3s (according to national figures) does not show up in the ISCED enrolment data, which may be partly because the facilities in question do not count as educational. For this reason, we will focus here on facilities for 3-5 year-olds.

Table 3 : Net enrolment rates in secondary education

	1970	1975	1980	1985	1990	1995	2000
EU average	n.a.	n.a.	**78.7**	**78.4**	**82.7**	**91.0**	**91.0**
BE	n.a.	n.a.	83.5	88.6	87.7	88	n.a.
DK	n.a.	n.a.	88	83.3	86.8	87.7	89.5
DE	n.a.	n.a.	n.a.	n.a.	n.a.	89	87.7
EL	51.9	63.7	76.8	80.7	82.7	86.2	87.4
ES	39.9	63	74.2	n.a.	n.a.	n.a.	93.7
FR	66.4	76.1	78.7	81.7	83.8	94.4	92.4
IE	63.4	75.3	77.5	81.4	79.4	86.5	n.a.
IT	n.a.	66.6	n.a.	68.4	n.a.	n.a.	90.5
LU	44.5	55.6	67.1	66.2	n.a.	66.9	78.3
NL	68.8	80.3	81.1	88.6	83.6	90.7	89.9
AT	68.7	70.4	n.a.	n.a.	n.a.	89	88.5
PT	30.3	29	n.a.	n.a.	n.a.	n.a.	85.2
FI	70.6	n.a.	n.a.	n.a.	93	92.6	94.6
SE	n.a.	n.a.	81.6	n.a.	85.3	98.4	96.1
UK	67.1	77.3	79.2	80	79.1	91.5	93.7

Notes : the net enrolment rate is the number of students enrolled divided by the official age group for secondary education. 1980 figures for BE, EL, LU and SE are 1981, 1985 figures for IT are 1984; 1990 figures for FR are estimates; 2000 figures for DK, DE and SE are 1999; EU average weighted by aged 11-18 population.

Source : UNESCO education database and Commission services.

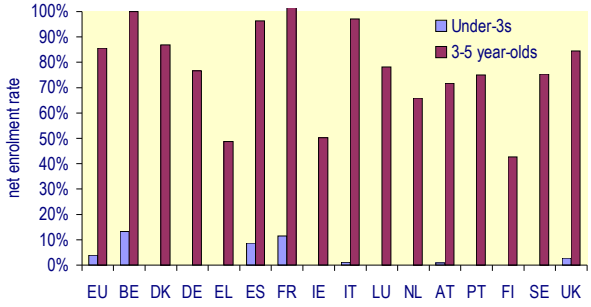
Table 4 : Enrolment in tertiary education as a share of population aged 20-29

	1970	1975	1980	1985	1990	1995	2000
EU average	0.08	0.11	0.12	0.14	0.17	0.21	0.26
BE	0.10	0.11	0.13	0.16	0.18	0.25	n.a.
DK	0.10	0.14	0.14	0.15	0.18	0.22	0.27
DE	n.a.	n.a.	n.a.	n.a.	0.15	0.18	n.a.
EL	0.07	0.09	0.09	0.13	0.19	0.21	n.a.
ES	0.05	0.11	0.13	0.16	0.19	0.24	0.28
FR	0.11	0.12	0.13	0.15	0.20	0.25	0.26
IE	0.08	0.10	0.11	0.13	0.18	0.24	0.26
IT	0.09	0.12	0.14	0.14	0.16	0.20	0.22
LU	0.01	0.01	0.01	0.01	0.02	0.04	0.04
NL	0.11	0.12	0.15	0.16	0.19	0.20	0.24
AT	0.06	0.09	0.12	0.14	0.15	0.19	0.25
PT	0.04	0.06	0.06	0.07	0.12	0.20	0.24
FI	0.08	0.13	0.16	0.17	0.23	0.33	0.44
SE	0.11	0.13	0.15	0.15	0.16	0.22	0.32
UK	0.07	0.09	0.10	0.12	0.13	0.21	0.27
USA	0.30	0.32	0.30	0.30	0.34	0.39	0.37

Notes : figures for BE 1975 and LU 1990 are estimated; the figure for the UK aged 20-29 population in 1970 is from 1972. Enrolment rates for Luxembourg are low because, until recently, there was no university in the country.

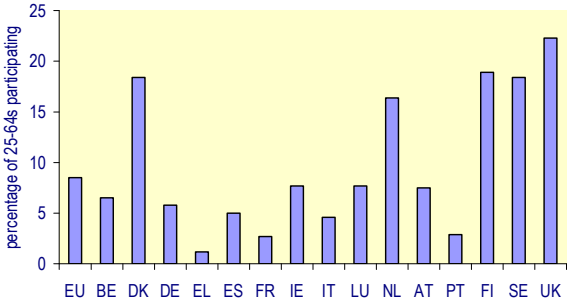
Source : UNESCO education database, Commission services and OECD.

Graph 5 : Enrolment of under-5s in education



Source : Commission services.

Graph 6 : Participation in lifelong learning, 2002



Note : shows the percentage participating in education and training in the four weeks preceding the survey.

Source : Commission services, Labour Force Survey.

In the long term, perhaps the greatest scope for a continuing increase in attainment lies in adult education. Graph 6 shows the latest figures on the share of the population aged 25-64 having participated in an education or training action during the previous four weeks. The EU average has remained broadly constant over the past few years at 8.4 per cent (compared to an estimated 8.5 per cent in 2000), despite the recently agreed EU benchmark of 12.5 per cent for 2010. Most participants in adult education have other substantial commitments and so are only able to devote a limited amount of time to education and training. This means that a relatively large increase in participation is necessary to have a sizeable impact on average attainment measured in years.

Table 5 shows the latest available data on the amount of resources invested in education and training and Graph 7 illustrates the recent evolution of public expenditure on education. As a share of GDP, this has fallen slightly over the past few years, to just under 5 per cent for the EU as a whole, although education accounts for a growing share of total public spending. The declining share of the under-25s in the population might have led one to expect a larger fall were it not for the apparent upward pressure on expenditure per student.

Indeed, the data on expenditure per student suggest a significant increase between 1999 and 2000 (5 per cent in tertiary education and over 7 per cent in primary and

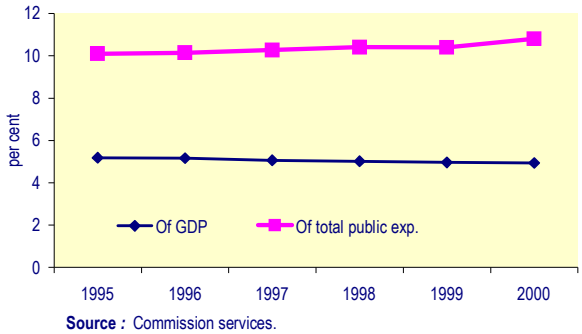
secondary – see Annex, Table A.2). The Eurostat figures are only available for a couple of recent years, but Gundlach *et al.* (1999), using UNESCO data, show that this is merely the continuation of a longer trend.

Table 5 : Investment in education: latest figures in per cent of GDP

	Public (2000)	Private (1999)	Workplace (1999)
BE	5.2	0.3	0.8
DK	8.4	0.3	1.6
DE	4.5	1.2	0.8
EL	3.8	0.3	0.3
ES	4.4	0.9	0.8
FR	5.8	0.4	1.2
IE	4.4	0.4	1.0
IT	4.6	0.4	0.7
LU	n.a.	n.a.	0.9
NL	4.8	0.4	1.4
AT	5.7	0.2	0.7
PT	5.7	0.1	0.6
FI	6.0	0.1	1.2
SE	7.4	0.2	1.5
UK	4.4	0.7	2.0
EU-15	**4.9**	**0.4**	**1.2**
USA	4.9	1.6	n.a.

Notes and sources : Total public expenditure as a share of GDP, Eurostat; private expenditure on educational institutions (net of public subsidies attributable for educational institutions), OECD education database; enterprise expenditure on continuing vocational training courses, Eurostat, based on CVTS 2. The latter figures are likely to be under-estimates since only expenditures by firms with 10 or more employees in NACE sectors C to K and O are included, whereas the denominator is total GDP. In addition, it is important to note that other important categories of workplace training (notably initial vocational training) are not included.

Graph 7 : Public spending on education, EU-15



Source : Commission services.

4.2 Policy scenarios

In order to look at the impact of different policy scenarios on average years of schooling in the population, it is useful to have an idea of the age profile of attainment. Fortunately, data on educational attainment by individual ISCED category and by age group are now available (though only for a few recent years under the ISCED 97 classification). These tell us what proportion of a given age group has reached each level of attainment – primary, lower-secondary, upper-secondary and so forth. This has been combined with de la Fuente and Doménech's (2001) figures on the number of (full-time) years of attainment corresponding to each level of attainment in the different countries. The results are given in Table 6.

Average attainment is highest in the 25-34 age group and, as would be expected, declines thereafter with age. The profile is broadly consistent with the finding that average years of schooling have tended to increase by 0.8 per decade. For the EU as a whole, the difference between the 55-64 and 25-34 cohorts is 2.2 years, slightly below 0.8 per decade. But by the time the 25-34 group reach the age of 55-64, the gap will have increased slightly, since some will reach a higher level of (ISCED) attainment through adult education. Average attainment among 15-24 year-olds is relatively low, of course, because many in this group are still studying. In ten years, their attainment will have risen to the level of current 25-34 year-olds or above.

Gender differences in attainment are notable. In the oldest groups, especially the 55-64 year-olds, male attainment comfortably exceeds that of females (except in Ireland, Finland and Sweden). In the youngest groups, however, women now have slightly more years of schooling on average than men. This of course reflects the substantial growth in female enrolment over time.

Country differences are also striking. Average attainment ranges from just over 7 years in Portugal to 13 years in Germany. Here, a word of caution is in order, since education systems in different countries are not fully comparable. The figures do take into account differences in the duration of different types of tertiary and upper-secondary programmes in the same country. However, they cannot take into account the fact that attainment is obviously higher in some countries in part because courses last longer, and it is debatable whether the quality of outcomes increases in proportion with the length of studies.

The age profile of attainment between the ages of 25 and 64 ranges from being almost flat in the case of Germany to a steep incline in Spain. Average attainment of 25-34 year-olds in Spain is four years higher than that of 55-64 year-olds, which reflects the tremendous increase in enrolment in recent decades.

Table 6 : Average years of schooling by age group, 2002

	15-24		25-34		35-44		45-54		55-64		25-64	
	F	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**
BE	10.7	10.3	12.4	11.9	11.4	11.5	10.6	10.8	9.4	10.0	11.0	11.1
DK	10.3	10.3	12.8	12.6	12.6	12.5	12.4	12.6	11.9	12.3	12.4	12.5
DE	10.0	9.8	12.9	13.1	12.9	13.2	12.8	13.3	12.2	13.1	12.7	13.2
EL	10.7	10.3	12.0	11.5	10.7	11.1	9.2	10.0	7.9	8.7	10.0	10.4
ES	10.2	9.6	11.1	10.6	9.7	9.7	7.9	8.5	6.4	7.3	9.1	9.3
FR	10.7	10.5	12.0	11.8	11.1	11.2	9.8	10.3	8.5	9.2	10.5	10.8
IE	10.6	10.2	11.9	11.6	11.1	10.9	10.1	9.9	9.0	8.8	10.8	10.5
IT	10.1	9.8	11.2	10.9	10.4	10.4	8.9	9.6	6.9	8.0	9.5	9.9
LU	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
NL	10.5	10.1	12.5	12.3	12.0	12.3	11.3	12.0	10.6	11.5	11.7	12.1
AT	11.2	11.0	12.6	12.8	12.4	12.9	11.9	12.6	11.4	12.3	12.1	12.7
PT	8.8	8.0	9.0	8.2	7.6	7.3	6.7	6.9	4.5	6.1	7.1	7.2
FI	10.3	10.0	12.7	12.1	12.4	12.0	11.4	11.0	9.9	9.9	11.6	11.3
SE	10.8	10.7	12.4	12.3	12.2	11.9	11.9	11.5	10.9	10.6	11.9	11.6
UK	11.8	11.7	12.3	12.4	12.1	12.3	11.7	12.1	11.2	11.6	11.9	12.1
EU-15	**10.6**	**10.3**	**12.0**	**11.9**	**11.5**	**11.6**	**10.5**	**11.0**	**9.3**	**10.2**	**10.9**	**11.3**
EU-15 (both sexes)	10.5		11.9		11.5		10.8		9.8		11.1	

Source : Commission services, Labour Force Survey; de la Fuente and Ciccone (2002) for cumulative years of schooling by educational level.

We now turn to estimating the likely increase in average attainment over the next ten years and beyond. In what follows, we will focus simply on the EU average, aggregated by country and by gender, for several reasons (not to mention limited space). First, the margin of error surrounding the estimates, as well as the source data, might make cross-country comparisons misleading. Secondly, the data on macroeconomic returns to education come from cross-country regressions. This means that estimates of returns for different countries (or different genders) depend on the functional form of the regression model. In the case of the model on which the figures presented in Section 2.2 are based, estimated returns are lower in countries with relatively high average attainment (see Box 2). Since it is an open question whether returns are in fact diminishing, we would not wish to impose such a restriction. Finally, this study is motivated by the Lisbon strategy, the goals of which refer to the performance of the EU as a whole.

Nevertheless, two important points follow from Table 6 and from the data presented in Section 4.1. First, the potential contribution of increased attainment to growth varies a great deal between countries where older workers are already relatively well-educated and those where the replacement of older workers by better-educated younger cohorts will substantially increase average attainment. Secondly, the scope for raising future attainment through current investment also varies significantly among countries, as the difference in enrolment rates in the different areas of education and training shows.

Even without additional investment, average years of schooling are destined to rise as younger, more educated cohorts replace those who retire. We begin, therefore, by estimating the increase in attainment holding enrolment rates constant. It is then relatively straightforward to study the additional impact of different policy scenarios by increasing the enrolment and/or attainment rates of different age groups, according to the policy target or benchmark in question.

In principle, the change in average years of schooling over the next 10 years can be estimated by moving the 55-64 year-old age group into retirement, shifting the younger age groups up by a decade, and estimating any increase in their attainment over that decade.

Clearly, demographic changes also have an impact as the size of the youngest cohorts declines relative to the workforce as a whole. Average years of schooling for the population aged 25-64 are thus calculated using Eurostat's baseline population projections for 2010 and 2050.

Table 7 : Policy scenarios : implications for average years of schooling in the aged 25-64 population and education expenditure

Scenario	Description	Increase in years of schooling in 25-64 population		Change in annual expenditure after first decade
		First decade	Long run	% of GDP
Constant enrolment	Enrolment rates by age remain constant	ca. 0.65	ca. 2.2	-0.30
Halve no. of early school-leavers	+ 10% of 18-24s achieve upper-secondary attainment	+0.04	+0.34	0.12
Rapid increase in tertiary participation	Equivalent of +9% of 20-29 year-olds enrolled in tertiary studies	+0.10	+0.69	0.41
More lifelong learning	+4% of 25-64 year-olds participating (at any given time)	+0.05	+0.22	0.24
More pre-school education	+4.4% of 3-5 year-olds participating	+0	+0.11	0.03

Notes : Here, preschool education and adult training are included in average years of schooling; this is not the case in Tables 6 and A.1 and Graph 2. Expenditure projections assume that expenditure per student grows at the same rate as GDP.
Source : See appendix

Given data on expenditure per student in the different areas of education and training, the possible implications for expenditure can also be estimated. This exercise simply assumes constant spending per student as a share of GDP, and is intended to be illustrative. In practice, with declining or rising student numbers, expenditure per student might well rise or fall (see Box 3).

The benchmarks, calculations and underlying assumptions are described in more detail in the annex. Table 7 presents the main results.

It is important to note that these scenarios are merely estimates of the change in full-time equivalent years of attainment. In the Table, a year of attainment is implicitly viewed as equivalent across the different areas of education and training. But, as the discussion in Section 3 suggests, this is not necessarily the case as far as the impact on economic growth is concerned.

The results in Table 7 confirm what is intuitively obvious: that most of the increase in average attainment over the next 10 years will result from investments already made, in some cases many years ago, as older and (on average) less-educated members of the workforce are replaced by younger cohorts. This will be the case even if the benchmarks for raising participation in upper-secondary education and lifelong learning are met, and tertiary enrolment continues to increase rapidly. On the other hand, it will take 50 years or more for the efforts to increase investment in education today to bear full fruit.

The long-term nature of the investment means that the rapid increase in enrolment in recent decades will be felt for several decades to come. Eventually, the growth in average attainment seems likely to slow down, owing to demographic change, the saturation of secondary and perhaps even tertiary education and the limited time most adults have available for training. Over the next decade or two, however, the results suggest that the increase in attainment will not be far below the trend of 0.8 per decade observed in recent history.

With constant enrolment, and if expenditure per student grew at the same rate as GDP, total expenditure on education would be expected to fall significantly as a share of GDP. While spending may be unlikely to fall by this much in practice, this does suggest that resources may be available to fund significant quality improvements or, for example, an increase in upper-secondary participation, even before increased expenditure is considered.

In view of the discussion in Section 3, some tentative conclusions on the relative returns to investments in different areas of education and training may be drawn.

- Pre-school education appears in many ways to be the best long-term investment, especially given its low opportunity cost and potentially high returns. The short-term pay-off is limited, for obvious reasons.
- Raising upper-secondary participation also appears to be a good long-term investment, coming relatively early in the life-cycle and with relatively low cost per student compared to tertiary education.
- The growth in tertiary enrolment is clearly likely to make the largest additional contribution to increasing attainment in the near future. The cost of

maintaining growth at a similar rate to that of previous decades is, however, significant.

- Lifelong learning can also make a significant contribution, and it offers the largest short-term pay-off relative to its long-run impact. But it also appears to be the most expensive option in terms of direct costs, mainly because the investment comes relatively late in the life-cycle.

Box 3: Expenditure projections

The expenditure projections in Table 7 are made on the basis of constant expenditure per student. Whether this is a reasonable assumption in the short to medium term, particularly in view of changing student numbers, may be open to question.

Salary costs make up the bulk (around 70 per cent) of public expenditure on education. The natural assumption is that these should be indexed to overall productivity in the long run, assuming that the quality of teaching staff relative to the rest of the workforce is to be maintained. There might be some scope for productivity improvements in non-staff inputs. Even here, however, in order to maintain a constant quality of education, schools must move with the productive capacity of the rest of the economy – for example, they will need to invest in up-to-date ICT facilities. Therefore, a reasonable approximation is to index total education spending to productivity in the wider economy. This implies that, in the absence of demographic shifts or changes in enrolment rates, and with a constant employment rate, spending on education as a share of GDP would remain constant.

At the primary and lower-secondary levels, there are reasons to think that expenditure per student is likely to rise in the face of a significant fall in student numbers, at least in the short term. First, some of the costs associated with infrastructure and equipment may be fixed and, to a certain extent, indivisible. For example, class sizes might have to fall significantly before the closure of a school and the reallocation of pupils to other schools would be justified. Secondly, staff representatives are likely to be able to mount effective political opposition to reduced expenditure (particularly since this implies a fall in the number of staff), and so there may be 'windfall gains'. These might take the form, for instance, of smaller class sizes or reduced workload – which may or may not lead to increased quality.

In tertiary and adult education, where participation seems set to continue expanding, there may be economies of scale, meaning that the marginal cost of enrolling an additional student is less than average expenditure per student. However, quality is likely to suffer eventually if enrolment is expanded substantially without sufficient additional finance.

Another method of projecting education expenditure is to assume that growth in expenditure per student initially follows recent trends and gradually converges (over a period of say 20 years) towards the rate of productivity growth. This approach suggests a significant increase in spending despite declining numbers at primary and lower-secondary level (Montanino *et al.*, forthcoming, Economic Policy Committee (2003)). Indeed, the cost of allowing spending per student to rise in this way could match the cost of increasing enrolment along the lines of the benchmarks presented in Table 7 (i.e. a total of 0.8 per cent of GDP per year).

4.3 The possible impact on employment

Compared to the vast economic literature on education and growth, it is striking that there is almost no solid evidence on the impact of education on aggregate employment.[159]

This is partly because full employment is implicitly assumed in most of the growth literature. However, the dependent variable in the growth regressions described in Section 2.2 is frequently GDP per person rather than GDP per employed person. In this case, the growth regressions should in principle pick up employment as well as productivity effects. Bassanini and Scarpetta (2001), for instance, using GDP per working-age person, arrive at similar results to the benchmark estimates in Table 1, which are based on GDP per employed person.

The paucity of empirical work on education and aggregate employment may also be partly due to the fact that theoretical priors, as discussed in Section 2.4, suggest a limited impact. Nevertheless, with employment far from full in many countries, and with human capital a key strand of employment policy, this issue would seem to be an important one for future research.

In the meantime, the best that can be done is to provide some indicative figures on the possible magnitude of the effects discussed.

Röger and Wijkander (2000) found that skill-biased technical progress could explain as much as 3.5 to 5 percentage points of unemployment in France, Germany and Italy. A similar-sized effect in terms of reduced labour force participation is easily imaginable, given the extent of early retirement in recent years. Thus the benefits of re-equilibrating the skills distribution would appear potentially significant.

However, calculations by Heckman (2000) suggest that investments of nearly 30 per cent of GDP might be required to fully reverse the increase in inequality due to skill bias in the USA by means of training – even

[159] Stenberg and Wikström (2004) is one of the few papers that squarely address the issue. These authors find that a rise in the share of individuals with a college degree has a short-run positive impact on the aggregate employment rate of Swedish males (though they do not take into account the initial negative effect of increased tertiary enrolment on participation). De la Fuente (2003) arrives at a tentative estimate of an aggregate employment impact, but this is based on scaled-down estimates of the correlation between attainment and employment probability at the individual level.

assuming a 10 per cent rate of return on investment. These are rough estimates that may not easily translate to the European case, but they serve to illustrate the point that, even if all investment in human capital were targeted, it would take a huge effort and/or a long time to offset the effects of skill bias. In practice, most investment is not targeted in this manner and some clearly works in the opposite direction.

Nevertheless, examples of targeted investments with likely positive employment effects may be highlighted, though it is extremely difficult to quantify these effects. The most obvious case is perhaps the target for reducing the share of early school-leavers by 10 per cent. This would increase both the wage and employment prospects of the individuals in question, though there may be some substitution for existing employees with upper-secondary qualifications. It would also reduce the supply of low-skilled workers, thus potentially raising wages for this group and potentially lifting some out of unemployment traps. However, since tertiary participation also seems set to continue increasing, the relative skill level of those with at most upper-secondary qualifications is set to decline over time.

In the longer term, the limited scope for increased secondary and tertiary participation together with greater focus on lifelong learning is likely to mean that the distribution of attainment by age will even out. In other words, the downward slope in attainment from the 25-34 age group onwards that is apparent in Table 6 is likely to flatten out over time. Indeed, as noted earlier, this is already the case for some countries, such as Denmark and Germany. It might be argued that this will help to counter skill-biased technical change, since older workers ought to be more adaptable, relative to the rest of the workforce, than they are at present.

Of course, it is not inevitable that technical change will continue to be skill-biased – it might become skill-neutral, or even biased towards the low-skilled, as seems to have been the case in the early 20th century (Acemoglu (2002)). On the other hand, since governments are actively encouraging skill-biased change in some respects (by subsidising R&D and promoting dynamic knowledge-based economies, for instance) they may have a responsibility to ensure that the requisite high-level skills are available. In that case, efforts to improve lower-level skills may be a necessary complement.

Increased upper-secondary and tertiary participation is likely to have a negative impact on employment in the short term. Table 8 shows employment rates in and out of education for 15-24 and 20-29 year-olds (the age groups most relevant for the benchmarks on upper-secondary and tertiary education). Assuming that these average rates remain unchanged and hold for the individuals in question, then meeting the benchmark for reducing early school-leaving implies that around 4.2 per cent of the 15-24 year-old population will have an average employment rate of 25 per cent instead of 64 per cent. This translates into a fall of 0.3 percentage points in the overall employment rate. Similarly, raising the participation of 20-29 year-olds in tertiary education by 9 percentage points implies a fall of 0.6 percentage points in the 15-64 employment rate (see annex for details) These of course are first-order effects and might be partly offset by reduced youth unemployment.

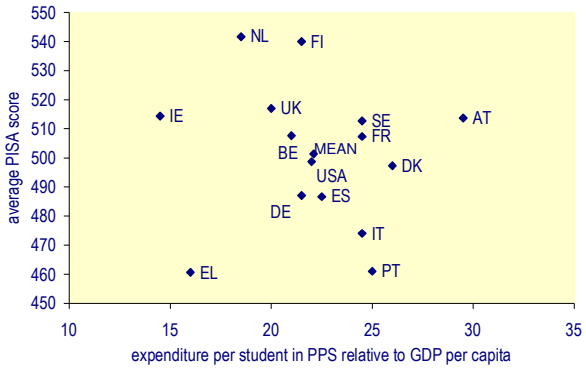
Finally, improved availability of affordable, good quality child care and education is likely to have a positive impact on female participation. Duncan *et al.* (2001), for example, show that the quality-adjusted price of childcare strongly influences the demand for childcare and, through that, the employment choices of mothers with pre-school children. For the EU as a whole, this is of most relevance in the case of care (as opposed to education) for 1-2 year-olds. But in those countries where enrolment of 3-5 year-olds in pre-school education is low, progress towards the Barcelona target could facilitate an increase in female labour force participation (see Graph 5).

4.4 Reforms

The importance of the quality of the school system was highlighted in Section 2.3. This raises the question of how educational outcomes can be improved.

Several authors have found that the relationship between students' educational performance and resource factors such as expenditure per student and class size are, in the words of Wößmann (2003, p. 156), 'dubious and weak at best.' This does *not* mean that money makes no difference – adequate resources are self-evidently a necessary condition for a high-quality education system. The apparently weak relationship between resources and outcomes does, however, suggest that resources are used with varying efficiency. For instance, the allocation between teachers' salaries and non-teacher inputs such as books and equipment may be far from optimal in some countries (Pritchett and Filmer, (1999)).

Graph 8 : Expenditure versus outcomes



Note : The PISA score is the average of the scores for reading, maths and science literacy in 2000. Expenditure per student is at primary and secondary levels (averaged) for 1999 in purchasing power standards (PPS).
Source : OECD.

Table 8 : Youth employment rates in and out of education, 2001

		In education	Out of education
BE	15-24	9.3%	58.7%
	20-29	45.1%	79.3%
DK	15-24	54.9%	78.8%
	20-29	63.9%	87.2%
DE	15-24	38.6%	65.0%
	20-29	49.8%	77.0%
EL	15-24	4.2%	55.6%
	20-29	12.6%	67.7%
ES	15-24	11.3%	69.0%
	20-29	28.4%	75.1%
FR	15-24	14.2%	51.7%
	20-29	38.0%	75.5%
IE	15-24	15.9%	83.1%
	20-29	16.8%	86.5%
IT	15-24	4.8%	51.7%
	20-29	14.9%	64.3%
LU	15-24	11.5%	81.3%
	20-29	32.9%	84.6%
NL	15-24	55.0%	84.0%
	20-29	60.4%	87.3%
AT	15-24	24.4%	67.5%
	20-29	21.8%	84.4%
PT	15-24	11.7%	78.3%
	20-29	37.9%	85.3%
FI	15-24	25.9%	55.1%
	20-29	50.9%	73.1%
SE	15-24	24.3%	73.2%
	20-29	36.0%	87.1%
UK	15-24	47.9%	71.8%
	20-29	62.3%	79.8%
EU average	15-24	24.9%	63.8%
	20-29	39.1%	76.0%
USA	15-24	48.0%	71.3%
	20-29	67.3%	80.3%

Notes: employment includes work-study programmes; figures for NL and USA for 2000.
Source: OECD, EAG 2002, Table C5.1; Eurostat and OECD for population weights.

By way of illustration, Graph 8 plots 15 year-olds' test results from the OECD's PISA study against public expenditure per student as a share of GDP per capita. Of course, this requires careful interpretation and should not be read in a simplistic fashion as an indicator of efficiency. For example, some observers question how accurately the PISA results reflect performance, arguing that children in some countries may be more used to tests and thus perform relatively well. In addition, it would be preferable (were the data available) to look at cumulative expenditure over the past decade, rather than from only the past two years. It should also be noted that expenditure appears relatively low in some countries, notably Ireland, where GDP growth has been particularly rapid in recent years and it may take some time for expenditure on education to catch up.

Nevertheless, the striking lack of any clear correlation between expenditure and performance suggests that resources may be being used with variable efficiency. At least, it suggests that efficiency issues deserve a prominent place on policy-makers' agendas.

Countries to the upper-left of the mean manage above-average attainment with below-average public spending on education (as a share of GDP per capita). Others, such as Austria and Sweden, also have well above average achievement, but this costs them significantly more. Italy and Portugal also spend more than the average but have relatively low attainment. This might signal efficiency issues, though it might also be partly due to reforms undertaken in recent years that have led to increased investment but will take time to be fully reflected in improved performance. In Greece, there might be a stronger case for increased investment, though of course the efficiency with which additional resources are employed will largely determine whether Greece moves towards the upper-left or the lower-right quadrants of the Graph.

Not everyone agrees that variables such as class size make no difference. Krueger (2003), for example, uses high-quality US experimental evidence to argue that an exogenous reduction in class size from 22 to 15 students yields a normal economic return of around 6 per cent.

But what also clearly matters is the incentives that determine how efficiently available resources are spent.[160] Wößman (2003) identifies a number of institutional features of schooling systems that are found to be positively related to student performance. Among the most important are centralised control of performance standards (in particular examinations) combined with school autonomy in process and personnel decisions, with power and incentives for individual teachers to determine appropriate methods but a relatively low level influence on these issues from teaching unions. The US literature has highlighted the role of competition and choice – between different public institutions (e.g. by means of voucher schemes) or between private and public schools – in promoting an increased focus on improving student performance (see, for instance, Hoxby (2003)).

The appropriate balance between centralised control, accountability and autonomy is also an issue in tertiary

[160] See "Investing Efficiently in education and training: an imperative for Europe", Communication from the Commission, COM (2003). 779.

education. Here again, there may be substantial scope for improvements. Table 9 provides a crude indicator of the public cost per graduate. This should also be interpreted with care. The costs reported are for all students, not only those graduating, while private expenditure is not included, and some of the public expenditure in some countries is in the form of student loans which will be repaid. Nevertheless, factors such as high drop-out rates and the long duration of tertiary studies in some countries undoubtedly explain a large share of the striking differences between Member States. Reforms to curtail excessive duration and to reduce high drop-out rates could significantly improve the ratio between attainment and enrolment.

Table 9 : Estimated public cost per tertiary graduate

	€ PPS	% of GDP per capita
EU	40750	186
BE	48028	205
DK	86602	335
DE	71108	305
EL	na	na
ES	24471	136
FR	26233	119
IE	25684	103
IT	51422	228
LU	na	na
NL	62530	253
AT	107405	434
PT	25709	167
FI	65743	294
SE	96399	415
UK	20286	92

Note: public spending on tertiary education in PPS (average of 1999 and 2000) divided by the number of tertiary graduates in 2001 (2000 for DK, FR, IT and FI).
Source : Commission services.

Reforms outside the school system could also have a significant impact on the returns to investment in human capital.

The Barcelona Summit set the objective of raising the effective retirement age by five years, from about 60 at present. Clearly, these extra years come at the end of working life, and so are heavily discounted as far as young people are concerned. Developing the example given in Section 3.6, the impact of extending working life from 40 to 45 years would be to raise the rate of return to schooling from 7.6 per cent to 7.7 per cent. If the increase came about through reduced early retirement – for example, extending working life from 35 to 40 years – then the effect would be slightly larger, with returns increasing from 7.3 per cent to 7.6 per cent.

The impact on returns to adult education and training, particularly for older workers, could be much larger. Extending the lifespan of an investment from 20 to 25 years, for instance, raises returns from 5.0 per cent to 6.2 per cent, using the same example. Similarly, under an alternative view whereby human capital depreciates more rapidly and needs to be maintained, raising the effective retirement age would significantly boost incentives to invest in adult education and training.

Labour market reforms could have a substantial impact on incentives to invest in education. Wage bargaining institutions, minimum wages, search and matching frictions and firing costs may all lead to compression of the wage distribution (Acemoglu and Pischke (1999)). A closer link between wages and productivity would directly raise the private returns to investment in education, though of course the reaction of labour demand and the implications for firms' incentives to provide training must also be taken into account. Greater opportunities for holiday work or part-time work while studying – for which there is ample scope in many countries (see Table 8) – could significantly reduce the opportunity costs particularly of tertiary education.

The differences in estimated private rates of return to education (Graph 1) suggest that labour market institutions may have a significant impact. However, they cannot explain all of the cross-country variation. Part of the reason why returns in Denmark and Sweden are relatively low may simply be that investment is relatively high (Table 5), thus driving down average returns. It could also be argued that investment in education leads to greater equality of opportunity, resulting in lower wage inequality. This could result in lower estimated private returns to education compared to other countries, but not necessarily lower social returns.

Labour taxation is a significant influence on private returns to education since it determines how much of any increment in gross wages due to education finds its way into disposable income. Out-of-work benefits too may reduce training incentives in the same way as they reduce employment incentives.[161] De la Fuente (2003), using OECD data on tax and benefit replacement rates at the average production worker wage, estimates that the negative impact of taxes and benefits on private returns to education is more than outweighed by the positive impact of public educational subsidies. A more detailed analysis would be necessary to take full account of the details and progressiveness of the tax and benefit system in different countries. Nevertheless, to give a broad indication of scale based on de la Fuente's calculations, a reduction in the marginal tax rate of one percentage

[161] In-work benefits, designed to boost the incomes of low-paid workers without operating directly on wages, may also discourage training.

point (from an EU average of just over 41 per cent) would raise the private rate of return to schooling for an average production worker by about 0.14 percentage points.

Finally, there are indications that gender balance in human capital investment and utilisation could be improved. The fact that private returns to investment in education tend to be higher for women than for men may indicate the presence of surplus returns. This is most probable in the case of older groups, since many women in the past did not have the same educational opportunities as men or, even if they had acquired a good education, dropped out of the labour force. Efforts to combat discrimination and perhaps to target lifelong learning initiatives at women who might wish to return to work could pay dividends. Younger women are nowadays better educated on average than their male counterparts. A policy of gender balance here might involve, for example, ensuring that efforts to reduce the number of early school-leavers not in further training are adequately geared towards the needs of young men.

5. Conclusions

The aims of this chapter were threefold: first, to review the economic evidence on the impact of education on growth; secondly, to see what insights are to be gained about particular areas of education and training that might deliver relatively high returns; and, thirdly, to look at the likely impact on attainment, and hence growth, of meeting various benchmarks for increased investment in education – in the broadest sense of lifelong learning.[162]

The best available evidence suggests that education has had a substantial impact on growth in recent decades. These estimates still come with a wide margin of error and several strong caveats. Nevertheless, a one year increase in the average attainment of the 25-64 population is plausibly associated with a 4 to 6 per cent increase in productivity, and perhaps a further 3 per cent in the long run.

Whether this continues to be the case in future depends on many unknowns, such as the nature of technical progress, the extent of any diminishing returns to continued growth in enrolment and whether increased investment is channelled into more or less productive areas of the education and training system. It also depends crucially on the quality of education and training systems. Indeed, the literature suggests, perhaps not surprisingly, that the quality of educational outcomes may matter at least as much as the number of years spent at school or college.

[162] See "Making a European area of lifelong learning a reality", Communication from the Commission, COM, final (2001) 678.

The economic literature does not allow firm conclusions about the returns to different areas of education and training to be drawn, mainly because the data that would be needed to address these questions are unavailable. Nevertheless, evidence in some areas as well as insights from the general returns framework allow some tentative conclusions to be put forward.

- Pre-school education looks to be a sound long-term investment, with potentially large economic and social benefits, relatively low costs (both direct and opportunity), likely benefits in terms of employment for mothers, and of course a long period of amortisation.
- A high-quality basic education for all would also seem to be a priority, particularly in view of the finding that success early on begets further opportunities for productive learning later in life, while a lack of education leads to poor prospects for employment and further training. The key margin for expansion in primary and lower-secondary education is quality. Raising upper-secondary participation – already compulsory and approaching universality in some countries – would also appear to be a sound investment.
- Tertiary education appears to be an area of high private and social returns. While concerns about over-education are periodically raised, the evidence does not suggest that this is a practical concern at present, although the possibility of diminishing returns to a further rapid increase in enrolment cannot be ruled out. Aspects of tertiary education may be of particular importance for technical progress, though the evidence does not provide precise estimates of the benefits.
- Adult education and training might seem at first sight to be an area of relatively low returns, on account of the shorter duration of the benefits. However, the opportunity cost may be lower than for tertiary education, and if the need to maintain and renew depreciating human capital is taken into account, the returns may be larger than they first appear. The evidence suggests that returns to work-related training – when the benefits to both firms and employees are taken into account – are at least comparable to the returns to schooling.

As to the likely impact of growth, it is likely that education will continue to make a substantial contribution over the next decade. Average attainment is set to increase at a rate not far below the recent trend of 0.8 years per decade. If the estimates of macroeconomic returns to schooling are accurate and continue to apply, that would imply a contribution of a little under 0.3 to 0.5 percentage points of GDP per annum on average in the EU as a whole.

However, around three quarters of the increase in average attainment will be due to investments already made, as younger and better-educated cohorts replace

those who retire. Average attainment is a stock that responds slowly to changes in the flow of enrolment. Thus, investments made in the next decade will have relatively little influence on growth in the near future. Indeed, it will take 50 years or more for them to bear full fruit, although increased tertiary enrolment and lifelong learning in particular may also have a significant shorter-run impact.

In the long run, it may seem unlikely that average attainment can continue to increase at the same pace, given the fall in the share of young people in the population, the saturation of upper-secondary and perhaps tertiary education, and the relatively limited scope for increasing adult education and training as long as most participants are working full time. Nevertheless, the effects of the rapid increase in participation in recent decades will continue to be felt for many years.

These gains will be very unevenly distributed among Member States, with the greatest benefits going to countries where enrolment has expanded most rapidly in recent decades. Nevertheless, there remain large disparities in average attainment between Member States, so further investments may still be required in countries that are rapidly catching up. Average attainment is set to increase by much less in countries where enrolment was already high in the 1960s and 1970s, and has grown less rapidly in subsequent years, which suggests that the contribution of education to growth in the coming years will be relatively low. Here again, however, it must be stressed that the number of years of attainment is by no means an ideal proxy for the stock of human capital. For example, a country that improved the quality and efficiency of its education system might see stable attainment in years, but increased attainment in persons and improved educational outcomes.

Finally, a number of general reflections are in order.

First, while most of the literature focuses on the productivity impact of education, there are also reasons to be optimistic that increased education will have a positive impact on aggregate employment in the longer term. This would be more likely if investments were targeted at the low-skilled and if the increased focus on lifelong learning helps older workers to remain longer in the labour market. In the short term, a further increase in upper-secondary and tertiary participation is expected to have a negative impact on employment, since those in full-time education are less likely to participate in the labour market.

Secondly, the social returns to education, although they are not measured with great precision, appear to be broadly comparable to the private returns. This does not suggest a compelling case based on market failure for a generalised increase in public investment in education. Rather, it makes sense to focus additional public funds on particular areas where significant market failures – and, moreover, ones that policy is able to address – appear more likely. In areas where both private and social returns appear high, but there is no clear evidence that the latter exceed the former, private investment is likely to be forthcoming where enabled. It does not seem to make sense to concentrate finite public resources in these areas, given the objective of increasing overall investment. However, the fact that estimated private returns appear high in relation to other investments suggests the existence of significant credit constraints and/or uninsurable risks associated with investments in human capital. Policy may need to ease these constraints in order to enable private investment.

Thirdly, if policy-makers are interested in maximising the impact of education on growth, then the focus should not only be on increasing investment. Raising the quality of educational outcomes, especially at basic and secondary level, must be a high priority, and the evidence suggests that incentives, rather than expenditure, are the key influence here. In addition, there is probably ample scope for improving the efficiency with which existing resources are used in some areas. Reforms leading to improvements in quality and efficiency would directly raise both private and social rates of return, thus encouraging further productive investment.

Fourthly, reforms in other areas should also be on the agenda. Private returns to investment in education would be higher in better-functioning labour markets. Raising the effective retirement age is perhaps one of the best ways to promote lifelong learning. Tax and benefit systems are an important influence on training incentives, and should be designed accordingly. Measures to reduce gender imbalances in access to education and training and to lower obstacles that may prevent able and qualified older women from making the most of their human capital would be desirable. The great advantage of reforms in these areas is that they would be immediately effective for the whole stock of human capital, not just current enrolment. They would thus have a relatively large impact in the short- to medium-term, which should be of interest from the perspective of the Lisbon strategy.

Fifthly, there is room for improvement in the design and evaluation of education policies in Europe. It is striking, for example, that almost all the evaluation literature on pre-school education is from the USA even though provision is much more extensive in several EU countries. Moreover, the scope for policy failure, as well as market failure, needs to be acknowledged. High-profile failures, for example in the area of tax breaks and subsidies for adult education and training, risk discrediting all such schemes. Yet, with rigorous design and evaluation, it may be possible to find ways of addressing the market failures in this area in an efficient way.

Sixthly, there is great potential for international cooperation and exchange of experience in the field of education and training. On one hand, EU-funded exchange programmes have proved to be profitable

experiences for many individual students and researchers. On the other hand, growing cooperation among education policy-makers in the EU promises progress on the mutual recognition of qualifications as well as exchange of best practice in a range of areas, from ICTs in the classroom to making better use of resources.

Finally, although the framework of returns to education offers useful insights, the chapter has highlighted a few shortcomings. It would be unrealistic to expect economic analysis to provide a precise guide to returns in every area of education, but some more results by type and level of training would be desirable. This is of course conditional on having adequate data, which is more likely in an evaluation-friendly environment (see above). It would also be useful to have an idea of the riskiness of investments. It is striking that there is very little solid evidence on the impact of education on aggregate employment. And the returns framework appears in need of some refinement in order to deal adequately with lifelong learning. It will be for economists to judge whether greater knowledge in these areas would justify the necessary investments.

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Annex : Simulation details

This annex provides some more details on the estimates of how average attainment is affected by demographics and enrolment patterns and on the implications for expenditure and employment.

Table A.1 shows de la Fuente and Doménech's (2001) estimates of average years of schooling in the adult population from 1960 to 1995 for EU countries and the US, together with our estimates for EU countries for 2002.

Table A.1 : Average years of schooling 1960-2002

	1960	1965	1970	1975	1980	1985	1990	1995	2002
BE	7.7	8.1	8.5	8.9	9.4	9.7	10.1	10.5	11.1
DK	10.8	10.9	11.1	11.3	11.5	11.7	11.7	11.9	12.5
DE	9.9	10.4	11.0	11.5	12.0	12.6	12.9	13.1	13.0
EL	5.6	5.9	6.2	6.6	7.1	7.5	7.9	8.7	10.2
ES	5.0	5.1	5.2	5.5	5.9	6.5	7.1	n.a.	9.2
FR	8.1	8.6	9.0	9.6	9.9	10.2	10.5	n.a.	10.6
IE	7.4	7.5	7.8	8.2	8.5	8.9	9.4	10.1	10.6
IT	5.4	5.8	6.2	6.6	7.0	7.5	8.0	8.6	9.7
LU	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.0
NL	8.1	8.5	8.9	9.4	9.9	10.4	11.0	11.4	11.9
AT	9.0	9.2	9.3	9.8	10.3	10.9	11.3	11.7	12.4
PT	4.4	4.6	4.9	5.3	5.7	6.1	6.4	n.a.	7.2
FI	7.7	8.2	8.7	9.3	9.9	10.5	11.0	11.4	11.4
SE	8.0	8.3	8.6	9.1	9.6	10.1	10.6	11.1	11.7
UK	8.6	8.8	9.1	9.4	9.8	10.2	10.5	n.a.	12.0
EU-15	7.8	8.2	8.5	8.9	9.3	9.7	10.2	n.a.	11.1
USA	10.6	11.0	11.3	11.8	12.2	12.4	12.7	13.0	n.a.

Note : figures for Germany before 1990 exclude former GDR, EU average (excluding Luxembourg) weighted by population aged 25-64.

Source : de la Fuente and Domenech (2001) for 1990-95, Table 4.4 for 2002; Commission services for population data.

A.1 Constant enrolment

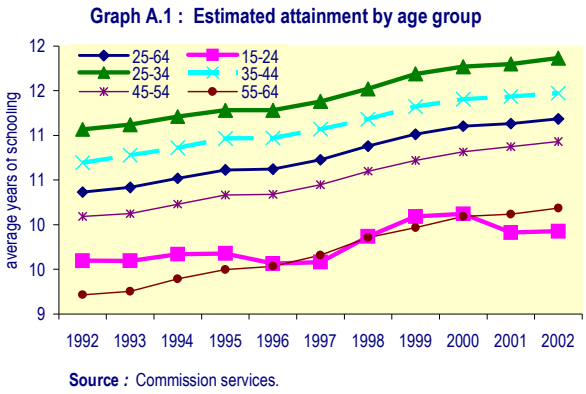
We begin by estimating what would happen to attainment over the next decade if enrolment rates were frozen at current levels.

Graph 3 in the main text shows cumulative net enrolment, or the sum of net enrolment rates – i.e. the number of people of a given age enrolled divided by the total number of people of that age. The sum of net enrolment rates from ages 5 to 65 gives *school life expectancy*, as reported by Eurostat, OECD and UNESCO. (In practice, net enrolment rates for the latter years are estimated, since data on the enrolment of over-40s are not available.)

As noted in Section 4.2, the data on enrolment (from the registers of schools and other institutions) are not fully comparable with the attainment data (from the Labour Force Survey). Years enrolled are significantly higher than years of attainment because of factors such as part-time studies, repeated years and drop-outs. These may well vary between countries, age groups and types of education, and comparable data are not available. Using the enrolment data to predict how much attainment would increase over the next decade leads to a large over-estimation. One could assume that the error is constant and estimate this by predicting current attainment using enrolment data from 10 years ago, but unfortunately the enrolment data do not go back far enough.

The LFS data giving a detailed breakdown of attainment by ISCED categories are only available for a few recent years. However, using the broader categories of low, medium and high education, it is possible to estimate attainment by age group for 1992-2002 (for most countries). It turns out that for 2002 the results are very similar to those obtained using the more detailed data. The pattern of increasing attainment is illustrated in

Graph A.1. (Attainment rises less among 15-24 year-olds than among the other age groups, perhaps in part because of the relatively limited scope for increasing secondary participation.)



We use this data to estimate lower and upper bounds for the increase in years of schooling over the next decade with constant enrolment. In essence, each age group is shifted up by 10 years (the 55-64 year-olds into retirement), and then some allowance must be made for increased attainment due to current enrolment.

The lower bound estimate assumes that 15-24 year-olds (currently with 9.9 years of attainment), reach the same level in 2012 as current 25-34 year-olds (11.9 years). Applying this to the population projections for 2010 gives an increase in average years of schooling in the 25-64 population of 0.47 years. This is clearly a lower bound since it misses current enrolment in the 15-24 age group that has not yet resulted in attainment.

For an upper bound estimate, we use the actual increase in attainment of the 15-24 cohort between 1992 and 2002. This of course includes not only existing enrolment that has not yet led to attainment, but also any increase in enrolment rates over the decade. The average attainment of 15-24 year-olds in 1992 grew from an estimated 9.6 years to 11.9 years by the time they reached the ages of 25-34 in 2002. If we had applied the method of the previous paragraph, this would have captured only 65 per cent of the actual increase, since the attainment of 25-34 year-olds in 1992 was only 11.1 years. For an upper bound, we will apply the same factor of error to the 2002 figures. Thus, we take the difference between 25-34 and 15-24 attainment in 2002 (2 years), divide this by 65 per cent, and add the result to 15-24 attainment (9.9). This gives an upper-bound estimate for attainment of 25-34 year-olds in 2012 of 13.0 years. Applying that to the population figures gives an increase in average years of schooling of 0.71 years.

These estimates need to be adjusted upwards by the expected increase in attainment among today's 25-54 year-olds due to current enrolment. This was done by looking at the enrolment profile, which suggests that school life expectancy for a five year-old is 17.1 years (Eurostat estimate). 15.8 of these expected years occur before the age of 25. Since attainment at this age probably lags enrolment (we suppose by about two years on average, given tertiary course duration of around four years), we take the figure for expected years before age 23, which is 15.4 years. Assuming that the profile of attainment is similar to that of enrolment, attainment before age 25 can be estimated to account for 90 per cent (15.4/17.1) of total attainment. (This may in fact be an underestimate to the extent that enrolment later in life is less likely to result in a higher ISCED qualification.)

Putting all this together gives a range of estimates for the increase in average years of schooling of 0.52 to 0.79 over the next decade, from which we select our rough baseline estimate of 0.65.

The baseline for total expected lifetime attainment of 15-24 year-olds is then 13.8 years. In the long run, with constant enrolment, the age profile of attainment changes markedly. Since attainment continues to increase throughout working life, albeit slowly after the age of 25, it is the 55-64 year-olds who end up with the highest level. Using the results from the previous paragraphs, and the shape of the enrolment profile, we derived the following attainment profile: 15-24, 9.9 years; 25-34, 12.5 years; 35-44, 13.4 years; 45-54, 13.6 years; 55-64 13.7 years. Applying this to the population projections for 2050 provides us with a rough estimate of average attainment in the long run with constant enrolment: 13.3 years, an increase of 2.2 years. Part of this effect is demographic: whereas today the 15-24 and 55-64 age groups are about the same size, the older group will significantly outnumber the younger one by 2050.

A.2 Early school-leavers

The Lisbon Summit set a specific target to halve the number of 18-24 year-olds with only lower-secondary education who are not in further education or training. In 2000, around 19.7 per cent of 18-24 year-olds were in this position. The target could be met by increasing participation in upper-secondary education and/or by increasing the participation of over-18s with only basic education in post-secondary education and training. For simplicity, we assume that hitting the Lisbon target will mean an extra 10 per cent of 18-24 year-olds will have achieved upper-secondary attainment by 2010 or shortly thereafter. Since enrolment does not necessarily lead to attainment, it is possible that some who participate may still end up with only basic qualifications. Thus the benchmark is slightly more ambitious than the Lisbon target.

The difference between upper- and lower-secondary attainment is 3.4 years on average in the EU (de la Fuente and Doménech (2001)). Hitting the target implies that, eventually (in 50 years, to be precise), 10 per cent of the 25-64 population will have an extra 3.4 years of attainment. Thus the long-run impact on average attainment will be 0.34 years.

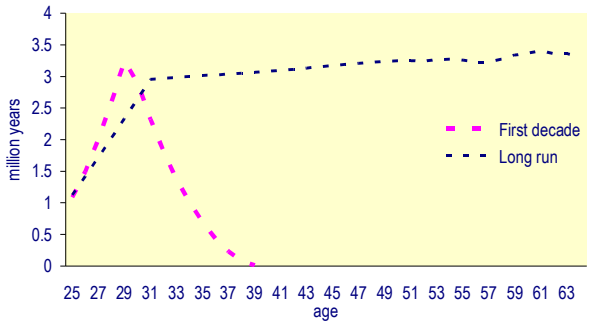
During the first decade, the impact is much smaller, for two reasons. First, in 2010, only one age group in the adult population (25-34 year-olds) has been affected. Secondly, we assume that progress towards the benchmark is gradual and linear, so that the increase in total attainment during the first decade is only about half of what it would be if the target were hit immediately. Applying this to the 2010 population projections implies increased attainment of a total of 8.1 million years. Dividing by the 25-64 population (in 2010) gives an increase in average schooling of 0.039 years.

A.3 Tertiary education

If (gross) tertiary enrolment in the EU grows by about the same amount between 2000 and 2010 as it did during 1990-2000, it will reach 37 per cent of 20-29 year-olds by 2010, which happens also to be the US rate for 2000 (see Table 4). We therefore take this as our scenario for a continued rapid increase in tertiary participation. An increase of 9 per cent of 20-29 year-olds (or a smaller equivalent share of a larger age group) implies an increase in school life expectancy of 0.9 years. The long-run increase in average years of enrolment in the 25-64 population is slightly below this (0.85, using Eurostat's population projections for 2050), since some in the 25-29 age group have yet to complete their studies.

As we have seen, it cannot simply be assumed that enrolment equates with attainment, particularly at tertiary level. We correct for this using the quotient of our baseline estimate of expected lifetime attainment of current 15-24 year-olds (13.8) and total school life expectancy (17.l), or 81 per cent. Thus we take the expected increase in attainment to be 81 per cent of 0.85, or 0.69 years. This may still be an over-estimate to the extent that the scope for drop-outs, repeated years and part-time studies is higher in tertiary education than at other levels. As before, we will also assume an average lag of two years between enrolment and attainment.

Graph A.2 : Extra years of schooling due to increased tertiary participation, by age



Source : Commission services.

Over the first decade, assuming gradual progress towards the target as before, and using the 2010 population projections, the total impact is estimated at around 26 million years. Adjusting for the gap between enrolment and attainment as before and dividing by 25-64 population (2010) implies an increase in average years of schooling of 0.10.

Graph A.2 illustrates the increase in attainment in the long run and in the first decade. The impact during the first decade is slightly larger than in the case of early school-leavers because some of it is immediate, in the sense that the 25-29 year-old group are already in the workforce.

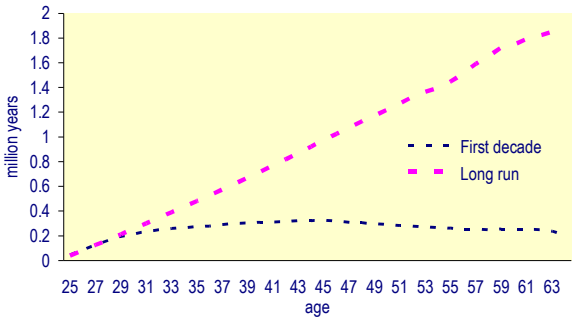
It should be stressed here that we merely follow the convention of the literature in defining the 'adult' population as those aged 25-64. In reality, of course, many people aged 15-24 have completed their studies and are productive members of the workforce.

A.4 Lifelong learning

In May 2003 the Education Council adopted a benchmark stating that 12.5 per cent of 25 to 64 year-olds should participate in lifelong learning by 2010 (up from an estimated 8.5 per cent in 2000). The benchmark relates to Labour Force Survey data on training undertaken in the four weeks preceding the survey. Since the duration of many continuing training activities is relatively short, the proportion of adults participating in some form of training within a 12-month period is much higher – between 13 and 56 per cent in the EU-15 Member States according to OECD (2002), based on 1994-98 data from the International Adult Literacy Survey (IALS).

IALS figures suggest that the mean number of annual hours per participant in 20 mainly OECD countries is around 143. This implies an average of 48.2 hours per capita in the population aged 25-65 (Tuijnman and Boudard, (2001)). We assume that an increase in the share of people participating in training during the previous four weeks will lead to a proportionate increase in the number of annual hours per capita. Hitting the target of 12.5 per cent would then imply an increase in average annual training per capita of 22.7 hours. Given an average working week of 37 hours (full-time and part-time) and a working year of 48 weeks, this implies a full-time equivalent increase in enrolment of 0.013 years.

Graph A.3 : Extra years of schooling due to increased lifelong learning, by age



Source : Commission services.

In the long-run, the average worker will have been enrolled in lifelong learning for an extra 0.013 years for every year that she has been in the adult population. Assuming that increased attainment is uniformly distributed in the 25-64 age group, the average 64 year-old will acquire an additional half a year of enrolment. The cumulative total on the basis of the 2050 population projections is 47.3 million extra years, which divided by 25-64 population (2050) gives an increase in average enrolment of 0.27 years. In the absence of information about enrolment and attainment in the wide variety of activities covered under adult education, we will make the same correction for the gap between enrolment and attainment as before, and assume that training acquired, with or without formal qualifications, has the same value as secondary and tertiary attainment. This implies a long-run increase in average years of schooling of 0.22.

During the first 10 years, and assuming as before that the target is reached gradually, meeting the benchmark of 12.5 per cent participation will mean an extra 12.7 million years of enrolment by 2010, which implies 0.05 additional years of attainment. Graph A.3 shows the pattern of increased attainment in the long run and after 10 years.

A.5 Early child care and education

Graph 5 in Section 4.1 shows that that 85.6 per cent of 3-5 year-olds are currently enrolled in early child care and education. We assume that hitting the Barcelona target would mean raising this to 90 per cent, and that a year of pre-school education can be compared to a year of traditional schooling. This implies an effective increase in school life expectancy of 0.132. Applying the same attainment/enrolment correction as before gives the equivalent of 0.11 additional years of schooling in the long run (72 years in this case). Needless to say, the impact over the next 10 years is zero.

Table A.2 : Expenditure per student in public educational institutions, PPS

	Pre-primary	Primary		Secondary		Tertiary	
	1999	**1999**	**2000**	**1999**	**2000**	**1999**	**2000**
EU	4244	3859	4157	5267	5639	7937	8334
BE	2848	4212	4635	6487	6846	8773	9897
DK	3948	6435	5897	7084	6944	9405	11922
DE	4632	3477	3827	4302	4690	9698	10183
EL	2197	1997	2496	2756	3436	3913	3168
ES	2617	3828	4031	5235	5527	5374	6227
FR	3660	3946	4253	7148	7621	7139	7618
IE	3177	2735	3145	3924	4268	9553	10402
IT	4816	4898	5496	5979	6517	6962	7422
LU	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
NL	3611	3827	3979	5284	5436	11310	10981
AT	4767	6059	6111	7872	8452	10078	10003
PT	2031	3469	3589	4853	5093	6461	6353
FI	3617	3794	3970	5646	5555	8930	7879
SE	3186	5268	5842	5388	6719	12799	13651
UK	5848	3364	3577	4618	5600	8433	8737

Note: EU average for pre-primary weighted by enrolment of 3-5 year-olds.
Source: OECD for pre-primary; Commission services.

A.6 Expenditure

Table A.2 provides the available Eurostat figures on expenditure per student by level of education. For a first estimate of the potential expenditure implications of the scenarios discussed above, we will assume constant expenditure per student. Whether this is likely to be the case in practice is discussed in Box 3 in the main text.

In order to estimate total expenditure, we multiply enrolment by expenditure per student, assuming the following age ranges for the different levels of education: 3-5 years pre-primary; 6-11 years primary; 12-18 years secondary; and 19 to 29 years tertiary. This produces a result of €432 billion, or 5.1 per cent of GDP, for the year 2000. Applying the same procedure to Eurostat's baseline population projections for 2010 yields €409 billion, or 4.8 per cent of 2000 GDP. Thus, abstracting from price and productivity developments, and holding enrolment constant, spending on education as a share of GDP falls, not surprisingly given the fall in the school-age population.

We now estimate the implied increase in annual expenditure by 2010 (or so) under the different scenarios.

Our benchmark for early school-leavers first needs to be converted into an equivalent increase in the enrolment rate. Recalling that the average duration of upper secondary attainment is 3.4 years, we adjust as before to give 4.2 years of enrolment. Then, noting that the 18-24 range comprises seven years, we calculate that in order to increase attainment in persons by 10 per cent, enrolment in the 18 to 24 age group would have to increase by 10 per cent of 4.2/7, or 0.06. In practice, of course much of this increased enrolment will come before the age of 18, but the impact on total expenditure will be the same, as we shall use the figure for expenditure per student at secondary level. This results in additional expenditure of €10.1 billion (0.12 per cent of GDP) compared to the constant enrolment scenario.

As the benchmark for tertiary participation is in terms of the enrolment rate, we simply add 0.09 to the net enrolment rates of 20-29 year-olds. This implies increased expenditure of €35 billion, or 0.41 per cent of GDP.

As discussed above, the selected benchmark for lifelong learning implies an increase in average annual enrolment of 0.012 years, which we add to the net enrolment rates of the 25-64 population. We assume, in the absence of better information, that adult education costs the same per hour as tertiary education. This implies increased annual expenditure of €20.9 billion from 2010, or 0.24 per cent of GDP.

For pre-school education, we raise the net enrolment rates of 3-5 year-olds by 4.4 per cent. This costs €2.2 billion, or 0.03 per cent of GDP.

A.7 Employment

Finally, we calculate the first order short-term impact of increased upper-secondary and tertiary enrolment on employment.

To estimate the impact of reducing the share of early school-leavers, we convert the attainment benchmark into an equivalent increase in enrolment in the 15-24 age group, as before (Section A.6). By 2010, 10 per cent more will have an extra 3.4 years of attainment, which on average will require an extra 4.2 years of enrolment. Spreading this over the 15-24 range implies increased enrolment of 4.2 per cent. We assume that, in the absence of increased employment opportunities for students, an additional 4.2 per cent of 15-24 year-olds will have the in-education employment rate of 24.9 per cent instead of the out-of-education rate of 63.8 per cent (see Table 8 in the main text). Applying this to Eurostat's baseline population projections for 2010 implies a reduction in the total (15-64) employment rate of 0.3 percentage points, other things equal.

The benchmark for tertiary participation implies that 9 per cent of 20-29 year-olds would have an average employment rate of 39.1 per cent instead of 76.0 per cent. This implies a reduction in the total employment rate of 0.6 percentage points.

4. WAGE FLEXIBILITY AND WAGE INTERDEPENDENCIES IN EMU

Some lessons from the early years

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WAGE FLEXIBILITY AND WAGE INTERDEPENDENCIES IN EMU

Some lessons from the early years

1. Introduction

Over recent years, a near consensus view has emerged on the roots of the high and persistent unemployment in many EU Member States, including all the major economies of the euro area, and the overall jobs deficit more widely. Broadly speaking, this view regards the poor labour market performance of the countries concerned to be the result of the interaction of a series of adverse macroeconomic shocks with unfavourable labour market institutions, and also product market regulations that have significantly limited the capacity to adjust to changes in economic conditions. Consequently, the institutional design and structural characteristics of European labour markets have assumed centre stage in many economic policy debates, with wage setting mechanisms typically figuring prominently in the analysis.

Obviously, wages as the price of labour have a key role to play in determining the overall balance of supply and demand in the labour market. Furthermore, the formation of economic and monetary union (EMU) is often taken to put further demands on the flexibility of wages to compensate for the lack of (national) instruments to deal with economic disturbances. If wages are too rigid, the necessary adjustment will come slowly and with considerable economic and social costs; moreover, asymmetries and differences in labour market performance across European countries may increase, and this may in turn lead to stronger pressure for monetary policy to be concerned with output stability alongside price stability. However, labour market structures and institutions are likely to change as a response to the integration process. It is therefore necessary to evaluate the mechanisms through which labour markets, and in particular wage setting mechanisms, could be affected by integration.

Recent years have seen some improvement in overall labour market performance, as indicated by rising employment rates, a trend increase in participation and a fall in structural unemployment. It has proven hard to explain these developments without taking recourse to relatively widespread wage moderation observed in the past couple of years, inter alia based on the re-emergence of informal income policies in a number of countries. However, from a more sceptical perspective, over the current protracted period of sluggish economic activity wage flexibility appears to have provided little, if any, support for cyclical recovery; thus, present wage rigidities may have seriously hampered the smooth adjustment to the macroeconomic shocks that have hit the euro area in recent years.

These observations also square with predictions that the formation of EMU and its associated impact on wage bargaining behaviour could affect both the level of (un-) employment and the flexibility by which wages adjust to shocks. It has been widely held that, in general, EMU should provide improved framework conditions for employment-compatible wage bargaining; indeed, with all the elements of the Marshall-Hicks rule of labour demand likely to operate, the link between wage and employment trends becomes more evident and stringent. However, it has also been argued that inherent in the integration process are forces which tend to make wages less flexible, which implies that more protracted output adjustment may follow, even though the equilibrium level of employment may increase and structural unemployment be lower. Stronger wage inter-dependencies and also nominal convergence may thus be beneficial for both the level of employment and the

objective of price stability, but it may come at the cost of greater volatility in output and employment, that is, nominal convergence but real divergence.

Against this background, this chapter takes a fresh look at wage flexibility in EMU and attempts to draw a few lessons from the experience of the early years. The chapter is organised as follows. Section 2 starts with a short refresher discussion of the role of wage flexibility as an adjustment mechanism to shocks; it then proceeds with a brief description of the stylised facts regarding nominal and real wage developments in the euro area over the recent business cycle; finally, it presents an empirical assessment of wage inertia based on new econometric estimates of a Phillips-curve type wage equation across euro area countries and offers an interpretation of the main findings with respect to nominal and real wage flexibility. Section 3 explores some specific aspects of wage setting interdependencies in EMU and cross-country transmission mechanisms. The first part of the section is devoted to an investigation of shock absorption and shock transmission under two different bargaining regimes, where (i) wages respond in a traditional way to purely national conditions, or (ii) when wage setting interdependencies are present, i.e.domestic wage setting takes developments abroad into account. Moreover, we also look into the transmission mechanisms of a wage shock under different degrees of goods market integration. The analytical tool employed in this part is simulation analysis of a stylised two-country model. The second part of this section then investigates the issue of wage pattern bargaining and wage convergence from a detailed sectoral perspective. Finally, Section 4 concludes.

2. Wages and the adjustment to shocks

2.1 Some background considerations

Wages are key in equilibrating demand and supply on the labour market. Wage setting mechanisms strongly contribute to determining the level of equilibrium unemployment in an economy; they are decisive for an efficient allocation of labour resources across economic activities; and, obviously, a flexible wage formation process is required to help absorb macroeconomic shocks and cyclical disturbances in a smooth way. The focus of the analysis here is on this latter issue. Clearly, other forms of labour market flexibility could partially act as a substitute for wage adjustment. But given that adjustment of the quantity of labour is socially and economically costly and, moreover, often infeasible for short-term adjustment, the adjustment of wages and prices is, in most of all cases, the preferred solution. Flexible labour markets facilitate the task of macroeconomic policies, which must otherwise bear the main burden of adjustment to economic disturbances. Indeed, with perfectly flexible markets, macroeconomic stabilisation policy would actually be irrelevant.[163]

With monetary union, the importance of labour market flexibility has gained an additional dimension.[164] Monetary policy is conducted in view of economic conditions of the euro area as a whole and the nominal exchange rate is uniform across the euro area. Thus, nominal exchange rate and national monetary policy are no longer available policy instruments to facilitate the adjustment to asymmetric or country-specific shocks.

This implies that other adjustment mechanisms have a larger burden to bear when it comes to country-specific economic disturbances. Among those, fiscal policy, efficient capital markets, product market and labour market flexibility clearly play an outstanding role. The first two can serve, in principle, to stabilise income, thereby preventing or reducing the need for quantitative adjustments. Flexibility of prices in goods and service markets as well as of wages in labour markets means that quantities can easily adjust to economic shocks. If they were inflexible, in response to a negative shock production would be lower and the rate of unemployment higher over a more protracted period of time.

Inflexibility of wages may be more costly in EMU than before in terms of employment. For example, a higher degree of competition, which stems from higher price transparency, increases the responsiveness of employment to wages. In case of adverse shocks rigid wages would lead to higher unemployment. Some economists also argued that country-specific shocks would translate into higher macroeconomic volatility, given the absence of monetary policy or nominal devaluation as policy tools at the national level.[165] Moreover, with the room for manoeuvre in some cases constrained by fiscal objectives, labour market flexibility is key to smooth adjustment to shocks.

Indeed, country-specific shocks or divergent cyclical developments usually trigger some realignment of relative competitiveness through changes in real effective exchange rates. As nominal exchange rates between euro area countries no longer exist, intra-euro area real exchange rate adjustment can only come via differing unit labour cost developments across countries, in particular changes in relative wages since productivity may be hard to influence in the short to medium term. Thus, flexible labour and product markets bring about a swift realignment of real effective exchange rates and correction of economic divergences.

Basically, wage flexibility can be seen as the speed with which wages adjust to economic shocks. Implicitly, this

[163] Allsopp and Vines (1998).

[164] See for instance, Pissarides (1997) or Chapter 10 and 11 in European Commission (1997).

[165] See Coricelli et al. (2000) and Lane (2000).

assumes the existence of a benchmark. The economic disturbance enforces a change of the wage rate and flexibility measures the pace with which actual wages converge to the benchmark. Against this background, it is possible to differentiate between the following forms of wage flexibility:

- Responsiveness of wages to the rate of unemployment. This measure of how fast labour market dis-equilibrium is dissolved is called real wage flexibility.
- Responsiveness of wages to changes in the price level or inflation. This so-called nominal wage flexibility has attracted some attention among economists because nominal wages are usually thought to be rigid when a downward adjustment is required. Swift adjustment of wages to price shocks, on the other hand, can lead to wage-price spirals.
- Responsiveness of wages to changes in the composition of labour demand or labour supply. This relative wage flexibility is associated with geographical, sectoral and skill mismatch. Wage compression may inhibit the possibility that individual skills, individual productivity or geographical conditions are correctly reflected in relative wages.

Empirically, it is difficult to establish a measure of wage flexibility. The conventional empirical strategy is to estimate a wage equation and to assess the empirical values against theoretical benchmarks: for example, whether the rate of unemployment has a significant impact on wages and how large this effect is; or, whether an increase in inflation translates into higher wage growth. Some further empirical problems are related to the different forms real wage flexibility could take. In addition to the impact of unemployment on wages, real wage flexibility could be measured in wage equations through:

(1) the responsiveness of wages to changes in productivity;
(2) the responsiveness of wages to external competitiveness (for example exchange rates);
(3) the responsiveness of wages to labour market dis-equilibrium (for example formulated as an "error correction term");
(4) the stickiness of wages, which is expressed as the impact of past wages on current wages (the auto-regressive term).

In principle, all these elasticities could be considered special forms of real wage flexibility. Usually, any overshooting of wage growth over productivity growth, any loss in external competitiveness or any labour market dis-equilibrium should yield an increase in the rate of unemployment over the short or long term and vice versa. In a strict sense, this also holds for a lack of wage responsiveness to changes in the cyclical situation, which has gained some attention in the current slowdown of economic growth.

A number of institutional features in the euro-area labour market could account for a lack of nominal as well as of real wage flexibility. Of primary interest are the impact of collective bargaining on contract length and the use of wage rules in collective bargaining, including wage indexation.

Obviously, as labour market institutions are interdependent, institutions and legal settings other than those mentioned above may have an equally strong impact. The transmission mechanism has been highlighted in a recent model by Manzini and Snower (2002) in which wage bargaining with insiders and new job seekers are imperfect substitutes. The degree of substitution depends on the firms' broadly defined costs of labour turnover, i.e. costs of hiring and firing and productivity differences between incumbent workers and job seekers, which determine the bargaining power of insiders relative to outsiders.

Assuming that new job-seekers are exposed to the current cyclical situation, whereas incumbent employees are to some extent sheltered from short-term variations in economic activity, the same frame can be used for explaining wage rigidities. Employment protection legislation, for instance, has an impact on wage rigidity because it strengthens the bargaining power of employees relative to outsiders and thereby affects the sensitivity of wages to changes in cyclical conditions. Another example would be the disincentives to search for a job resulting from the design of tax and benefit systems, which seem to impact in particular on low-skilled unemployed. Fewer incentives to seek employment in a cyclical downturn would bolster the bargaining position of incumbents and thereby yield more stable wage growth over the cycle. While these links are apparent in theory, their empirical verification is still outstanding. [166]

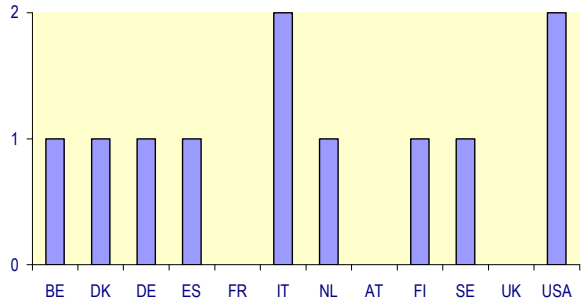
An obvious reason for wage rigidities could be the prevalence of collective wage agreements when they cause collective bargaining to take place at larger intervals than individual bargaining would use. Most wages in the euro area are directly or indirectly agreed with reference to collective bargaining, between trade unions on the one hand, and employers' associations on the other. Even in sectors where wage bargaining at the firm or individual level is the norm, collectively agreed wages provide orientation. Contract length has, of course, a major impact on nominal rigidities: the longer the duration of a wage contract, the less frequent the occurrence of adjustment.

[166] An empirical paper using the European Community Household panel is Dessy (2002), which finds union coverage to be positively and employment protection legislation negatively related with downward wage flexibility of job stayers. The first result suggests that higher union coverage is supportive when adjustment of wages to negative economic shocks is required.

Economic theory has provided a number of reasons why contracts are infrequently adjusted, most of which are linked to the transaction costs involved in negotiating a contract. These costs, however, are not fixed but depend on economic characteristics. Two of such characteristics have been subject to recent empirical research, namely the impact of the wage bargaining system and the degree of uncertainty.

Groth and Johansson (2002) argue that two counteracting factors affect the relationship between contract duration and the wage bargaining system. On the one hand, the more centralised the economy, the lower the number of negotiations. As contract costs are therefore lower, contracting can be more frequent and contract duration shorter. On the other hand, a high degree of centralisation makes it more difficult to reach agreement, increasing contract costs and favouring longer duration. Based on this insight, the authors identify a u-shaped relationship between the degree of centralisation and contract length. Centralised and de-centralised systems are associated with longer duration while intermediate wage bargaining systems tend to have more flexible wages. The authors stress, however, that the empirical result should be considered as indicative only, due to caveats concerning the accuracy of their data on contract duration. Notwithstanding their reservations, Graph 1 displays their indicator of contract duration for EU Member States and the USA. [167]

Graph 1 : Indicator of wage duration 1985-95



Note: 0 := duration smaller or equal than 1 yr; 1 := duration between 1 and 3 yrs, 2 duration equal or longer than 3 yrs.
Source: Groth and Johansson (2002).

Other explanations stress that the advantages of long labour contracts are related to the degree of uncertainty in the economy. The lower the uncertainty, the less risky it is to agree on long-term contracts. In this context, the setting of multi-annual contracts in Germany and Austria in 2000 was considered to be associated with the increased stability of the macroeconomic framework in EMU.[168] In microeconomic terms, the duration of a labour contract provides implicit insurance to the employee against the repercussions of economic shocks. Incentives to employers and employees to agree on a long-term contract therefore depend not only on uncertainty *per se*, but also on the sources of uncertainty. Testing for this hypothesis with US data, Murphy (2000) found that contract duration is indeed linked to risk sharing between employees and employers. Maturity declined with nominal uncertainty and uncertainty about relative price shocks, but increased with real uncertainty.

Two further institutional factors are of relevance when it comes to explaining wage stickiness at the aggregate level. Firstly, as collective bargaining takes place in many sectors in the 12 Member States, the flow of new agreements that feeds into actual wage behaviour must not be less continuous than under individual bargaining. More discretion can, however, be expected when wage bargaining at the central level dominates, as this may imply a single adjustment for the whole economy or of a large part of the economy at one point in time. Secondly, actual wages tend to differ from collectively agreed wages.[169] Bonuses and other forms of payment-related pay introduce an additional moment of flexibility and the magnitude of the so-called wage drift can be expected to be higher, the less the outcome of collective wage bargaining captures the need to cater for cyclical variations.[170]

Another important source of inflexibility may be the way in which formal and informal wage setting rules are applied. Hancké and Soskice (2003) observe a tendency in many countries to guide wage bargaining along some more or less binding proposals set up by small groups of labour market experts. A review among trade unions in the European Union carried out by ETUC reveals that inflation and productivity are the most important factors used in wage bargaining.[171] The role of economic growth and other determinants varies across countries, but is considerably smaller. The use of such wage rules reduces the cyclical responsiveness of wages if past data are used instead of current outcomes, if actual inflation and productivity is known only with a lag or if trend productivity or inflation is taken as a proxy for actual developments.

[167] Their data set covers 17 OECD countries. UK HM Treasury (2003, p. 24) gives a detailed breakdown of labour contracts in the UK manufacturing and services sector, showing that about 95 per cent of labour contracts in companies are of a duration of 12 months or less.

[168] See EU Economy 2001 Review, Chapter 2.

[169] See van het Kaar and Grünell (2001).

[170] UK HM Treasury (2003, p. 25) provides evidence that the inclusion of bonuses and overtime increases flexibility of pay.

[171] See Dufresne and Mermet (2002).

Table 1 : Factors influencing trade unions' wage demands in the EU Member States

Country	Economic growth	Inflation	Productivity	Other determinants
BE	Factor used	Determinant factor	Commitment (Doorn initiative): per hour and per worker	Institutional comparisons imposed by the State
DK	Factor used	Factor used: HICP	Factor used: per worker and per hour	
DE		Determinant factor: NCPI	Determinant factor: per hour	Redistribution component
EL		Determinant factor: NCPI	Factor used	Comparison with European average
ES	Factor used	Factor used: NCPI	Factor used: GDP per worker	
FR	Factor used	Determinant factor: NCPI		SMIC increases corporate profits
IE		Factor used: NCPI	Factor used: estimates based on difference GDP and employment	Promotion of employment, tax cuts and wage moderation
IT		Determinant factor (sectoral level): NCPI	Determinant factor (enterprise level): real value added per worker	
LU		Determinant factor: indexation		
NL		Determinant factor: producer prices	Determinant factor: per hour and per worker	Assessment of external effects
AT	Factor used	Factor used	Factor used: GDP per worker	
PT		Determinant factor: NCPI	Determinant factor: GDP per worker	Comparison with European average
FI		Determinant factor	Determinant factor	
SE		Determinant factor: inflation target, NCPI		EU average targeted and actual inflation rates
UK		Determinant factor: NCPI		

Note : NCPI is the national consumer price index.

Source : Dufresne and Mermet (2002).

Some rigidity in wages may be due to the use of past or trend productivity growth in the calculation of wage rules. As those are an inaccurate proxy of actual cyclical conditions, their use may lead to wage developments that lag behind the business cycle. Productivity developments are generally not known with great accuracy. Official data on aggregate labour productivity growth is usually released only with a considerable lag and is often subject to major revisions, mainly due to revisions of labour input data. According to the survey mentioned above, trade unions in the EU do not use a harmonised concept of productivity, some countries relying on output per worker calculations, others on output per hour worked. More sophisticated concepts that correct for the impact of changes in either employment or capital-deepening on productivity growth were not mentioned in the survey. A further important point is that labour productivity growth varies with the cycle. The use of trend productivity data therefore circumvents cyclically inappropriate wage claims based on outdated or imprecise data. But the smoothing character of trend series comes at the expense of introducing some inertia into wage behaviour.

Incorporating the inflation component into the wage rule can lead to rigidity under a number of institutional practices. For instance, wages are still price-indexed in a number of Member States. This generates the same behaviour of wages as if they were adjusted to past inflation. Since wages are important determinants of prices, backward-looking wage indexation gives scope to temporary price shocks to initiate wage-price spirals. Moreover, it increases the rigidity of nominal wages. In consequence, the quantity adjustment of the labour market to a given exogenous shock is larger and more protracted than without indexation.

Table 2 : Wage indexation in euro area Member States

	Form	Coverage
Belgium	Automatic 2% increase in wages once inflation increases by 2%	About 80% of public employ and workers
Spain	Standard in collective wage agreements to set a compensation once inflation exceeds the agreed increase	About 70% of workers
France	Formal indexation	Only of minimum wage
Netherlands	Possible in collective agreements	
Luxembourg	Systematic adjustment one month after CPI increase exceeds 2.5% on average over the last 6 months	All wages, pensions and benefits
Greece, Finland, Italy, Portugal	Conditional indexation that applies once inflation exceeds a certain threshold	

Source: Commission services.

When the ETUC survey was conducted in 2001, trade unions did not report to make use of the ECB's inflation target. Rather, they used their forecast of the national consumer price index, with only a few Member States deviating from this general rule. Provided that these inflation forecasts are not just an extrapolation of past trends, such behaviour increases the cyclical sensitivity of wages. The alternative behaviour, namely orientation at the ECB's inflation target, while making nominal wage growth more rigid, would help to prevent the emergence of price-wage spirals as inflation would faster revert to the ECB's target.

Collective wages are not independently agreed across sectors and Member States, which may also give rise to stickiness. Wage bargaining in some countries explicitly takes wage settlements in neighbouring countries into account, for instance in Belgium and the Netherlands. In Germany, wage agreements of the IG Metall provide orientation for bargaining in other regions and sectors.[172] Such interdependence implies that current wage growth becomes correlated with past wage setting. In consequence, wages are less sensitive to local labour market conditions than under conditions of autonomy.[173]

Obviously, over the medium to long term, institutions are adaptive to economic changes, implying that the duration of labour contracts but also trends in centralisation or coverage of collectively agreed wages are endogenous. Macroeconomic stability may therefore be an important source of wage rigidities, in particular in a period when cyclical variation picks up again after a relatively long period of increasing stability. Following this interpretation, constant wage growth in the euro area could be the result of rising macroeconomic stability during the 1990s.

Price stability may increase the importance of nominal wage rigidity. Recently, some attention has been paid to the issue that low rates of inflation increase the stickiness of wages, based on the conjecture that workers are resistant to nominal wage cuts, i.e. the lower the rate of inflation, the more important becomes the zero threshold of nominal rigidities.[174]

The supposition that nominal wage growth cannot become negative rests on both considerations of fairness and the existence of money illusion. Wage cuts may not be socially acceptable and, moreover, inefficient if employers fear that it has negative consequences on employees' motivation and productivity. Experiments have shown that agents attach more importance to nominal rather than real variables, even if they are equal in value.[175] Furthermore, the legal form of a labour contract implies that any change can only be inserted through consent of employers and employees. Once a contract expires, conditions continue to be applied until wage bargaining parties agree on new terms. This legal arrangement creates a strategic advantage for employers to resist wage cuts.[176]

A number of micro-econometric studies have been conducted in recent years in order to detect evidence of nominal wage resistance. They indicate that a considerable number of wage earners report to have experienced nominal wage cuts. Their share among employees who stayed in their job varies between about 15 and 25 per cent in Germany, France, the UK and the

[172] For a brief review of practices, see Hancké and Soskice (2003).

[173] For a general elaboration of the impact of wage imitation on wage flexibility, see Andersen (2003).

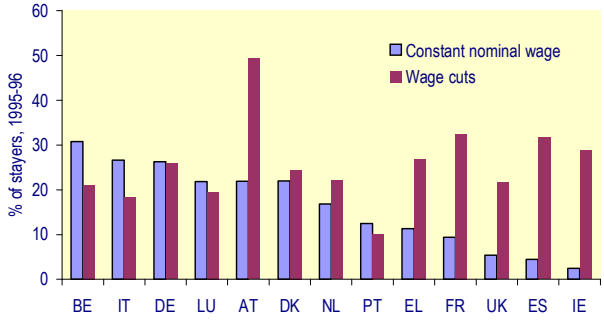
[174] See for example Coenen (2003), Kieler (2003).

[175] See for example Shafir et al (1997).

[176] See Holden (2002), Beissinger and Knoppik (2003).

USA.[177] The empirical analyses also display a pronounced clustering of observations for unchanged nominal wages. Graph 2 shows that the share of workers with constant nominal wages is higher in those countries where the share of those with wage cuts is lower. This negative correlation is evidence for the existence of some nominal wage rigidity. Using data from the European Community household panel, Dessy (2002) finds that nominal wage rigidities are more important in Germany, Belgium and Italy than in France, Spain or Ireland.

Graph 2 : Share of employees (not) affected by nominal wage rigidities



Source : Dessy (2002).

Knoppik and Beissinger (2001) analysed the economic significance of nominal wage rigidity in Germany. They concluded that low rates of inflation impede real wage adjustment and estimate that zero inflation would cause a 1 per cent increase in the rate of unemployment in Germany. Based on a simulation exercise, Coenen (2003), on the other hand, argues that the nominal wage rigidity has no significant negative effect with low inflation of 1 per cent.

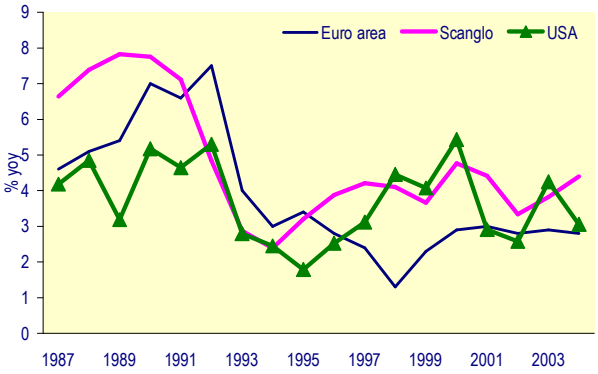
2.2 Wages and the recent business cycle: Some stylised facts

2.2.1 Nominal euro area wage growth : stability at a relatively low level

Stability in nominal wage growth is an important but often disputed macroeconomic feature of the euro area. Since 1999, annual growth of nominal compensation per employee has been close to 3 per cent and is forecast to remain at that level at least until 2004. Following a deceleration from high wage growth in the early 1990s, steadiness in actual wage growth seems to have coincided with the introduction of the euro, but depending on the assessment of the period of extraordinarily low nominal wage growth in 1997/98, it could even have started as early as 1993.[178]

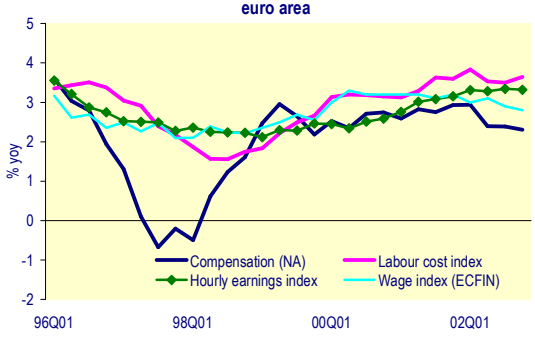
A deceleration of wage growth was also observed in other economic areas in the early 1990s, but in the euro area it was more pronounced and durable. In 1993/94, declining rates of nominal wage growth was a common feature of the euro area, the USA and other Anglo-Saxon and Scandinavian countries. For illustrative purposes, Graph 3 summarises nominal wage growth in three Scandinavian countries (DK, SW, NO) and 4 Anglo-Saxon countries (UK, CND, AUS, NZL) into the aggregate "Scanglo".[179] Wage growth in these countries was similar to that in the euro area in the first half of the 1990s, since then it shows a striking co-movement with that registered in the USA.

Graph 3 : Nominal wage growth



Source : Commission services.

Graph 4 : Higher-frequency (nominal) wage indicators, euro area



Source : Commission services.

[177] See Decressin and Decressin (2002), Dessy (2002), UK HM Treasury (2003).

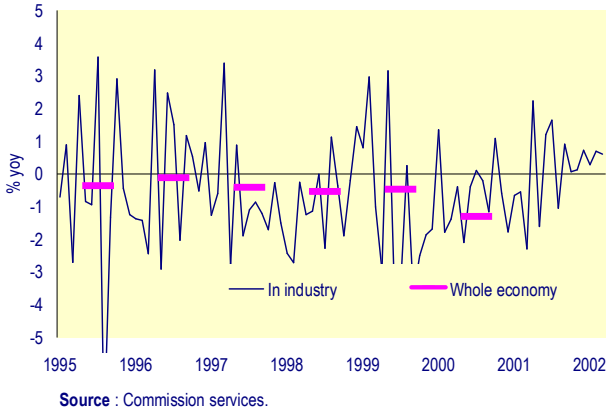
[178] Note that low growth in nominal compensation per head in the national accounts in 1998 is not mirrored by other wage indicators.

[179] The aggregate is weighted with nominal compensation in purchasing power standards. This is how Eurostat weights wage indictors for the EU aggregates. Alternative weighting mechanisms with GDP in PPS or GDP in current exchange rates did not produce considerable different results. The behaviour of the "Scanglo" aggregate is strongly determined by UK data (weight 44 per cent), while the three Scandinavian countries have only a minor impact (combined weight 15 per cent).

The debate about wage rigidity in the euro area has re-gained attention because the adjustment to the current growth slowdown has been different in the euro area than in other economic entities. Nominal wage growth in the euro area remained relatively stable, despite strong economic growth in 1999/2000 and a subsequent considerable weakening in economic activity, thus showing little, if any, procyclicality. In contrast to stability in the euro area, nominal wage growth in the USA and other economic entities accelerated in line with the strengthening in growth in the late 1990s. It peaked in 2000 and witnessed another V-shape between 2001 and 2003. While it was higher on average than in the euro area, its behaviour over time is more in line with cyclical conditions. In this context, the crucial question is whether stability at a relatively low level as prevalent in the euro area may compensate for flexibility at higher average levels.[180]

Comparing various higher-frequency wage indicators for the euro area reveals that the notion of stable nominal wage growth is not supported by all of them. The indicators supporting the hypothesis of stable wage growth are quarterly national account figures of compensation and ECFIN's wage indicator (see Graph 4). The latter is on a slight downward trend since early 2000. Both Eurostat's labour cost index and the hourly earnings index consistently display an upward trend starting at the time of the introduction of the euro and continuing until recently.[181] It is only since a peak in autumn 2001 that wage growth started to lose pace somewhat. Some of the difference between alternative wage indicators and nominal compensation is explained by the exclusion of working time from the latter.

Graph 5 : Hours worked per person employed, euro area



Source : Commission services.

Taking working hours into account raises nominal wage growth on average by about 0.5 per cent.[182] While this could explain most of the average difference in growth rates between the various indicators, it does not explain the difference at any point of time. In any case, once nominal compensation per employee is corrected for hours worked, the findings above need to be taken with a pinch of salt.

- Wage growth accelerated since 1998. Hourly wage growth picked up to 4 per cent in 2001 and the information available for 2002 suggests that deceleration may have started only in the course of that year. This implies that wages lag the business cycle rather than being invariant to it.
- Pro-cyclicality in hours worked suggests that enterprises use variation in working time to adjust to changes in demand.[183] Taking this into account, it is not obvious whether labour costs per hour worked are always the appropriate benchmark for wage developments.

2.2.2 Unit labour cost developments

Data on nominal wage growth provides relatively little information on the economic significance of labour cost developments. Looking at nominal wage growth is to a degree justified by the fact that wage contracts are agreed in nominal terms. But in order to assess the economic meaning of an observed trend in nominal wages, it is more telling to relate them to the output generated, either in nominal or real terms. The former is the underlying concept of unit labour costs, i.e. costs of labour per employee per unit of output produced per person employed. The aggregate price level should remain broadly constant if wages rise with labour productivity, and the benchmark of a 2 per cent inflation rate should not be challenged in the medium-term, when unit labour costs grow by less than 2 per cent. Taking price developments into account, real unit labour costs provide for an assessment of labour costs against the real value of output, thereby highlighting changes in the relative price of labour, which is of relevance for the level of (un-)employment and the profitability of entrepreneurial activity.

As regards the appropriateness of labour costs over the cycle, it should be noted that shocks to labour productivity and inflation mechanically translate into changes in unit labour costs. Rigidity appears because

[180] Here, structural and cyclical factors are strongly intertwined and a definite answer is beyond the scope of this paper.

[181] An upward trend also emerges in the ECB's series of nominal compensation per employee (not shown here). The difference between Eurostat and ECB data is likely due to the need to estimate wage and employment data for those countries, for instance Germany and Greece, which do not yet report them.

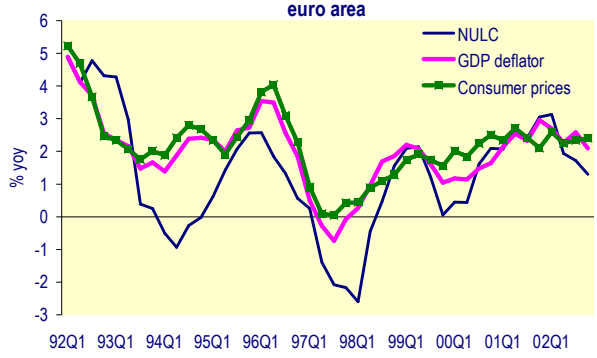
[182] The data used here is of annual frequency and resembles the basis data from the labour force survey. More recently, Eurostat also started to publish a monthly index on hours worked in industry which is based on business surveys in most countries of the euro area or on the labour force survey.

[183] It is not clear, whether the scarce data available on hours worked allows establishing the notion of pro-cyclicality. Furthermore, the euro-area aggregate hides notable differences across Member States.

nominal wages, in which contracts are closed, are adjusted less frequently than shocks occur. For this reason, volatility in inflation and labour productivity warrants caution in interpreting high-frequency data of unit labour costs.

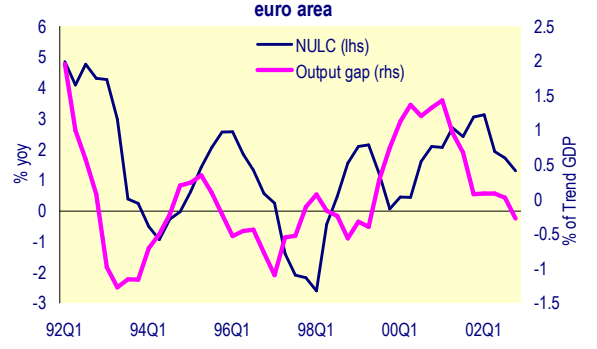
Growth in nominal unit labour costs increased steadily from 0.3 per cent in 1998 to 3.2 per cent in early 2002, indicating a rising pressure from wages on prices in the euro area. Quarterly data displays a quite volatile development of unit labour costs, reflecting volatility in GDP and employment growth. Growth in nominal unit labour costs peaked in the first quarter of 2002 and has fallen by about 2 percentage points to 1.2 per cent until the end of 2002. Graph 6 indicates a strong co-movement of unit labour cost growth with inflation. This is in line with theoretical predictions, but does not allow the establishment of a causal link. The visual inspection suggests that unit labour costs do not generally lead inflation developments, except for the early 1990s. Both series' co-movement is almost contemporarily or with a small lag of growth in nominal unit labour costs. Moreover, some form of asymmetry can be observed: when growth in nominal unit labour costs was very low or even negative, inflation remained at a somewhat higher level.

Graph 6 : Nominal unit labour costs and inflation, euro area



Source : Commission services.

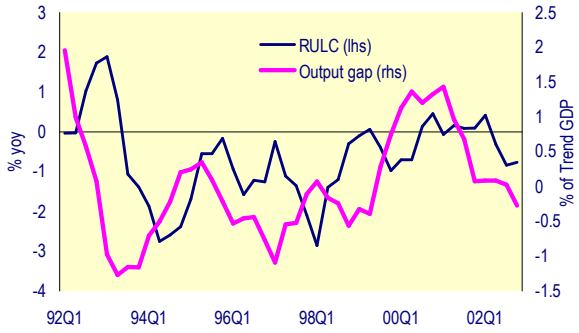
Graph 7 : Nominal unit labour costs and output gap, euro area



Source : Commission services.

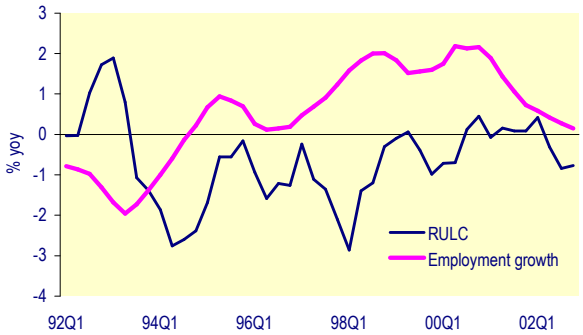
Empirically, unit labour costs in the euro area responded to economic activity with a considerable lag. Since nominal wages have grown steadily, changes in unit labour costs are dominated by changes in labour productivity and hence by GDP and employment growth. When plotting the annual growth of nominal unit labour costs against the output gap, as in Graph 7, a picture appears that could be interpreted as showing primarily pro-cyclical wage growth behaviour. The reason why labour costs are high in downturns and low in upswings is, however, due to the definition of unit labour costs.[184] It is the consequence of stability in nominal wage growth in combination with employment growth that lags GDP growth. Thus, labour productivity is high in an upswing, which mechanically generates a decline in unit labour costs given that wage growth remains steady. The impression of slow adjustment in labour costs also holds if real unit labour costs are looked at instead of nominal unit labour costs (see Graph 8).

Graph 8 : Real unit labour costs and output gap euro area



Source : Commission services.

Graph 9 : Real unit labour costs and employment, euro area



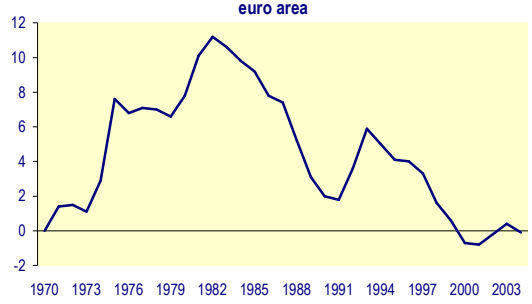
Source : Commission services.

Pronounced shrinking real unit labour costs are mirrored in accelerating employment growth. This empirical observation is in line with theoretical reasoning. Declining real unit labour costs imply that labour becomes cheaper in output units, which should stimulate an expansion of employment. The troughs in the growth of real unit labour costs in early 1994 and 1998 went hand in hand with a marked acceleration of employment

[184] A lag would be consistent with either indexation of wage contracts or with the currently prevailing rate of inflation being taken into account in wage settlements.

growth. This is, however, partly also linked to strong economic growth in the periods concerned, which mechanically diminished real unit labour costs and spurred employment. Overall, the trend decline in real unit labour costs came to a halt at the turn of the decade; in fact, trend growth in real unit labour costs was upward sloping in the second half of the 1990s and it remains to be seen whether the most recent dip indicates a trend reversal.[185] Using a somewhat refined real wage gap indicator broadly confirms the impression that while overall wage discipline has prevailed, real wage moderation has not continued in recent years.[186]

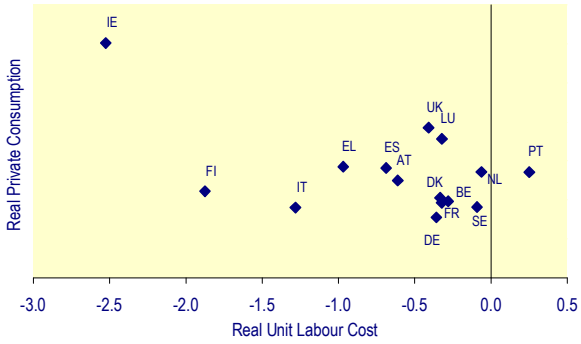
Graph 10 : Real wage gap indicator (1970 = 100), euro area



Source : Commission services.

Obviously, the wage share cannot, should not, and will not fall forever. However, real wage moderation, in the sense of reducing the mark-up of effective wages over competitive wages, helps to increase employment and lower structural unemployment over the medium term, without necessarily compromising domestic demand in the economy. This assertion is not only solidly backed by standard economic theorizing, but also by the factual experience of many euro area countries, in particular in the second half of the 1990s.[187] Indeed, across euro area countries no systematic relationship can be detected between the decline in real unit labour costs and the growth rate of real private consumption.

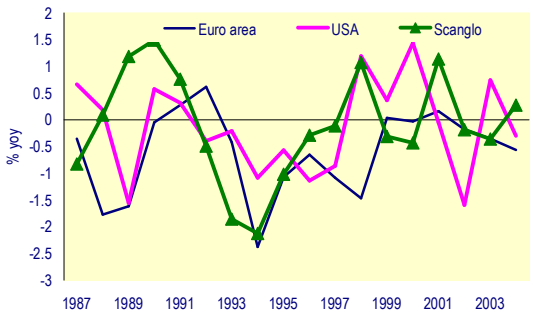
Graph 11 : Average annual percentage growth



Source : Commission services.

Growth in real unit labour costs has become steadier over time in the euro area. Since 1999, it has hardly responded to changes in the cyclical situation. Graph 12 gives rise to the following observations: In the euro area, growth in real unit labour costs was volatile in the period 1987 to 1994. Since 1998, it has been in a very narrow range. In the USA, growth in real unit labour costs was broadly similar to that in the euro area in the late 1980s and early 1990s. It was relatively stable in the mid-1990s, but has been very volatile since then. Over the whole period 1987-03, growth in real unit labour costs was very volatile in "Scanglo". The comparison with other economic areas suggests that the stability currently observed in the euro area is unusual, but not unique. Comparable stability was seen in the USA in the period 1994-98, i.e. the early phase of the employment and productivity boom.

Graph 12 : Real unit labour costs



Source : Commission services.

2.2.3 Wage dispersion across Member States

The observed stability over time of wage growth at the euro area level is to some extent due to aggregation and hides less stable patterns in some Member States. This is witnessed by the fact that the standard deviation of nominal wage growth between 1999 and 2004 is lower for the euro area than for each Member State (see Graph 13).[188] Wage growth has been fairly stable since

[185] Applying an HP-filter on quarterly data, growth in real-unit labour costs has trended upwards since 1996 and remained on an upward trend since then.

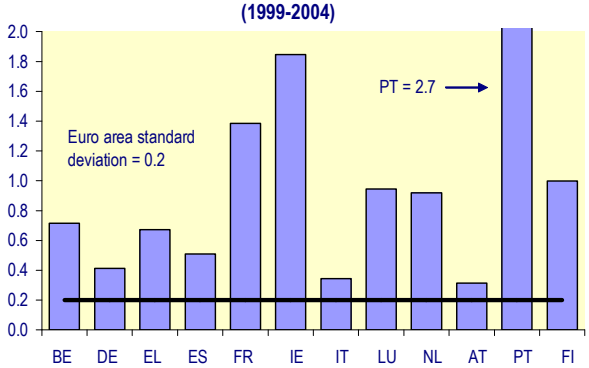
[186] Apparent labour productivity is replaced by a measure of Harrod-neutral technical progress to calculate real wages in efficiency units; additionally a correction factor for (higher) unemployment is applied. For a definition of the indicator see Chapter 2 in last year's edition of the EU Economic Review.

[187] For an analysis of structural labour market developments and its interaction with real wage moderation see in this context also Chapter 2 in last year's edition of the EU Economic Review.

[188] This observation generally also holds if the coefficient of variation is used to account for differences in growth rates,

1999 in the larger Member States (DE, ES, FR, IT) and Austria but more volatile in the other 7 Member States.[189] Also the pronounced trough in 1997/98 in the euro area aggregate is due to developments in some Member States only, namely DE, FR, ES, AT, FI, NL.

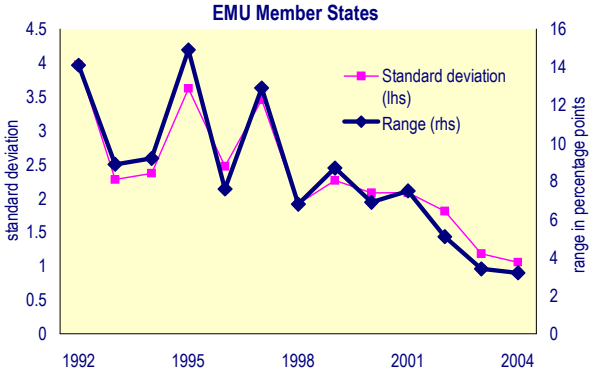
Graph 13 : Standard deviation of wage growth (1999-2004)



Note: FR with 2000 observation, otherwise 0.1.
Source : Commission services.

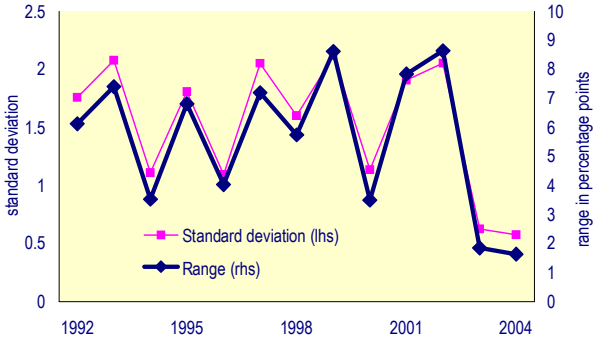
Wage growth has converged across Member States, but as labour productivity has not, dispersion of real unit labour costs has remained high. Indicators of dispersion show a remarkable convergence of wage growth at an aggregate level in the course of the 1990s and in particular since 1999. Both standard deviations and the range between highest and lowest wage growth in the Euro area Member States trend downwards over time. This finding is independent of whether nominal wages, real wages or nominal unit labour costs are considered the relevant wage variable. However, the true extent of convergence may be overstated in Graph 14 due to the fact that inflation and labour productivity growth declined over the 1990s. This is evidenced by the dispersion of growth in real unit labour costs as this measure allows abstracting from the impact of these two factors. The standard deviation of growth in real unit labour costs in 12 euro area Member States was volatile during the 1990s without any clear trend.

Graph 14 : Dispersion of nominal wage growth, EMU Member States



Source : Commission services.

Graph 15 : Dispersion of growth in real unit labour costs, EMU Member States



Source : Commission services.

Dispersion in wage growth explains less of the dispersion in inflation in EMU than in the past. In the 1980s, the correlation between inflation and wage growth across the 12 Euro-area Member States was close to 1, suggesting that differences in wage growth were an important explanatory factor of inflation differences. The correlation came down in two steps: first, in the beginning of the 1990s and secondly in 1999 when the euro was introduced. Since then, it has tended upwards, implying that wage differences have gained again in importance in explaining inflation differences across Euro-area Member States. Strikingly, a wedge is visible in Graph 16 for the period since 1999 between the coefficient of correlation of inflation with nominal wage growth on the one hand and growth in nominal unit labour costs on the other. In EMU, inflation differences are more correlated with wages than with those of unit labour costs, although the latter is the theoretically sounder concept. Differences in productivity developments may stem from differences in the take-up of new technologies and may therefore be linked to variation in sectoral structures across Member States. They entail a widening of differences in profit mark-ups across Member States, which should not be sustainable in a competitive environment.

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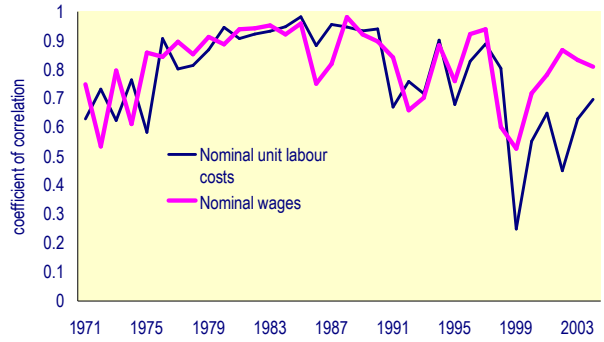
and if real wage growth or growth in real unit labour costs is looked at.

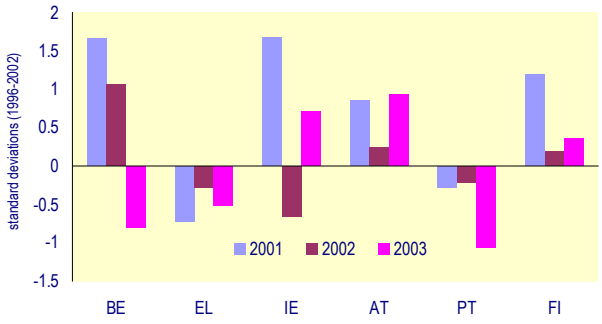
[189] This ignores high wage growth in France in 2002 due to the introduction of the 35-hours working week.

Graph 16 : Correlation of consumer price inflation across EMU Member States with growth in ...



Source : Commission services.

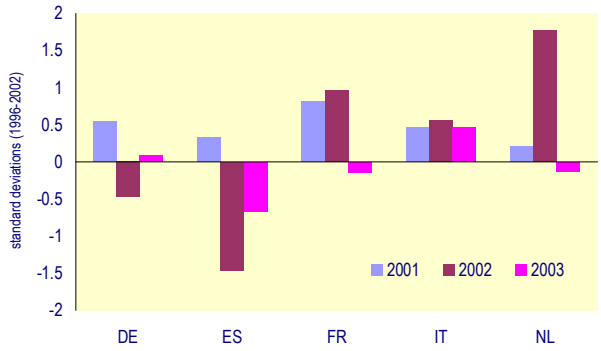
Graph 18 : Growth in real unit labour costs - Member States



Source : Commission services.

The variation in the response to the cyclical downturn of real unit labour costs has also been high across Member States. The only countries where nominal wage growth per employee visibly declined in 2002 were Italy, Ireland, Luxembourg, the Netherlands and Finland. In all the other Member States it either increased or remained about constant, as in the case of Germany and Portugal. In 2003, nominal wage growth is forecast to accelerate still in 3 countries: Germany, Italy and Finland. A similar picture emerges if the economically more meaningful real unit labour costs are looked at. They shrank in 5 out of 12 Member States in 2002 and in 6 in 2003. Comparing growth rates, real unit labour costs decelerated in 7 Member States in 2002 and 6 in 2003. Graph 17 shows the development of growth in real unit labour cost as measured against each Member State's average and volatility in real unit labour costs growth 1996-02. It reveals that many of the countries recorded a sizeable change, exceeding one standard deviation in at least one of the two years. However, this major change was downwards only in two countries, namely Spain and Portugal. Large increases occurred in Belgium, France, Ireland, the Netherlands, Austria and Finland.

Graph 17 : Growth in real unit labour costs - Member States



Note: The scale is normalised, i.e. zero is average growth between 1996 and 2002 and the unit is in terms of standard deviation over the same.
Source : Commission services.

As discussed before, monetary policy and changes in nominal exchange rates are no longer available tools to facilitate adjustment to country-specific developments in the euro area. In their place, wage and price developments have become key adjustment mechanisms to changes in competitiveness among Euro-area Member States. Moderate wage growth in response to overcooling restores intra-area price competitiveness and aligns a country's growth performance. Excess wage growth, on the other hand, may be a reflex of high growth and a favourable employment performance driven by improvements in non-price competitiveness. The emerging price pressure, which will yield increasing inflation differences within the euro area, is not necessarily unwarranted but may indicate an efficient working of market forces.

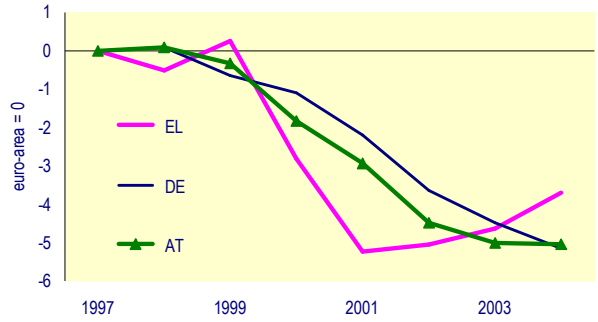
Against this background, any divergence in wage growth must be carefully assessed as it could be caused either by different starting conditions when the euro was introduced, by changes in non-price competitiveness since then, or by unbalanced labour market conditions. The first two factors would not explicitly challenge policy-making. Nevertheless, even in these cases, inflation differences have to be carefully analysed and monitored in order to prevent any over-shooting of wage and inflation trends, correction of which could become costly in terms of output and employment.

In order to identify changes in intra-euro area price competitiveness, Graphs 19 to 21 plot the increase in nominal unit labour costs accumulated since 1997 in the different Member States. 1997 was used as a base year to take into account developments immediately before the introduction of the euro when variations in nominal exchange rates were materially absent. The numbers are expressed as a percentage point difference from the euro-area average. The divergence of national nominal unit labour costs from this average allows clustering Member States into three groups.

- *Intra-euro area price competitiveness has considerably increased in Germany, Austria and Greece.* Germany has been identified a laggard as regards economic growth in the euro area. Its labour market has improved less than that in other

countries and, thus, the increase in price competitiveness is a welcome working of the adjustment mechanism explained above.[190] Austria has enjoyed a somewhat better growth performance and, in particular, much lower unemployment, but wage developments have been historically closely linked to those in Germany. Greece is a special case in so far as the country joined the euro-area only in 2001. The relative decline in Greek nominal unit labour costs seems to be related to the country's efforts to qualify for the euro. Since the euro introduction in 2001, Greece's competitive position has deteriorated in line with its favourable growth performance.

Graph 19 : Nominal unit labour costs, Member States

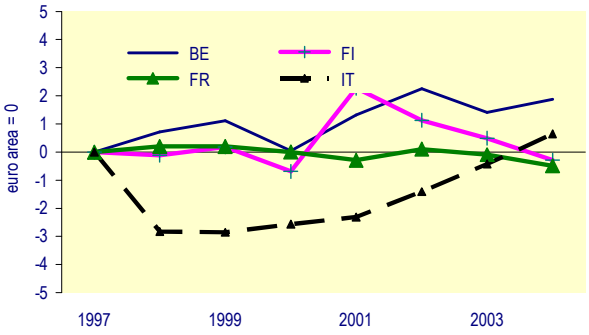


Source : Commission services.

- *Four countries have developed close to the euro-area average*. Nominal unit labour costs in France did not differ systematically between 1999 and 2003. Italy's price competitiveness improved in the run-up to EMU but gradually normalised afterwards. In 2003, the gap is almost closed. This is probably not totally consistent with the country's growth and employment performance, which has been worse than the Euro-area average. Finland and Belgium have seen a marginal deterioration in intra-area competitiveness when economic growth weakened. There is, however, an interesting difference. In the course of the growth slowdown, the gap with the Euro-area average closed in the case of Finland but continued to increase in the case of Belgium.

[190] On this issue, see EU Economy 2001 Review, Chapter 2.

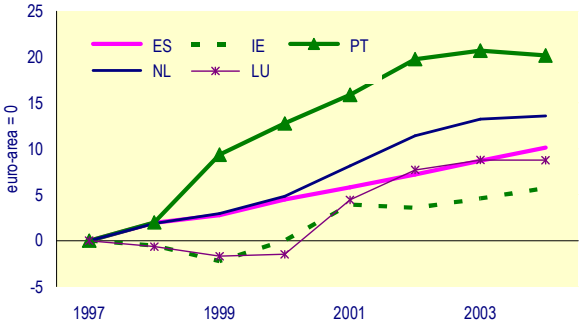
Graph 20 : Nominal unit labour costs, Member States



Source : Commission services.

- *Nominal labour costs grew faster than in the euro area as a whole in Spain, Ireland, Luxembourg, the Netherlands and Portugal.* All these countries have witnessed higher than average output growth and a considerable decline in unemployment in the late 1990s. The deterioration in these countries' price competitiveness relative to the euro area is broadly consistent with their growth and employment performance until 2002. Developments in the Netherlands are to a large extent due to a built-up of price competitiveness prior to 1995 because nominal unit labour costs were below the average of the Euro-area Member States for all the time since 1981. However, the most recent observations of both negative growth for three consecutive quarters in 2002/2003 and the emergence of an output gap higher than that of the euro-area point to the possibility that the Dutch economy has been overheating. In Portugal, with labour market conditions relatively tight up until 2002, significant wage pressures have built up, eroding competitiveness and damaging employment prospects.

Graph 21 : Nominal unit labour costs, Member States



Source : Commission services.

Observing both a loss of intra-area price competitiveness in former high-growth countries and gains in countries with relatively low growth and weak labour market performance suggests that the aforementioned adjustment mechanism, although slow and often painful, is at work in the euro area.

2.3 Phillips curve estimates

In order to evaluate the degree of nominal inertia more formally and rigorously, this section presents econometric estimates of Phillips-curve-type wage equations, the usual economists' workhorse for this type of analysis. The standard Phillips curve suggests a relationship between the change of wage inflation and the unemployment gap, with the relationship affected by various shocks, for example to labour productivity or the terms of trade. The way wages adjust to inflation and productivity also affects the dynamic response of wages to the unemployment gap as given by different distributed lag schemes of the unemployment gap in the Phillips curve. It is also important to note that the long run Phillips curve is vertical, i.e. equilibrium unemployment does not depend on nominal variables such as the inflation rate, the rate of money growth or nominal interest rates. A formal exposition of the model as used by DG ECFIN for the present analysis can be found in Annex 1.

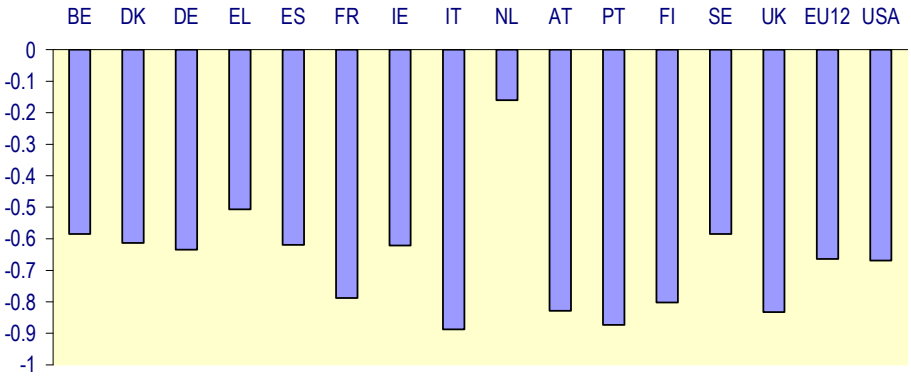
DG ECFINs Phillips curve estimates suggest the existence of a significant degree of nominal wage rigidity in the euro area economy. Only about 65 per cent of the wage adjustment to an inflationary shock is completed within the first year. The output response to a price shock can be used as an indicator for the overall nominal inertia in the economy. As shown in the figure below, the first year output response to a negative inflationary shock of 1 per cent amounts to -0.5 per cent on average in the euro area.[191] There is also considerable variation across Euro-area countries, both with respect to the size of the output effect as well as the duration of the adjustment process. Relatively low costs of disinflation can be found for Portugal, Austria and the UK, with similar adjustment patterns despite very different labour market institutions. The estimate for Italy also shows a fairly small impact response, though the negative effect tends to be much more persistent. The highest output cost of a disinflationary shock occurs in the Netherlands, where we find a low response of wages to the unemployment gap. Belgium, Germany, Denmark, Spain and Sweden also show negative output responses which are slightly above average. Moreover, the estimated duration of the adjustment period is also different across countries. Higher degrees of persistence can be found for Spain, France, Italy, Sweden and Finland.

The empirical estimates exhibit the striking feature that the degree of nominal rigidity found for Euro-area countries does not differ greatly from that of the United States. In fact, the aggregate wage response appears to be surprisingly similar in the EU and the USA, both in terms of the magnitude as well as the dynamics of the adjustment. However, this result is not entirely new and has been confirmed by other studies. For example, testing for a common OECD Phillips curve, Turner and Seghezza (1999) found it possible to impose the restriction of a common sacrifice ratio for almost all countries examined, thus suggesting a similar inflation response of individual countries to the output gap. More recently, using the backward and forward looking Phillips curve specifications presented by Gali et al. (2001), one also finds very similar responses of output to inflationary shocks for the euro area and the USA. With the backward looking model, the output response of a 1 per cent negative money shock is 0.8 per cent in both economies. In the forward looking specification the response to the same shock is -0.5 per cent in the euro area and -0.4 per cent in the US. Last, but not least, a recent IMF study (2003) concludes that, historically, both price and output shocks appeared to have longer-lasting and more significant impacts on prices in the euro area than in the USA; however, following the hardening of most Euro-area countries' commitment to stable exchange rates in the ERM after the mid to late 1980s, impulse responses look broadly similar between the USA and the euro area.

Both the fact that within Europe countries with different labour market institutions seem to have fairly similar adjustment speeds and the similar adjustment speeds found for Euro-area and US wages make it difficult to identify institutional labour market characteristics as the major determinants of nominal rigidities. Moreover, the low correlation between the degree of nominal rigidity and the level of the unemployment rate across countries suggests that nominal factors probably do not play a major role for changes in unemployment. Thus, while institutional and structural factors are probably key to an understanding of what determines the mark-up of effective wages over competitive wages over the medium term and, in consequence, the level of equilibrium unemployment, institutional labour market characteristics appear to be of less importance for the degree of nominal inertia in the economy.

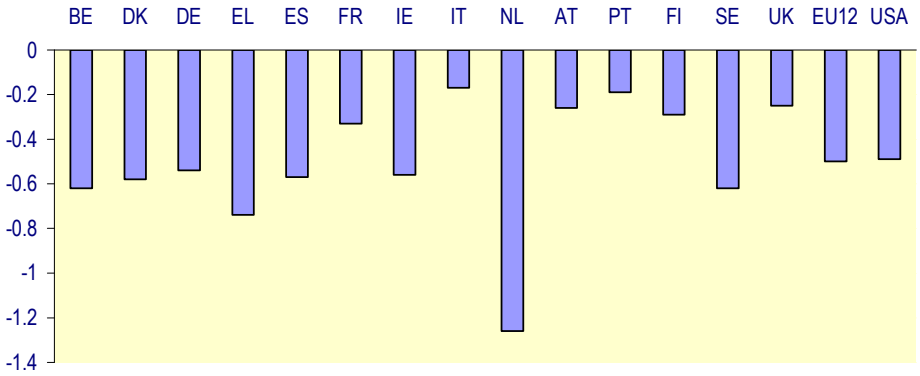
[191] The first year impact response figures have been computed using the estimated Phillips curve coefficients as given in Table A2 in Annex I.

Graph 22 : First year wage response to a 1% disinflationary shock



Source : Commission services.

Graph 23 : First year output response to a 1% disinflationary shock



Source : Commission services.

2.4 Summing up

This section tried to establish some stylised facts on nominal and real wage developments in the euro area over the recent business cycle. The main findings can be summarised as follows:

- For the euro area as a whole, nominal wage growth per worker has been remarkably stable since the beginning of EMU. While accelerating slightly around the turn of the decade, growth of nominal compensation hovered around close-to-but-below 3 per cent and is forecast to remain at that level well into 2004.
- With nominal wage growth per worker rather invariant to the cyclical situation, the slowdown in labour productivity growth translated into stronger increases of nominal unit labour cost in 2001 and 2002, clearly overshooting the benchmark value consistent with the monetary policy goal to keep inflation close to but below 2 per cent. However, with labour productivity growth expected to pick-up again at the present conjuncture, nominal unit labour cost growth is forecast to return to well below 2 per cent next year.
- After a prolongued period of declining real unit labour costs, the fall in the wage share came to a halt at the turn of the decade. With real unit labour costs growth essentially flat over the past 4 years, the development has been much smoother than in the beginning of the 1990s, when a marked acceleration of real unit labour cost growth was followed by a sharp downward correction, largely reflecting strong labour-shedding. In a nutshell, while overall wage discipline has been preserved, real wage moderation has not continued in recent years. However, indications are that real unit labour cost growth has re-entered negative terrain at the present conjuncture.
- The observed stability in overall wage developments at the euro area level is to some extent due to aggregation and hides less stable patterns in some Member States. As regards different nominal unit labour cost developments across countries – the basic mechanism for intra-area realignments of labour cost competitiveness -,

the accumulated evidence over the past five years points towards significant improvements for Germany, Austria and Greece; in Spain, Ireland, Luxembourg, the Netherlands and Portugal, on the other hand, nominal labour costs increased considerably faster than in the euro area as a whole.

- Formal econometric analysis of Phillips curve type wage equations shows considerable nominal inertia in the wage inflation process in the euro area. Across EU countries, relatively low costs of disinflation can be found for Portugal, Austria and the UK. The highest output cost of a disinflationary shock is estimated for the Netherlands, due to a fairly limited response of wages to the unemployment gap. Negative output responses slightly above average are also found for Belgium, Germany, Denmark, Spain and Sweden. Moreover, the estimated duration of the adjustment period is also different across countries. Spain, France, Italy, Sweden and Finland appear to be characterised by relatively higher degrees of wage inflation persistence.
- However, the empirical estimates also suggest that wage inflation persistence is not higher in the euro area than in the USA; in fact, the aggregate wage response to an inflationary shock appears to be surprisingly similar between the euro area and the USA, both in terms of the magnitude and and the dynamics of the adjustment. Taken at face value, these results would imply that the more sticky inflation developments in the euro area in recent years can hardly be ascribed to a higher degree of nominal wage rigidities.
- The finding of broadly similar degrees of nominal inertia across different countries in the euro area, and in the euro area and the USA, makes it difficult to identify institutional labour market characteristics as the major determinants of nominal rigidities. Thus, while institutional and structural factors are probably key to an understanding of what determines the mark-up of effective wages over competitive wages and, in consequence, the level of equilibrium unemployment over the medium term, institutional labour market characteristics appear to be of less importance for the degree of nominal inertia in the economy.

3. Wage interdependencies in EMU

Considerable academic research has been devoted to the impact of EMU on wages and wage bargaining institutions immediately before and since the introduction of the euro.[192] In the economic literature, a number of channels have been identified how the switch in monetary regime may affect incentives in wage bargaining. Some of them are obvious, others less so.

(1) In EMU, interest rates and exchange rates are no longer a tool for economic policy at the Member State level;

(2) The degree of product market competition is higher in EMU, which reduces the rents that could be freely allocated in wage bargaining;

(3) Wage bargaining has a smaller impact on the euro area inflation rate than on the national inflation rate, which changes strategic interaction between wage bargaining and monetary policy;

(4) Wage bargaining institutions may adapt to the new environment.

This section explores some specific aspects of wage setting interdependencies in EMU and cross-country transmission mechanisms. The first part of the section is devoted to an investigation of shock absorption and shock transmission under two different bargaining regimes, where (i) wages respond in a traditional way purely to national conditions, or (ii) when wage setting interdependencies are present, i.e. domestic wage setting takes developments abroad into account. Moreover, we also look into the transmission mechanisms of a wage shock under different degrees of goods market integration. The analytical tool employed in this part is simulation analysis of a stylised two-country model. The second part of this section then investigates the issue of wage pattern bargaining and wage convergence from a detailed sectoral perspective, offering some insights into developments that are not visible in aggregate data. Last, but not least, overview information on recent developments in bargaining systems is provided in Annex III.

3.1 Transmission of Shocks in EMU: The role of goods and labour market integration

3.1.1 Setting the stage

The effects of asymmetric shocks, both in the country where the shock occurs as well as the transmission to other members of the euro area, are a central policy concern. Without flexible exchange rates the adjustment must take place predominantly via wages and prices. Depending on the amount of nominal inertia in wage and price formation, the shocks can have strong and fairly protracted real effects. Another important issue is the degree to which prices and wages can move in different directions within the euro area. To the extent to which this is possible, inflationary pressures in one group of Euro-area Member States could have negative transmission effects on other Member States through an increase in real interest rates. The generally accepted view on the shock transmission within a currency union suggests that both positive demand and positive cost

[192] For a survey, see Calmfors (2001).

shocks are likely to have negative effects on other Member States. [193]

However, in a more forward looking perspective it should also be considered that the new monetary regime is likely to change the structure of the euro area economy, which itself may have implications on how shocks will be absorbed. Monetary union can be regarded as a catalyst for generating further integration in both goods and labour markets. Obviously, exploiting the benefits of economic integration is one of the major reasons for creating a monetary union. One of the possible benefits of a common currency is increased competition between domestic and foreign firms which goes along with greater openness and increased price transparency (first substantial signs that this is happening can already be observed). Better informed customers will increase the willingness to substitute between domestic and foreign goods. Apart from positive growth effects, this will also have consequences for the transmission of macroeconomic shocks, since firms will be less able to increase prices in a more competitive environment. Thus, more highly integrated goods markets could have a sizeable impact on how shocks are absorbed and transmitted.

It has also been recognised that higher integration of goods markets will have implications for wage setting, even in the absence of significant changes in labour mobility. Increased product market competition results in fewer rents that could be distributed in wage bargaining. Moreover, trade unions which recognise the impact of higher goods market competition on the elasticity of labour demand will pay more attention to wage developments in other Member States. While this could lower wage mark-ups in individual Member States and therefore increase the level of employment, there may be a trade off between the variability of employment and that of prices.[194] Linking domestic wages to foreign wages could increase nominal rigidity and therefore slow down the adjustment of the economy to shocks.

A dampening impact of EMU on wage flexibility may also emerge from direct changes in wage bargaining mechanisms, for example through increased cross-border co-operation of trade unions. Again, if it came into existence, it would imply that wages respond less to national determinants.[195] However, more apparent to date is the trend towards enforced national co-ordination of wage bargaining, which may be a direct consequence of the lack of monetary instruments at the national level.

Indeed, a lot of attention has been paid by economists to whether EMU will be accompanied by the evolution of pan-European wage bargaining. Actually, several trade unions started engaging in cross-border co-operation. The comprehensive documentation by Dufresne and Mermet (2002) on the ongoing efforts displays only limited progress so far without any visible impact on wage negotiations. In practical terms, there are not many possibilities to co-operate and notable differences in national structures lead to high costs of co-ordination, because they imply that national trade unions may have distinct preferences.[196]

Against this background, this part of the study looks at the question of how stronger wage interdependencies and higher goods market integration might affect the way in which shocks are absorbed and transmitted in EMU. To analyse this issue we perform simulation analyses using a stylised two country version of the Commission's QUEST model. We look at two equally sized regions (with similar economic structures) which we call domestic and foreign, and we subject the domestic region to asymmetric demand and supply shocks and to a wage push shock. More specifically, we analyse the transmission mechanisms of the following three types of shocks:

1) A (temporary) positive shock to consumer demand (1 per cent of private consumption over one year, phased out over 5 years).

2) A (temporary) negative shock to TFP (1 per cent of TFP, phased out over 5 years).

3) A (permanent) 10 per cent positive shock to the wage setting rule in the domestic economy.

The issue of interest in the first two simulation exercises is how different wage setting regimes affect the response of the two regions to asymmetric demand and supply shocks. In what may be labelled an "early stage of EMU" scenario, it is assumed that domestic wages are set in traditional behaviour, responding purely to domestic economic conditions. In the second variant, an "integrated EMU" scenario, we assume significant interdependencies in wage setting; this is implemented in the model simulations by giving equal weight in the determination of wages to the traditional "local" explanatory factors and to wage developments abroad.

In the third simulation exercise we analyse the effect of a cost push shock. In the first scenario the cost shock is analysed for historically given price elasticities ("early stage of EMU" scenario) between domestic and foreign goods. In a second scenario the assumption is made that goods markets are completely integrated, i.e. customers regard goods produced in both regions as perfect substitutes ("integrated EMU" scenario). In this case, competition forces price equalisation across EMU regions. Both these variants are analysed under the

[193] For a textbook-type formal analysis to illustrate the interdependencies between wage formation, inflation and monetary policy, see Annex II.

[194] See Calmfors and Johansson (2002), Saint Paul and Bentolila (2001).

[195] Hancké and Soskice (2003) analyse how a leading trade union could take others' responses to its own wage claims and economic shocks into account.

[196] See Borghijs (2002) and Borghijs et al. (2003).

assumption of independent wage setting at home and abroad.

3.1.2 Demand and supply shocks under different wage setting regimes

3.1.2.1 A Positive Demand Shock

Independent Wage Setting

A positive demand shock leads to higher prices and higher GDP in the domestic economy. The increase in demand is associated with a temporary rise in employment and wages. Because of different inflation rates, real interest rates are down in the domestic economy and up in the foreign economy. This mechanism leads to a negative transmission of the demand shock to the rest of EMU and a fall in both prices and wages. Note that the cross-country shock transmission is sizeable, mainly due to a strong negative investment response to a temporary rise in real interest rates.

Interdependent Wage Setting

With interdependent wage setting, the conditions for a slowdown of the adjustment of wages and prices are met. As can be seen from the first scenario, wages and prices in the domestic and the foreign economy move in opposite directions. With higher interdependencies in wage setting, the wage and price response slows down in both regions. In the domestic economy this leads to a notable effect on GDP. Since wages rise less, there is initially a stronger employment effect. However, since prices do not rise as much either, there will be less of a disinflationary effect for the subsequent years over which the adjustment takes place, and therefore real interest rates will be lower. It takes approximately one year longer for the output adjustment process to work out. For the foreign economy, the differences in the adjustment process under interdependent and independent wage setting seem to be less pronounced. It appears that the smaller fall in prices and wages is compensated by a smaller increase in real interest rates. Thus the adjustment path of investment looks fairly similar in the two wage setting regimes.

3.1.2.2 A Negative Supply Shock

Independent Wage Setting

A negative supply shock has adverse effects on investment, consumption and GDP. The initial decline of real interest rates in the domestic economy is a consequence of insufficient demand, stemming from the shock to productivity of existing capital, rather than a stimulus for increased demand. There can be a short run positive effect on employment due to insufficient price flexibility. The supply shock is transmitted negatively to the rest of EMU via an increase of real interest rates, resulting from the spillover effect implied by the inflationary pressures from the domestic economy. The downward pressure on wages and prices increases unemployment.

Interdependent Wage Setting

With interdependent wage setting, wages rise less or even fall. This helps to limit the rise in costs in the domestic economy and even slightly stabilises the response of output to the supply shock in the domestic economy relative to the case of independent wage setting. The transmission of the shock to the foreign economy is slightly more pronounced, because wages decline less than under independent wage setting. The adjustment of employment therefore takes longer.

3.1.3 Wage shocks under different degrees of goods market integration

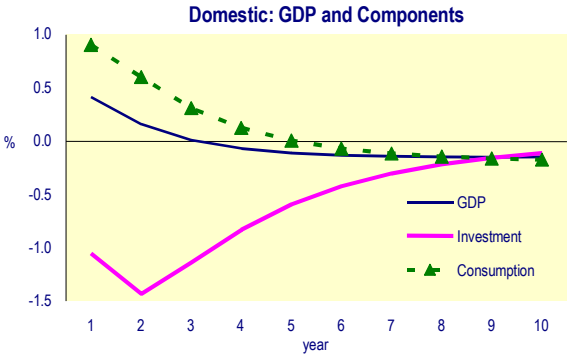
Imperfect Goods Market Integration

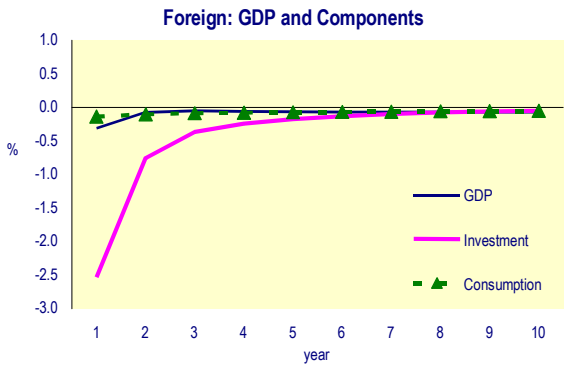
The wage push shock has strong adverse effects on employment. Since prices rise domestically, there is a negative real interest rate effect which stimulates investment initially. However, the investment response is not strong enough to prevent GDP from falling already in the first year. The wage shock is transmitted negatively to the rest of EMU through an increase in real interest rates. While in the short run the transmission of the shock is negative because of adverse real interest rate effects, there is also a long run negative terms of trade effect. Capital costs increase due to the price increase of imported investment goods. This slows down capital accumulation in the longer term.

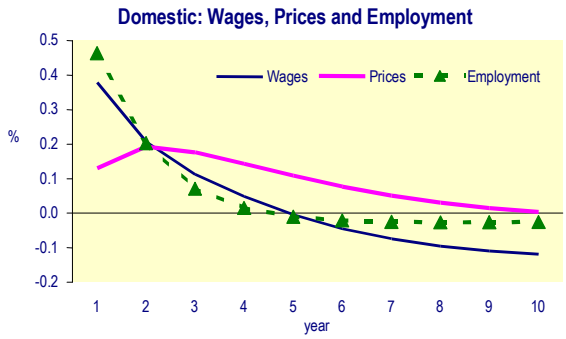
Full Goods Market Integration

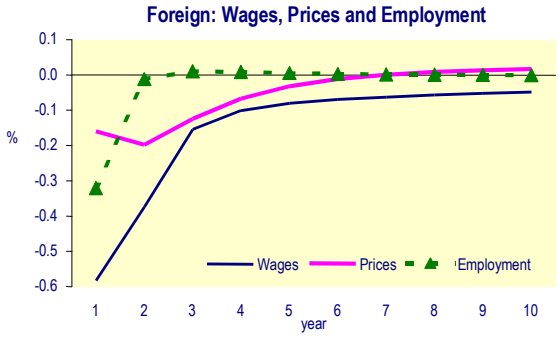
Price divergence and therefore divergence of real interest rates in EMU occurs, because nationally produced goods are imperfect substitutes. To the extent to which cross border goods market competition increases, competitive forces prevent price divergence. In such a scenario, the adjustment process will take place differently. Domestic firms can only respond to a wage increase by lowering cost, i.e. by reducing employment, which has two effects on domestic cost. First, it reduces cost by increasing the capital intensity of production; second, it reduces wages through higher unemployment. The decline of economic activity in the domestic economy lowers real interest rates in the monetary union as a whole, simply because by definition no inflation differential emerges. Thus, in this case the wage shock is transmitted positively and is associated with a strong investment stimulus in the countries not hit by the wage shock.

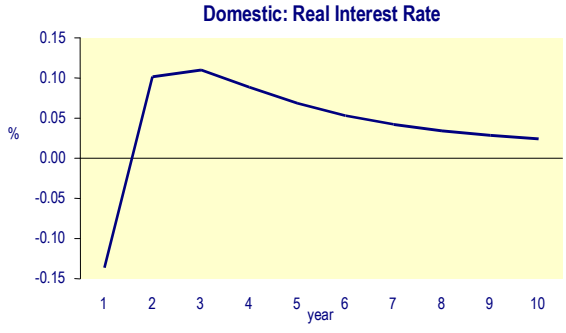
Graph 24 : Demand Shock Independent Wage Setting

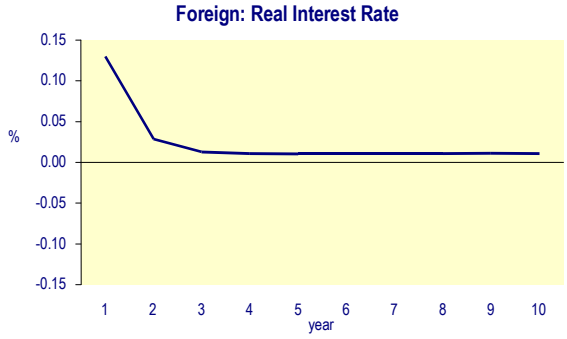






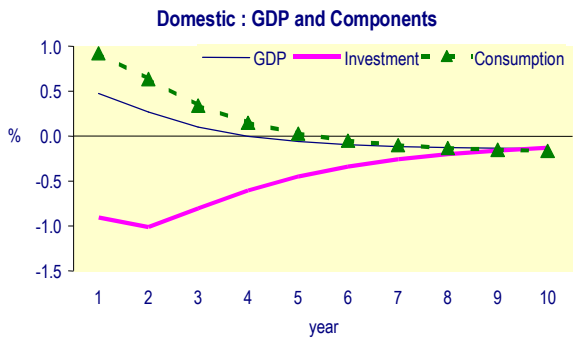


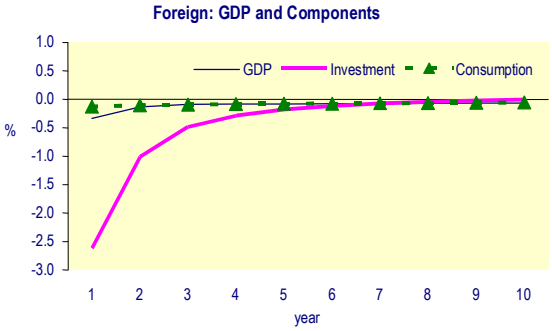


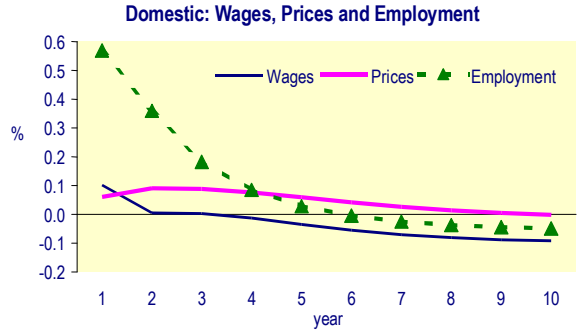


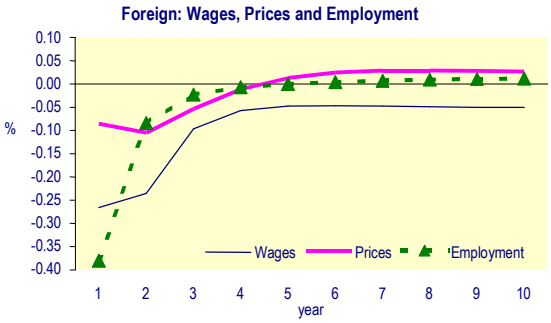
Source : Commission services.

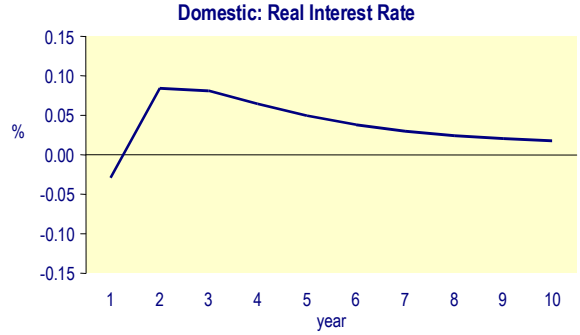
Graph 25 : Demand Shock Interdependent Wage Setting





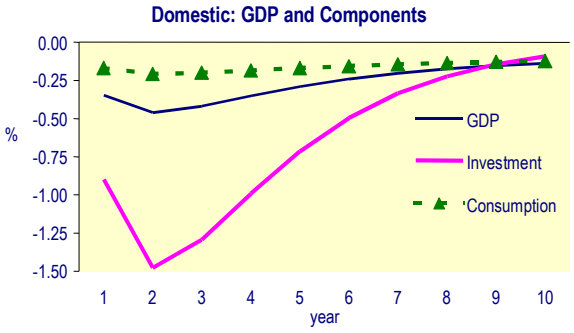


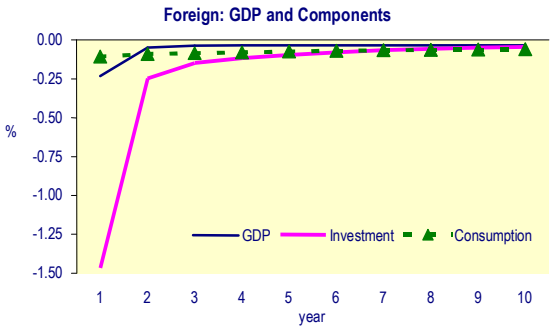


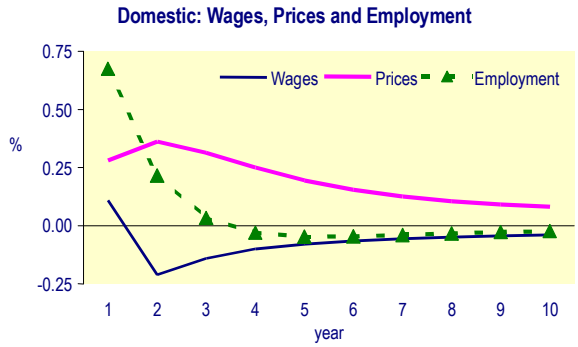


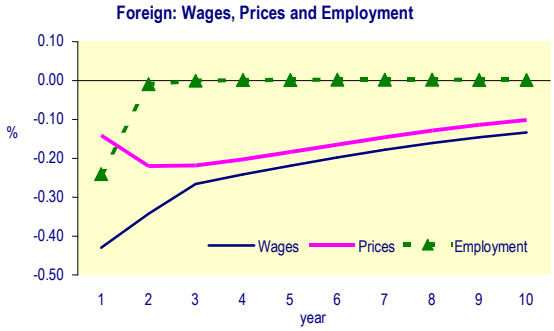
Source : Commission services.

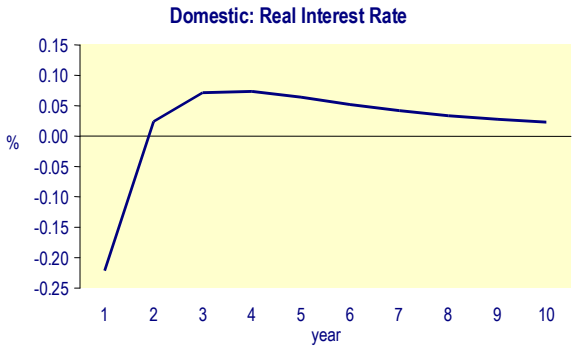
Graph 26 : Supply Shock Independent Wage Setting

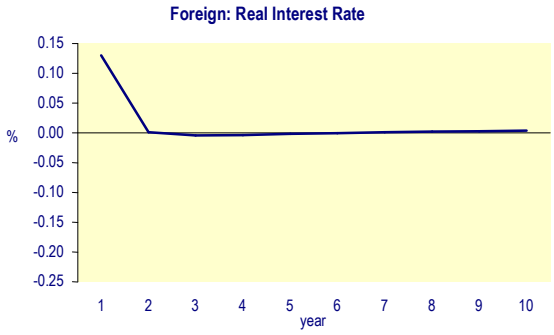






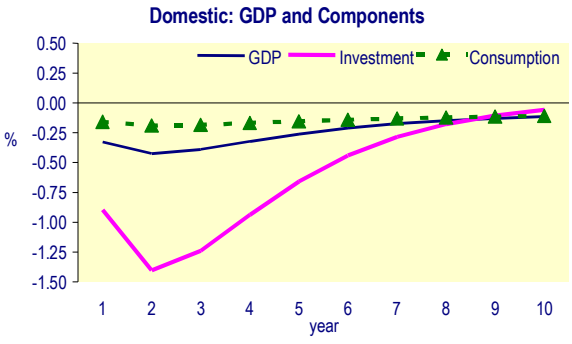


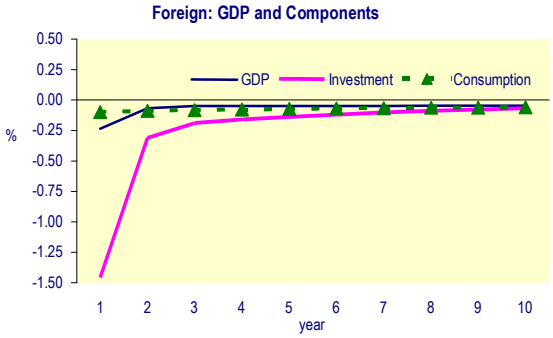


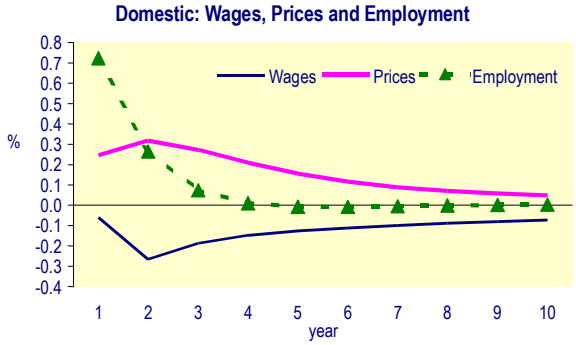


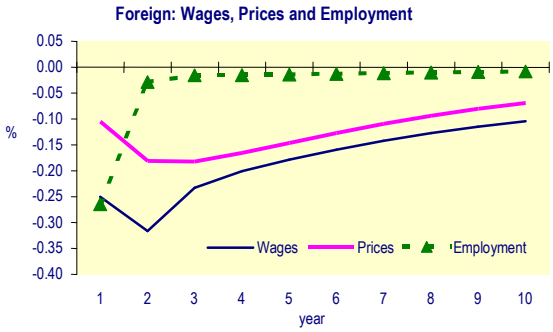
Source : Commission services.

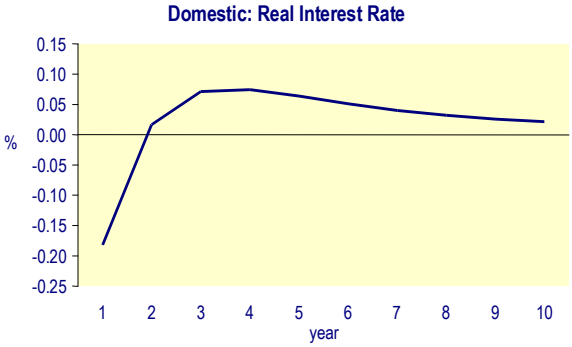
Graph 27 : Supply Shock Interdependent Wage Setting

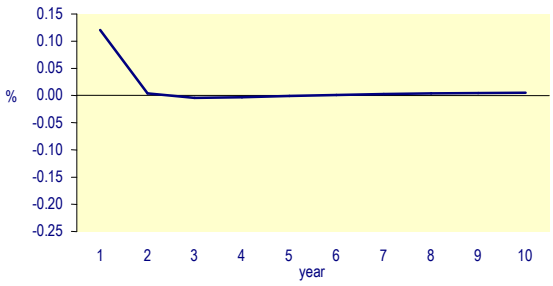






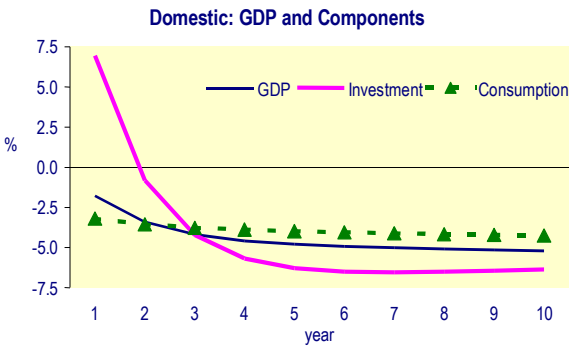


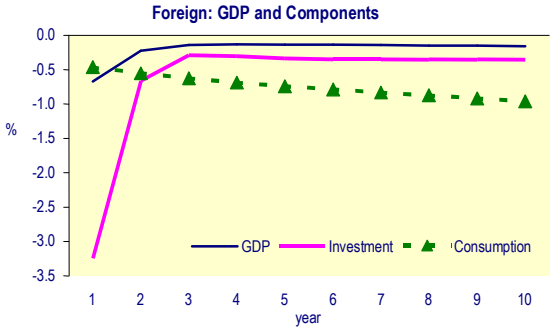


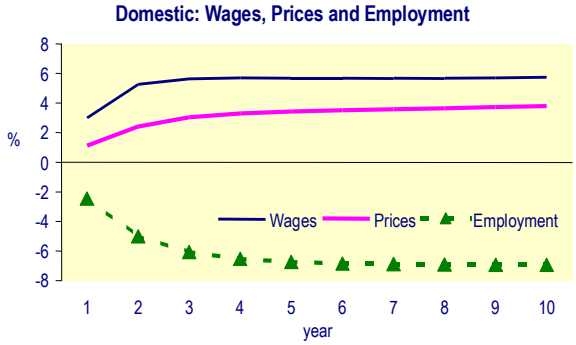


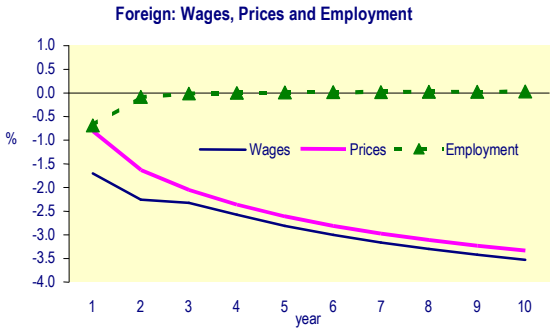
Source : Commission services.

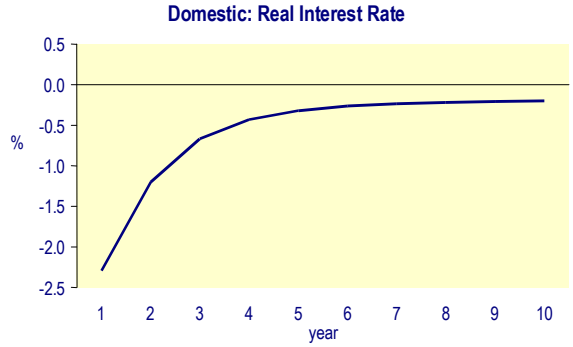
Graph 28 : Wage Shock Imperfectly integrated goods markets

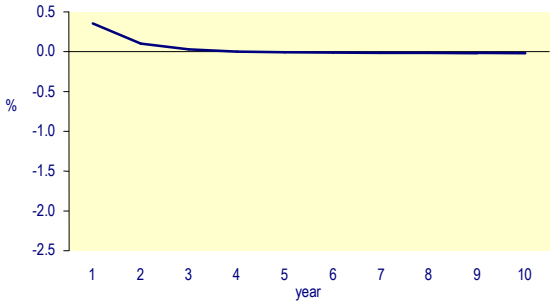






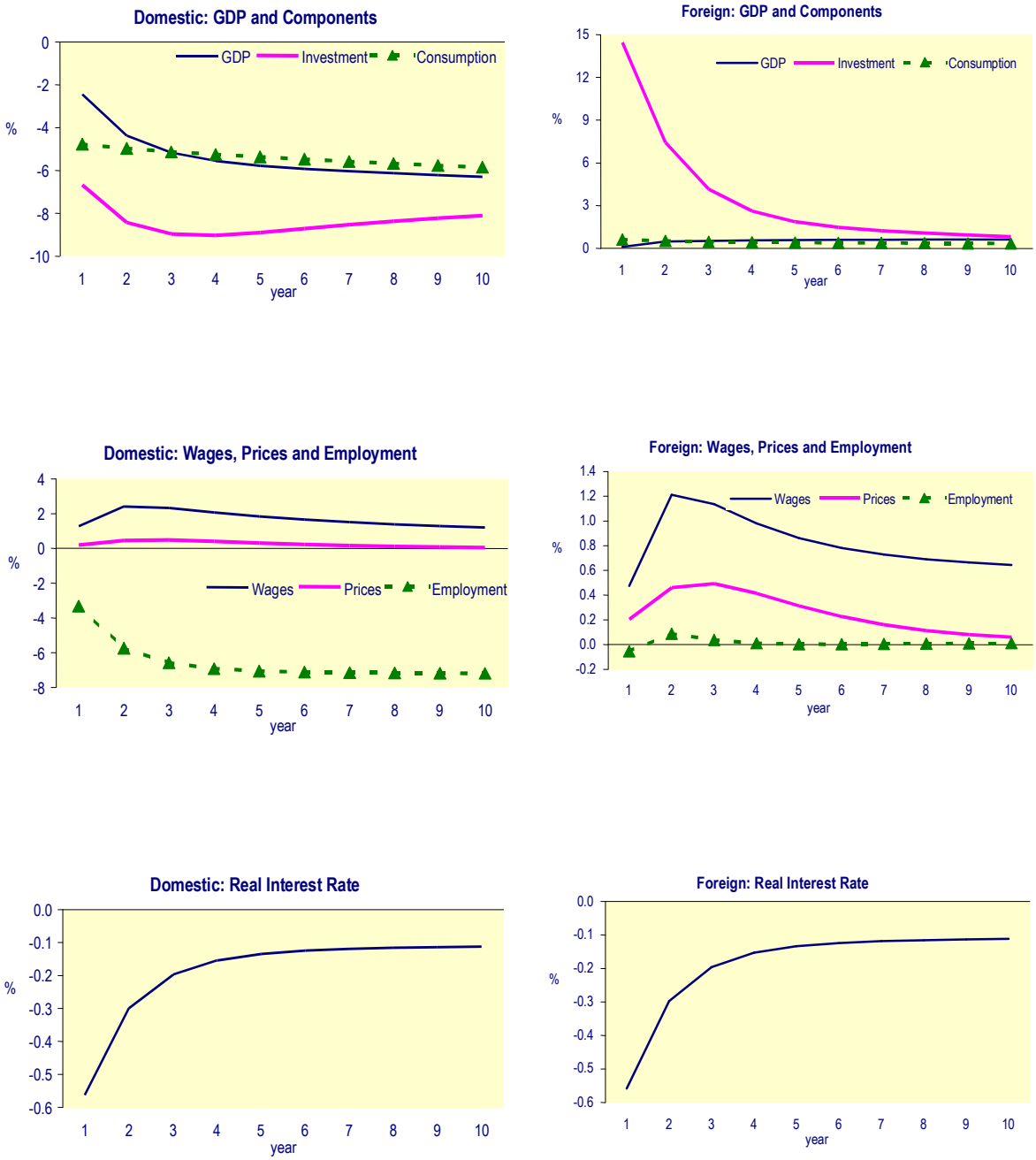






Source : Commission services.

Graph 29 : Wage Shock Fully integrated goods markets



Source : Commission services.

3.2 Wage pattern bargaining and sectoral wage convergence

Do wage levels converge as economic integration becomes stronger? Is there evidence for a "Europeanisation" of wage bargaining? How strong are the effects of wage bargaining coordination within countries? For the first time, we are able to explore these issues from a detailed sectoral perspective. This offers insight into developments that are not visible in aggregated data, with the most obvious distinction being the relative behaviour of tradable versus non-tradable goods and services. Another example is efforts for cross-border bargaining coordination that differ greatly across

sectors. The analysis is based on a data set that covers wages, value added and hours worked in 13 countries for 29 to 49 sectors from 1980 to 2001.[197] However, in order to reconcile the wealth of the data with the scope of this chapter, the main focus here is on selected branches, which can be considered as being broadly representative of trends in the different broad sectors of the economy.

3.2.1 Economic integration, competitiveness and wage convergence

Economic integration, in particular the single market programme and EMU, can be expected to trigger price level convergence among tradable goods as competitive pressure increases.[198] As firms react to competitive pressure, convergence of unit labour costs across countries is also to be expected. In this subsection, we try to identify convergence of unit labour costs in selected branches. In a second step, we analyse the convergence of hourly wage levels, since it is wages, together with productivity, that determine unit labour costs.

The bandwidth of unit labour costs in 2001 is rather similar across branches, services and industrial sectors alike, with the exception of retail trade. This is surprising, as the bandwidth does not seem to systematically reflect the degree of competition in a given sector. Looking at the whole period under observation, unit labour costs (ULC) do not follow a uniform pattern in the different sectors. Upward trends in some sectors (such as textiles, fabricated metals and retail) coexist with stable or even strongly decreasing ULC in others. Graphs 30 and 31 display the band between the highest and lowest unit labour costs as well as the standard deviation and the coefficient of variation for the example of the chemicals industry and financial intermediation.

Convergence of unit labour costs was stronger in the 1980s than in the 1990s. Graph 32 shows the coefficients of variation of ULC for six selected branches. In the chemicals industry as well as in textiles, and fabricated metal products, unit labour costs converged during the 1980s and early 1990s, but then diverged again in the late 1990s: the coefficient of variation first declines and then increases again. In the chemical industry, further reductions at the bottom level of ULC account for the divergence observed in the 1990s. Not so in the textiles and fabricated metal sectors, where the divergence seems to stem mostly from increases in ULC where they are already high.

In the ICT sector, there is a strong downward convergence of unit labour costs from high levels. The relative dispersion, though, remains broadly the same over the period and at a level comparable to that of other sectors. In the retail sector, the band between highest and lowest ULC is relatively wide, and diminishes only slowly in the 1990s, as the highest levels are reduced. In financial intermediation, the band is quite narrow, but starts widening again after the early 1990s. Finally, in public administration, there is a clear upward trend of ULC, and convergence stems from a "catching-up" of the bottom levels, whereby the band becomes remarkably narrow.

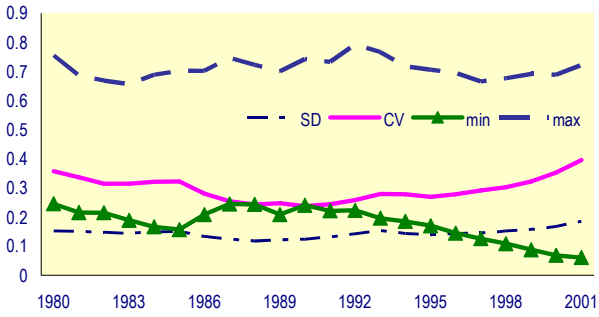
The convergence or divergence of unit labour costs captures the competitive position of industrial sectors in different EU Member States. Developments of unit labour costs are driven both by changes in wages and changes in productivity. As a next step, we therefore explore wage convergence.

The absolute differences in hourly compensation tend to become wider as (nominal) wages increase. There is thus no catching up of wage levels in absolute terms. In 2001, the bandwidth of wages in the selected sectors stands between 11.7 EUR (fabr. metal) and 26.6 EUR (office machinery) [Graphs 33 and 34]. This notwithstanding, there is convergence in relative terms (coefficient of variation (CV), Graph 35) over the past 20 years. It follows a similar, if not stronger, pattern than unit labour cost. The dispersion of wages has decreased in all selected sectors. Again, convergence was stronger in the 1980s than in the 1990s.

[197] In principle, 54 sectors are included in the data set, but in all countries, disaggregated data is missing for some of these.

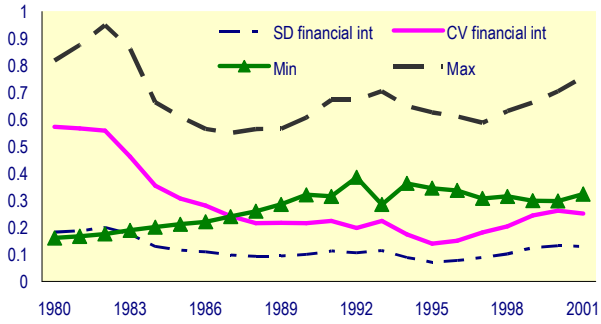
[198] See European Central Bank (2002).

Graph 30 : ULC in chemicals



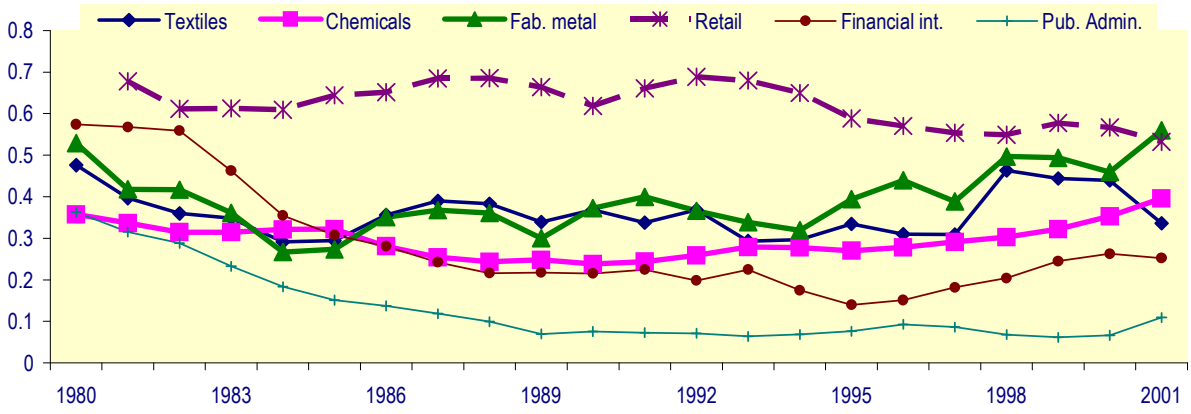
Source : Commission services.

Graph 31 : ULC in financial intermediation



Source : Commission services.

Graph 32 : Coefficients of variation of unit labour costs in selected sectors



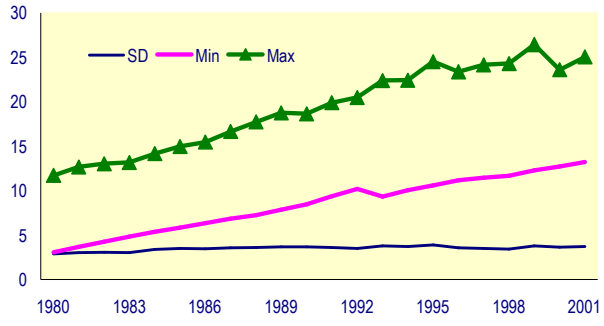
Source : Commission services.

The strongest convergence can be observed in the office machinery (down from a CV of 0.6 in 1980), fabricated metals and textiles sectors. It is weakest in retail trade, where the dispersion is basically stable from the late 1980s on. Convergence in the chemicals sector and in public administration is quite strong until the early 1990s, but thereafter the trend is reversed and dispersion increases again. While in the chemicals sector the lower wages stabilised from the mid-90s on, in public administration it seems to be accelerated wage growth in high-wage countries that drives the divergence. In financial intermediation, dispersion increases in the early 1990s, interrupting a decreasing trend, which resumes only a couple of years later.

In conclusion, the reduction of wage dispersion contributed to the narrowing of unit labour costs. While the gap between absolute wages continued to widen (no "strong" catching-up), the relative dispersion of wages decreased over the past 20 years. Convergence differs across sectors in terms of strength; it seems to be generally stronger in the industrial sector than in services, potentially reflecting the intensity of competitive pressure. Wage convergence did not wait for the completion of the single market or EMU to happen: in fact, the strongest convergence occurred in the 1980s.

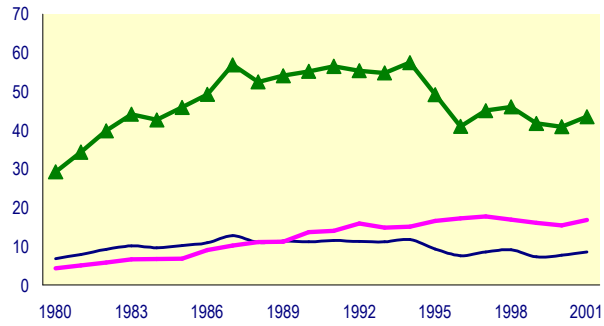
These results are broadly in line with those reported by Duque et al (2002). They use different approaches to gauge the convergence of aggregate unit labour costs, wages and productivity and find that unit labour costs and wages converged in the EU-11 between 1981 and 2001, but that the same is not true for productivity. However, as the disparities remain more or less similar after 1997, they conclude that "the introduction of the euro does not seem to have accelerated the process of wage equalisation" (p. 18).

Graph 33 : hourly wages fabr. metal



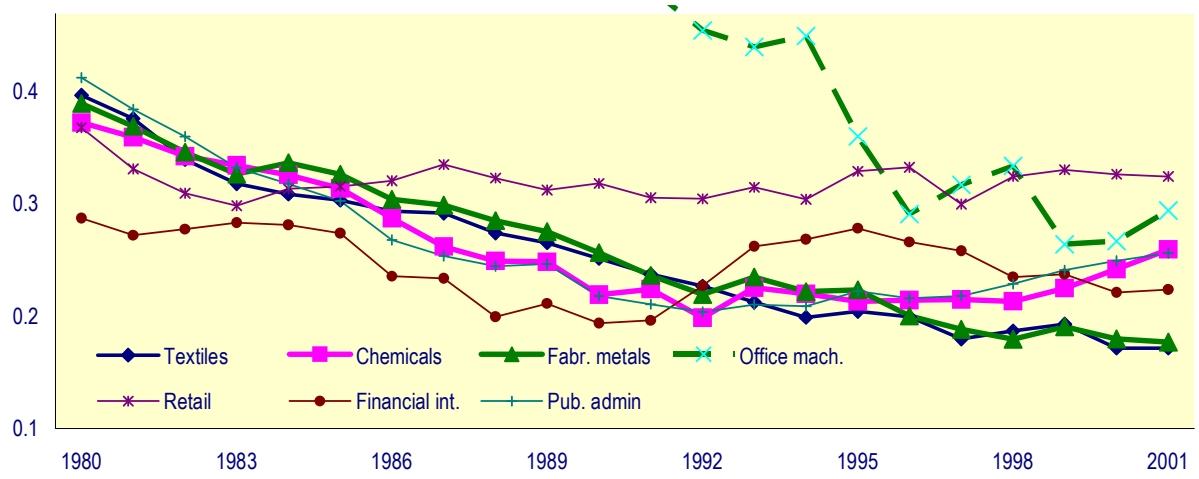
Source : Commission services.

Graph 34 : hourly wages office machinery



Source : Commission services.

Graph 35 : coefficients of variation of hourly wages



Source : Commission services.

3.2.2 Sectoral wage coordination across borders: Emergence of EU-level bargaining?

In this section, we investigate cross-border coordination of wage bargaining. As competition is fostered by economic integration, in particular the single market and EMU, it is rational for social partners to take wage developments in other countries into account. Moreover, competitive pressures as well as business structures of internationally operating companies may have already prompted social partners at earlier stages to consider wages in other countries in their own negotiations.

So far, wage bargaining coordination takes rather soft forms. As part of policy coordination in EMU, the Macroeconomic Dialogue was set up among the top organisations of EU Social Partners, the Council and Commission and the ECB in order to discuss the macroeconomic policy mix. During the run-up to EMU, the EU has also seen some attempts by trade unions to coordinate wage bargaining, mostly through supranational wage norms by which trade unions commit to seeking wage increases that cover inflation plus "a balanced participation in productivity gains".[199] The 1998 Doorn agreement between trade unions from Belgium, Germany, Luxembourg and the Netherlands was a trail-blazer in that respect. The Doorn initiative is followed up through regular meetings that have, however, not led to any further deepening of wage coordination. The "coordination guideline" put forward by the European Trade Union Confederation in 2000 foresees that "qualitative" gains (such as equality of pay) should be sought as compensation if real wage increases remain below productivity gains. Among the sectoral trade union federations, the metalworkers' federation was a forerunner in establishing a coordination rule; some other industry federations have followed. In the metalworking sector, some purely regional bargaining networks also exist.

Coordination efforts and wage norms have to date mainly led to an exchange of information, sometimes including the participation of observers in wage

[199] European Metalworkers' Federation (1998).

negotiations.[200] The wage norm seems to serve as a general benchmark, but it is hard to gauge its impact, since price and productivity developments play a role in bargaining at national or lower level anyhow. More far-reaching ambitions to coordinate wage bargaining are limited by the employers' strict opposition. Moreover, it is inhibited by the diversity of wage bargaining structures and practices in Member States and, even within the trade union sector itself, by the European federations' lack of a mandate to negotiate.[201]

As far as possible stronger forms of coordination are concerned, it is important to keep their potentially detrimental effects in mind. Firstly, coordination reduces the differentiation of wages according to local labour market conditions and productivity.[202] For coordination at EU level, this is likely to imply that the response to asymmetric shocks is inhibited. The importance of that rigidity obviously depends on the strength of the coordination mechanism and the kind of the shock. Fully "Europeanised" bargaining with uniform wage increases would be more rigid than the general wage rules that apply so far. Demand shocks in a highly integrated sector are less likely to have strong asymmetric effects than supply shocks, if products are highly mobile and input factors are not. Secondly, Borghijs et al (2003) show that strong coordination of trade unions' wage demands (such as demands for uniform wage increases) will increase wage markups, thereby leading to higher unemployment.[203]

Since cross-border coordination is an issue of competitiveness, it is useful, in this section, to focus on nominal hourly wages. We chose four sectors: textiles, fabricated metal products, retail trade and financial intermediation.

Table 3 summarises correlations of wage increases across countries in selected sectors for the period 1981-2001.[204] Correlations with the USAwere also calculated, in order to have an external reference. As could be expected, correlations appear to be stronger in the industrial sector than in services.

Table 3 : Cross-country correlation of wage increases

	Significant pairs*		Average of all correlation coefficients
	Absolute	**%age of possible**	
Textiles	25	32	0.347
Fabricated metals	30	38	0.350
Retail trade	8	12	0.232
Fin. Intermediation	12	15	0.269

* Number of pairs for which the value is above the critical value defined by Brandner and Neusser (1992). For the sample 1981-2001, this value is 0.44.

Source : Commission services.

Textiles: For the full sample, co-movements are fairly strong, also beyond the EU. There seems to be an "atlantic" pattern including Finland, Sweden, the UK, the USA and to some extent France and Spain, but it does not hold if one looks at the shorter period 1990-2001. The strong correlation of Italian and Spanish wages, however also holds in the shorter run. We have tested for potential imitation (i.e. the "convergence countries" would imitate wage developments in the "core") by regressing Italian and Spanish wages on the unweighted average of B, F, NL and A (Germany excluded because of reunification effects) and linear and geometric trends. For Italy, the wage increases of the core group as well as the (negative) linear trend are highly significant (Table 4), while for Spain only the linear trend variable turns out to be significant.

Table 4 : Wage growth in Italian textiles sector regressed on "core" and trend

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob**
C	10.032	3.171	3.164	0.005
CORE	0.887	0.359	2.470	0.024
LIN_TREND	-0.574	0.157	-3.652	0.002
R-squared	0.742			
Adjusted R-squared	0.713			

Source : Commission services.

[200] For an overview, see Dufresne and Mermet (2002), Mermet (2002).

[201] See Borghijs et al (2003), Calmfors (2001) and Visser (2001).

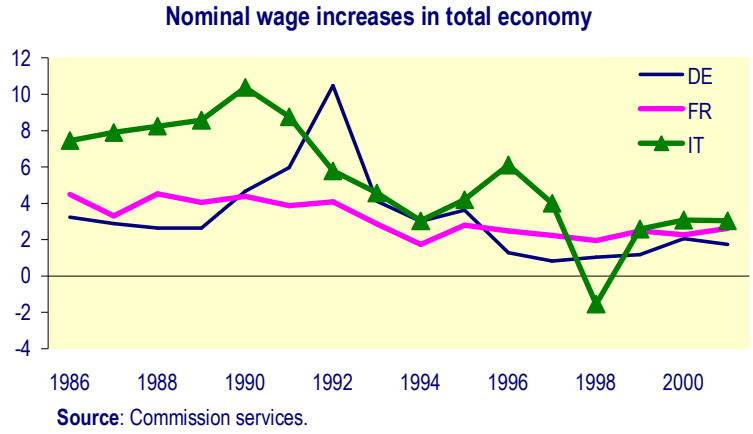
[202] See the overview in Flanagan (1999).

[203] The authors acknowledge, though, that there may be a counteracting effect through better anticiption of the monetary policy response.

[204] The same was also carried out for the sub-period 1990-2001, for which a smaller number of significant correlations were detected. This is due to technical difficulties on the one hand (smaller number of observations) and to the fact that the pace of disinflation was high in the 80s and began levelling off in the 90s (when inflation rateswere already relatively low) on the other. The latter point implies that correlations based on the full sample may be biased upwards.

Box 1 : The situation in Germany influenced by reunification

Wage increases in Germany in the 1990s were strongly influenced by reunification. In this context, three factors explain to a large extent the absence of significant correlations with wages in partner countries: (1) Technically, there is a break in the time series in 1992, when Eastern Germany is first added to Western Germany. (2) Economically, due to the demand shock of reunification, Germany moved later into the recession of the early 1990s than its neighbours. German wage growth in the early 1990s reflects this cyclical exception as well as (3) the catching-up of Eastern wages, which was particularly strong in the early years after reunification due to the political will to equalise wages across the country (see graph below; note that these are monthly wages from national accounts).



Source: Commission services.

Fabricated metal products: As could be expected, correlations turn out to be numerous and strong, although, for the shorter period, the picture is less clear. The sector is subject to intense competition, and the single market was completed early on. Moreover, the European Metalworkers' Federation was the first sectoral federation to adopt a rule for national bargaining, in 1998. Again, there is also a strong transatlantic dimension, probably indicating competititve pressures. The hypothesis that a long history of ESCS membership may have led to more intense wage coordination is tested by regressing Belgian wage increases on those in France, Germany, Italy and the Netherlands (i.e. founding members of the ECSC).[205] Again, the result is mixed: "Germany" turns out to have the wrong sign, while "France" is insignificant. However, "Italy" and "Netherlands" turn out to be highly significant (Table 5). Again, we also investigate the wages in Spain and Italy in relation to the "core", trying to disentangle trends from wage coordination. The hypothesis that wage developments of the core countries are imitated is rejected for both countries, while the negative linear trend indicating the slowdown of wage growth is highly significant.

[205] ECSC stands for European Coal and Steal Community.

Table 5 : Wage growth in Belgian fabr. Metal sector regressed on ECCS partners

Variable	Coefficient	Std. Error	t-Statistic	Prob
FR	0.04034	0.134436	0.3001	0.768
IT	0.341609	0.111018	3.0771	0.007
DE	-0.1222201	0.149721	-0.816	0.426
NL	0.502985	0.146058	3.4437	0.003
R-squared	0.592236			
Adjusted R-squared	0.520278			

Source : Commission services.

Retail trade: Since retail trade operates in local markets, there should not be much competitive pressure across borders. Coordinated wage-setting would therefore not make much sense. Indeed, cross-country correlations turn out to be the exception rather than the rule, although there are co-movements in the larger EU-countries except Germany. Looking at the shorter period, the only significant correlation remaining is between Spain and Italy (a regression of Spanish on Italian wage increases turns out to be highly significant for both periods, but with little explanatory power).

Financial intermediation: Here, the number of observed correlations lies between the retail sector and the two industrial branches. Competitive pressure may be an explanation for more common wage spillovers across borders than in retail trade. The fact that

Table 6 : Correlation of sectoral wage increases

	Sectors	Significant pairs**		Average of all correlation coefficients
		Absolute	**% age of possible**	
BE	42	708	82.2	0.60
DK	44	511 (525)	54.0 (55.4)	0.47
DE	42	505 (550)	58.1 (63.9)	0.49
ES	35	140 (183)	23.5 (30.8)	0.32
FR	40	97	12.4	0.13
IT	29	253	62.3	0.50
NL	49	95 (174)	8.1 (14.8)	0.15
AT	43	571	63.2	0.48
FI	48	286	25.4	0.27
UK	34	37 (91)	6.6 (16.2)	0.14
USA	41	269 (280)	32.8 (34.1)	0.31

* Excluding data for certain years (excluded: DK 2000-01, D 1992, 2001; E 1981-85 and 2000-01; NL 1981-87; UK 1981-89 and 2001; USA 2001).

** Number of pairs for which the value is above the critical value defined by Brandner and Neusser (1992) [$2/\sqrt{N}$]. For the full sample (1981-2001), this value is 0.44. Where the sample is smaller, the critical value is higher, but we also indicate the number of coefficients > 0.44 in brackets.

Source : Commission services.

correlations with the USA are quite strong, in particular in the UK, may point at the role of international players in shaping pay increases in national markets.

In conclusion, co-movements of wages clearly predate EMU and also reach beyond it: observed correlations are numerous and significant over the whole period of observation since 1980. Moreover, "Atlantic" patterns are visible in three of the selected sectors. As one would expect, tradability seems to matter, as the evidence from the selected sectors suggests that correlations are stronger in the industrial sectors than in services. We had a particular look at the effect of formal coordination arrangements in the metalworking sector, but the result is mixed. The distorting effect of German reunification obviously blurs the picture. As far as the "Southerners" Spain and Italy are concerned, medium-term disinflation trends usually explain more of the wage developments than the imitation of wage developments in the "core" group.

3.2.3 Correlation of wage developments across different sectors within a country (national coordination; pattern bargaining)

We finally look at correlations of annual increases of real wages across different sectors within the same economy.[206] The existence of strong correlations would indicate that wage developments in different sectors are somehow coordinated.

Correlations do not tell us which form of coordination may be prevalent, e.g. formal intersectoral coordination or "pattern bargaining" whereby the wage agreement in one sector becomes the benchmark for negotiations in other sectors. Since only annual data is available, it is not possible either to check for forerunner-follower patterns. Therefore, the data needs to be interpreted against the backdrop of other information available on forms of intersectoral wage coordination.[207]The first finding is that correlation across sectors is relevant in all Member States for which data is available. Table 6 gives a first impression by indicating the number of significant pairs of correlated sectors and the average value of the correlation coefficient across all sectors.

[206] Social partners usually negotiate nominal wage increases. However, the sector correlations of nominal wages may be biased upwards, in the likely case that variations of inflation are incorporated in the same way in pay increases of different sectors. In order to derive more conservative estimates, and since the focus of this subsection is not so much on competitiveness, we use real wage increases, here.

[207] See, for instance, the OECD indicators on bargaining coordination and centralisation; Barkbu et al (2003) suggest broadening the framework by looking at five complementary indicators of coordination.

From the table, Belgium comes out clearly top of sectoral correlation, followed by a group of countries with high sectoral correlation made up by Denmark, Germany, Italy and Austria. Spain and Finland range in the middle, while sectoral correlation is low in France, the Netherlands and the UK. The USA, which is used here as a benchmark outside the EU, also belongs to the middle group.

These results are broadly in line with OECD indicators of wage bargaining coordination as well as our own earlier analyses. In Belgium, the biennial intersectoral wage norm sets a strong framework for sectoral wage negotiations. Wage correlations often reach beyond the broad sectors of the economy (e.g. there are strong co-movements of wages in the food processing industry with certain services). The group of refining, chemical industry and rubber, and to a lesser extent fabricated metal products and electronic valves, seem to play a central role, both with respect to other industry sections and with services (in particular the insurance business) and the public sector.

In Germany and Austria, wage coordination is not formal, as in Belgium, but pattern bargaining is traditionally important, and strong trade union federations (DGB and ÖGB) play a coordinating role. Our analysis shows that in Austria, "central" sectors, which have strong co-movements with wages in other sectors, are chemicals, refining and rubber, food processing, electronic valves as well as insurance. Metalworking comes out with surprisingly weak correlations. In Germany, unexpectedly, chemicals, basic and fabricated metals do not seem to be "central" in terms of wage correlations, but car production is. Other sectors with numerous significant correlations are: food processing, wood, furniture, trade and very strongly the public sector. The weak evidence for a central role of metalworking in both countries might be due to wage drift, if companies systematically pay extras to the agreed wage increases, but what influences the other sectors are negotiated wages. Further work is warranted to clarify this puzzle.

Wage negotiations at sectoral level set the framework for wage growth in Italy; the guidance from tripartite agreements is very general. Across sectors, pattern bargaining leads to a certain harmonisation. As expected, the broad metalworking sector (incl. mechanical engineering) plays a central role; this role is, however, even stronger for textiles & leather, as well as wood & paper. Other sectors for which we find an important number of correlations include food, chemicals, furniture, trade, and public administration.

In Denmark, intersectoral negotiations are fairly general. The framework for wage increases is mostly defined by sectoral agreements at national level, which are then supplemented by more detailed firm level bargaining. This framework notwithstanding, our evidence indicates central roles for food processing, mechanical engineering, construction and trade. Given that formal bargaining structures are quite decentralised, this evidence is rather surprising.

In Finland, national wage agreements define basic wage increases for two years. These are topped-up at sectoral level. If national negotiations fail, there is a certain degree of pattern bargaining across sectors. Our data shows such patterns, which are limited to the industrial sector, around food, wood & paper and the broad area of metalworking. Formal intersectoral wage coordination in Spain is rather weak, but there is some pattern bargaining. The data shows that chemicals, non-metal minerals and metalworking play a certain role in that respect. Moreover, the public sector seems to have a benchmarking function for a number of services.

No patterns are visible for France or the UK. In both countries, there is no formal coordination at the intersectoral level and bargaining is fairly (France) to completely (UK) decentralised. Also for the Netherlands, the data does not show any systematic pattern, although the Labour Foundation usually gives general recommendations on wage developments and some pattern bargaining is reported. Data limitations and the specific labour market situation in recent years may explain the failure to detect patterns: In fact, data is only available for the period 1988-01, part of which was marked by labour market tightness that may have triggered wage divergence.

Despite the absence of formal coordination and completely decentralised bargaining, our data also shows some, albeit limited, patterns for the USA, where sectors such as wood, paper and print show some correlation with furniture, energy providers and construction, and mechanical engineering, office machines, wires and valves form a second cluster.[208]

In conclusion, the observed correlations across sectors permit establishing a ranking of countries that is broadly in line with our knowledge about wage bargaining structures as well as formal and informal wage coordination across sectors. Moreover, the data allows us to tentatively identify sectors which seem to play a central role in "pattern bargaining". However, further analysis is required: Firstly, the ranking results for the Netherlands and Denmark (and to some extent the USA) do not conform with conventional wisdom. Secondly, the role of the presumably leading sectors in pattern bargaining is not always confirmed. It would be useful to take negotiated wages into account in future analysis, in order to be able to identify wage drift.

[208] There is some pattern bargaining, though, within specific industrial branches, cf. Marshall and Merlo (1999).

3.2.4 Summing up

Do wages levels converge as economic integration becomes stronger?

One central finding is that the convergence of wages and unit labour costs has not waited for the single market, let alone EMU, to be completed. Generally speaking, convergence was stronger in the 1980s than in the 1990s. We find that ULCs have converged in most sectors during the observation period. However, they do not follow a uniform pattern. Strong convergence in high tech industries contrasts with more moderate convergence in a majority of sectors and little to none in some. Hourly nominal wages generally did not converge in absolute terms, as they continued to increase. Relative dispersion, however, decreased in a large majority of sectors. Again, in the 1990s, some of the earlier convergence was reversed. Here too, the strength of convergence differs across sectors, and it seems to be stronger in the industrial sector than in services.

Is there evidence of cross-border coordination of wage bargaining in the EU?

Looking at annual wage increases, we find strong cross-country correlations in the two selected industrial sectors (textiles and fabricated metal products), while in retail trade, the cross-country correlation is much weaker; the financial intermediaries lie in-between. Stronger concerns about safeguarding competitiveness in the tradables sector may explain this observation. However, more detailed analysis of co-movements in the metal sector among founding members of the ECCS leads to mixed evidence. At least in the case of Germany this may be explained by the repercussions of reunification. Concerning the two big southern Member States, the effect of a disinflation trend is generally stronger than that of imitating wage developments in the "core". What is more, correlations of wage increases are neither in time nor in space limited to EMU. In fact a transatlantic dimension is discernible in three of the four selected sectors.

How strong are the effects of wage bargaining coordination within countries?

Given the relevance the literature attaches to the effect of wage bargaining coordination on the outcome of wage agreements, it is of particular interest to explore evidence of wage co-movements across sectors. We are able to establish a broad ranking of countries in terms of strong to weak correlations of sectoral wage increases. This ranking broadly coincides with our knowledge about bargaining structures and formal as well as informal bargaining coordination: Coordination is strongest in Belgium, followed by still high sectoral correlation in Denmark, Germany, Italy and Austria. Spain, Finland and the USA rank in the middle, while no systematic pattern of correlation is visible in France, the Netherlands or the UK.[209] Further analysis should also take wage drift into account.

4. Concluding remarks

Both common macroeconomic shocks and country-specific developments have in recent years subjected the flexibility of wage setting mechanisms in the euro area to a stress test. From a bird's eye perspective, it is probably fair to say that overall wage discipline has been preserved, and concerns that the inflation overshoot would lead to extended second-round wage effects appear to have been misplaced. However, with nominal wage growth rather invariant to the cyclical situation, the slowdown in labour productivity growth translated into greater increases of nominal unit labour costs in 2001 and 2002, clearly exceeding the benchmark value consistent with the monetary policy goal to keep inflation close-to-but-below 2 per cent. Still, with labour productivity growth expected to pick up again at the present conjuncture, nominal unit labour cost growth in the euro area is forecast to return to well below 2 per cent next year.

After a prolonged period of declining real unit labour costs, the fall in the wage share came to a halt at the turn of the decade; but indications are that real unit labour cost growth has re-entered negative terrain recently. Obviously, the wage share cannot and will not fall forever. However, real wage moderation, in the sense of reducing the mark-up of effective wages over competitive wages, helps to increase employment and lower structural unemployment over the medium term, without necessarily compromising domestic demand in the economy. This assertion is not only solidly backed by standard economic theorising, but also by the factual experience of many Euro-area countries, in particular in the second half of the 1990s. It should also be noted in this context, though, that aggregate real wage moderation is a fairly poor substitute for wage differentiation when it comes to helping to price the low-skilled back into jobs.

The observed stability in overall wage developments at the euro area level masks fairly different nominal unit labour cost developments across countries. Accumulated over the past five years, Germany and Austria have significantly improved their relative position in the euro area; this also holds true for Greece during the run-up period to entry into EMU; in Spain, Ireland, Luxembourg, the Netherlands and Portugal, on the other hand, nominal unit labour costs increased considerably faster than in the euro area as a whole. While the resulting realignment of intra-area labour cost competitiveness may not be unwarranted in most cases, in some others, such as in Portugal, it will require

[209] We argue that the lack of observed correlations in the case of the Netherlands may be due to data restrictions as well as the exceptional labour market situation in the late 1990s.

corrections that could become costly in terms of output and employment.

Conventional wisdom has it that wage formation mechanisms in Europe are characterised by a high degree of rigidity and slow adjustment to shocks. However, in line with findings from other studies, formal econometric analysis of Phillips-curve-type wage equations suggests that wage inflation persistence is not higher in the euro area than in the USA. Taken at face value, these results would imply that the more sticky inflation developments in the euro area in recent years can hardly be ascribed to a higher degree of nominal wage rigidities.

The finding of broadly similar degrees of nominal inertia across several different countries in the euro area, and in the euro area and the USA, makes it difficult to identify institutional labour market characteristics as the major determinants of nominal rigidities. Thus, while institutional and structural factors are probably key to an understanding of what determines the mark-up of effective wages over competitive wages and, in consequence, the level of equilibrium unemployment over the medium term, institutional labour market characteristics appear to be of less importance for the degree of nominal inertia in the economy.

The emergence of stronger wage interdependencies across countries and higher goods market integration can affect the way in which shocks are absorbed and transmitted in EMU. The stylised model simulation exercises presented in this chapter suggest that with stronger interdependent wage setting, the adjustment process does not look very different in case of a supply shock, while it becomes more protracted in case of a demand shock. Perhaps more significant is the difference in the transmission patterns of a wage push shock; when goods markets become fully integrated, the negative spillover effect from a ”local” wage shock to other countries tends to disappear. However, this result obviously only holds in the absence of interdependent wage setting behaviour.

Looking at the issue of wage pattern bargaining and wage convergence from a detailed sectoral perspective yields a fairly differentiated picture. One central finding is that the convergence of wages and unit labour costs has not waited for the single market, let alone EMU, to be completed. Generally speaking, convergence was in fact stronger in the 1980s than in the 1990s. While unit labour costs have converged in most sectors during the observation period, the strength of convergence differs across sectors, and it appears to have been stronger in the industrial sector than in services. With respect to annual wage increases, the analysis identifies strong cross-country correlations in the two selected industrial sectors (textiles and fabricated metal products), while in retail trade, the cross-country correlation is much weaker; the financial intermediaries lie in-between. However, correlations of wage increases are neither in time nor in space limited to EMU, with a transatlantic dimension discernible in three of the four selected sectors.

Finally, given the relevance the literature attaches to the effect of wage bargaining coordination on the outcome of wage agreements, it has been of particular interest to explore evidence of wage co-movements across sectors in individual countries. The analysis has established a broad ranking of countries in terms of strong to weak correlations of sectoral wage increases. Coordination is strongest in Belgium, followed by still high sectoral correlation in Denmark, Germany, Italy and Austria. Spain, Finland and the USA rank in the middle, while no systematic pattern of correlation is visible in France, the Netherlands or the UK. This ranking appears to be broadly consistent with general perceptions of bargaining structures and formal as well as informal bargaining coordination.

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ANNEX I: The Phillips curve model used

The Phillips curve model

Following standard textbooks, there are broadly four different hypotheses trying to describe the labour market: the neoclassical view, the efficiency wage approach, the wage bargaining theory and the search model. Pissarides (1997) provides an extensive discussion of wage rules under these four hypotheses. A generic wage rule which covers all standard hypotheses has wages determined as a function of the expected price level, a measure of the reservation wage, productivity and the unemployment rate. Blanchard and Katz (1999) also use such a rule as the starting point of their discussion of the NAIRU. Such a rule as specified by equation (1) also serves as the basis for the discussion in this note

$$w_t - pc_t^e = a_0 + (1-\mu)b_t^e + \mu pr_t^e - \beta u_t + a_t^w \qquad (1)$$

Workers/trade unions negotiate a nominal wage w_t at time t conditional on consumer price expectations pc_t^e, on the expected level of the reservation wage b_t^e, on expected productivity pr_t^e [210] and on the unemployment rate u_t. The term a_t^w is a shock to the wage-setting rule that can be autocorrelated.

Labour demand is formulated in terms of a first order condition for an optimising, not necessarily perfectly competitive firm, which equates the real wage to the marginal revenue product of labour (MRPL) as expressed by equation (2). The MRPL can be decomposed into average labour productivity and a residual term (*x*) which can contain other factors such as a mark-up or efficiency shocks. The left hand side of eq. (2) can also be denoted as the "demand wage for labour", which is the wage the firm is willing to pay for a given level of productivity.

$$w_t - p_t = (y_t - l_t) + x_t \qquad (2)$$

The variable x can itself be a function of various factors, both structural (x*) and cyclical (ρ). For expositional purposes it is useful to distinguish between these two components, though it is not assumed that the econometrician can actually observe these components separately. Therefore we write

$$x_t = x_t^* + \rho_t . \qquad (3)$$

We are not making an a priori restriction about the concept of productivity used by workers in setting wages and define the concept of productivity entering the wage rule as

$$pr_t = (y_t - l_t) + \psi x_t, \quad 0 \le \psi \le 1 \qquad (4)$$

In one extreme case, when $\psi = 0$, workers use average productivity when setting wages; and in the other extreme, when $\psi = 1$, then workers set wages according to the marginal revenue product of labour.

We also express the reservation wage as a fraction of productivity

$$b_t = b_t^0 + pr_t \quad , \qquad (5)$$

where b_t^0 is the logarithm of the replacement rate, which in general terms is the wage which can be earned if not employed. Notice that as b_t^0 is allowed to vary over time, the formulation (5) is not restricting the dynamics of the reservation wage.

Adjustment of wages to inflation and productivity

Adjustment of wages to economic conditions can be delayed because of limited information in the formation of expectations or because of institutional rigidities (e. g. a fixed contract length). We consider two types of adjustment schemes, moving average and adaptive expectations. Modelling expectations or more generally the adjustment of wages to inflation and productivity as a moving average of current and

[210] The notion of productivity entering the wage equation will be discussed in more detail below.

past inflation and productivity growth as in equation (6a) and (6b) is quite popular in the NAIRU literature. With annual data an MA (2) process seems sufficient:

$$\pi_t^e = a\pi_t + (1-a)\pi_{t-1} \quad (6a)$$

$$\Delta pr_t^e = c\Delta pr_t + (1-c)\Delta pr_{t-1}. \quad (7a)$$

The degree of nominal rigidity is proportional to (1-a), while the degree of real rigidity is proportional to (1-c). Alternatively we also allow for adaptive expectation schemes such as in equation (b) and (7b). Such schemes would be consistent with formulations of the Phillips curve where the change in wage inflation responds to a quasi first or second difference in the unemployment gap. Such representations of the Phillips curve seem to be more data congruent in some countries. We also allow for combinations between (6,7a) and (6,7b) in the regressions.

$$\pi_t^e = a\pi_{t-1} + (1-a)\pi_{t-1}^e \quad (6b)$$

$$\Delta pr_t^e = c\Delta pr_{t-1} + (1-c)\Delta pr_{t-1}^e \quad (7b)$$

Deriving the Phillips Curve

Equations (1) to (7b) can be used to derive the Phillips curve. It is useful to proceed in two steps by first deriving an expression for the structural unemployment rate and in a second step determine the dynamics of wages as a function of the unemployment gap.

Step 1: The structural unemployment rate:

The structural unemployment rate is defined as the level of unemployment which is generated in this labour market when there are no expectation errors on prices and productivity and no terms of trade shocks, i.e. $pc_t^e = p_t$, $pr_t^e = pr_t$ and when the wage share is equal to its structural value, i.e. $x_t = x_t^*$. Under these conditions, the equilibrium unemployment rate is given by

$$u_t^* = [a_0 + (1-\mu)b_t^0 + (\psi - 1)x_t^*]/\beta \quad (8)$$

Equation (8) shows that the equilibrium level of unemployment depends positively on the reservation wage (which itself is a function of labour taxation, unemployment replacement rate etc.), and negatively on the trend wage share, provided workers do not take into account changes to the demand wage in wage setting. It is also important to note that the long run Phillips curve is vertical, i. e. u* does not depend on nominal variables such as the inflation rate, the rate of money growth or nominal interest rates.

Step 2: Dynamics of the Phillips Curve:

Using equation (1) and (8) one can express wages as a function of the unemployment gap

$$w_t - pc_t^e = (y_t - l_t)^e + \psi x_t^e - (\psi - 1)x_t^* - \beta(u_t - u_t^*) + a_t^w. \quad (9)$$

Equation (9) can also be reformulated in rates of change

$$\Delta w_t = \pi_t^e + \Delta(y_t - l_t)^e + \psi\Delta x_t^e - (\psi - 1)\Delta x_t^* - \beta(u_t - u_t^*) + a_t^w. \quad (10)$$

Using the expectation rules (6,7a) the following Phillips curve can be derived.

$$\Delta^2 w_t = \beta^y \Delta^2(y_t - l_t) + \beta^x \Delta^2 x_t + \beta^{tot}\Delta^2 tot_t - \beta^u(u_t - u_t^*) + v_t^w \quad (11a)$$

Combining adaptive inflation expectations with MA expectations for productivity and the wage share yields

$$\Delta^2 w_t = \sum_{i=0}^{1} \beta_i^y \Delta^2 (y_{t-i} - l_{t-i}) + \sum_{i=0}^{1} \beta_i^x c_i \Delta^2 x_{t-i} + \sum_{i=0}^{1} \beta_i^{tot} c_i \Delta^2 tot_{t-i} - \beta_i^u \left[(u_t - u_t^*) - (1-a)(u_{t-1} - u_{t-1}^*) \right] + v_t^w \quad (11b)$$

Adaptive inflation and adaptive productivity expectations yields

$$\Delta^2 w_t = \sum_{i=0}^{2} \beta_i^y \Delta^2 (y_{t-i} - l_{t-i}) + \sum_{i=0}^{2} \beta_i^x \Delta^2 x_{t-i} + \sum_{i=0}^{2} \beta_i^{tot} \Delta^2 tot_{t-i} - \beta_i^u \left[(u_t - u_t^*) - (2-a-c)(u_{t-1} - u_{t-1}^*) + (1-c)(u_{t-2} - u_{t-2}^*) \right] + v_t^w \quad (11c)$$

The standard Phillips curve suggests a relationship between the change of wage inflation and the unemployment gap which can be subject to various shocks, in particular shocks to labour productivity, terms of trade and the wage share. The shocks are expressed as changes in the growth rate of the relevant variables. Finally, depending on how wages adjust to inflation and productivity affects the dynamic response of wages to the unemployment gap as given by different distributed lag schemes of the unemployment gap in the Phillips curve.

Adding the Wage Share as an additional explanatory Variable

The theoretical model outlined above suggests that shocks to labour demand as captured by the variable x and represented by the wage share could play a crucial role for wages. The importance of the wage share has been recognised before (see, for example Blanchard and Katz (1999), Gordon (1990)). A comparison of Table 3 and 4 shows that allowing for a second difference in the log wage share does indeed improve the fit of the regressions for nearly all countries; it also makes other shocks more significant. The estimated coefficients are consistent with the theoretical prediction for productivity, terms of trade and wage share.

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Table A1: Regression Results (1963-2004)

	CONST	$\Delta^2(y_t - l_t)$	$\Delta^2(y_{t-1} - l_{t-1})$	$\Delta^2 tot_t$	$\Delta^2 tot_{t-1}$	$u_t - u_t^*$	$u_{t-1} - u_{t-1}^*$	$u_{t-2} - u_{t-2}^*$	R**2	Q-Statistic, p-value
BE	-.0015 (0.50)	0.34 (2.32)		0.30 (1.15)	0.08 (0.34)	-1.46 (3.08)	1.06 (2.22)		0.28	0.49
DE	-.0013 (1.53)	0.48 (1.96)	0.39 (1.14)			-1.64 (2.34)	1.50 (1.95)		0.38	0.75
DK	-.0027 (0.79)						-0.86 (1.78)		0.19	0.75
ES	.0000 (0.00)	0.32 (2.04)			0.95 (4.14)	-0.93 (3.07)	0.59 (1.75)		0.40	0.71
FR	-.0011 (0.70)			0.58 (1.93)		-0.32 (1.50)			0.30	0.57
GR	-.0009 (0.23)	0.13 (0.94)				-0.61 (1.59)			0.49	0.97
IR	-.0024 (0.45)				0.56 (2.78)	-0.93 (1.46)	0.38 (0.62)		0.45	0.26
IT	-.0020 (0.60)				0.32 (0.76)	-4.10 (2.03)	6.95 (3.34)	-2.23 (1.03)	0.06	0.41
LX	-.0013 (0.70)	0.19 (1.47)		0.30 (1.18)		-1.22 (2.06)			0.17	0.91
NL	-.0027 (1.32)					-0.38 (1.85)			0.11	0.60
OS	-.0014 (0.67)					-1.27 (1.96)			0.27	0.96
PO	.0000 (0.00)				0.37 (1.20)	-0.89 (2.31)			0.19	0.86
SF	-.0021 (1.97)					-0.85 (2.03)	0.82 (1.56)		0.23	0.07
SW	-.0015 (0.94)					-0.85 (1.43)	0.86 (1.30)		0.18	0.50
UK	-.0005 (0.15)						-1.54 (2.76)		0.24	0.99

Source: Commission services, t-statistics in parentheses.

Table A2: Regression Results (1963-2004), Wage Share as an additional Variable

	CONST	$\Delta^2(y_t - l_t)$	$\Delta^2 tot_t$	$\Delta^2 tot_{t-1}$	$\Delta^2 x_t$	$u_t - u_t^*$	$u_{t-1} - u_{t-1}^*$	$u_{t-2} - u_{t-2}^*$	R**2	Q-Statistic, p-value
BE	-.0009 (.35)	0.63 (5.46)			1.01 (5.87)	-0.24 (1.63)			0.57	0.10
DE	-.0006 (.35)	0.86 (8.25)		0.18 (1.46)	1.41 (11.12)	-0.38 (1.83)			0.83	0.14
DK	-.0015 (.63)	0.39 (2.86)		0.19 (1.43)	0.93 (9.10)		-0.35 (2.24)		0.68	0.71
ES	-.0021 (.65)	0.77 (3.30)		0.43 (3.30)	0.45 (2.57)	-1.01 (3.75)	0.73 (2.61)		0.43	0.51
FR	-.0002 (.13)	0.79 (3.28)	0.26 (1.83)	0.42 (3.13)	1.13 (8.54)	-1.08 (1.83)	1.90 (1.75)	-1.29 (1.93)	0.76	0.37
GR	.0006 (.10)	0.54 (3.75)		0.29 (3.75)	0.56 (5.46)	-0.71 (2.18)			0.49	0.83
IR	-.0017 (0.42)	0.11 (0.49)		0.51 (3.49)	0.19 (1.11)		-0.88 (1.56)	0.77 (1.42)	0.42	0.39
IT	-.0006 (0.14)	0.78 (2.33)		0.59 (0.86)	0.70 (3.22)	-2.71 (1.97)	4.48 (2.76)	-2.36 (1.59)	0.32	0.13
LX	-.0011 (0.15)	0.61 (3.29)				-1.03 (1.35)			0.32	0.75
NL	-.0027 (1.13)	0.82 (4.27)		0.21 (0.93)	0.88 (6.03)	-0.06 (0.30)	-0.32 (1.29)		0.53	0.12
OS	-.0011 (0.72)	0.42 (3.50)		0.14 (1.05)	0.78 (8.74)	-1.63 (3.85)			0.74	0.66
PO	-.0025 (0.02)	0.80 (7.28)		0.60 (7.04)	1.02 (6.59)	-2.31 (3.92)	2.67 (2.92)	-2.70 (4.11)	0.66	0.42
SF	-.0021 (0.58)	0.07 (0.24)		0.11 (0.43)	0.45 (2.34)	-1.21 (1.60)	1.90 (1.45)	0.82 (.98)	0.37	0.09
SW	-.0009 (0.24)	0.55 (2.44)			0.87 (5.20)	-0.47 (0.73)	0.47 (0.91)		0.53	0.32
UK	-.0007 (.17)	0.56 (5.09)		0.80 (5.79)	1.10 (10.77)	-1.65 (4.40)	0.49 (1.38)		0.49	0.01

Source: Commission services.

ANNEX II: A model of wage interdependencies

This annex presents a simple text-book example to illustrate the interdependencies between wage formation, inflation and monetary policy resulting in potential externalities and cross-country spillover effects.[211] Let $i = 1....N$ index countries within a currency union sharing the same monetary policy.

Wage setting (expectations augmented Phillips curve)

$$\hat{W}_{it} = \frac{W_t - W_{t-1}}{W_{t-1}} = \pi_t^e + \varepsilon_i \left(Y_{it} - Y_i^* \right)$$

where π_t^e is expected inflation (assumes that the consumer basket is the same in all countries, hence no i index), Y_{it} denotes actual activity, and Y_i^* structural activity (related to the structural unemployment rate in country i via Okun's law).

Price setting (mark-up pricing)

$$P_{it} = mW_{it}$$

$$\pi_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}} = \hat{W}_{it}$$

Aggregate inflation

$$\pi_t = \sum_{j=1}^{n} \alpha_j \pi_{j_t}$$

where α_j denotes the relative weight (size) of country j in the currency union, where

$$\sum_{j=1}^{n} \alpha_j = 1$$

Aggregate demand

$$Y_{it} = -\Lambda r_t + u_{it}$$

where u_{it} is an aggregate demand shock, and r_t the (expected) real rate of interest (thus representing the monetary policy instrument for given expectations). Note that for simplification all other variables of importance for aggregate demand are kept constant and hence neglected.

Country specific inflation

$$\begin{aligned} \pi_{it} &= \pi_t^e + \varepsilon_i \left(Y_{it} - Y_i^* \right) \\ &= \pi_t^e + \varepsilon_i \left(-\Lambda r_t + u_{it} - Y_i^* \right) \end{aligned}$$

Aggregate inflation

$$\begin{aligned} \pi_t &= \sum_{j=1}^{n} \alpha_j \left[\pi_t^e + \varepsilon_j (-\Lambda r_t + u_{jt} - Y_j^{*)} \right] \\ &= \pi_t^e - \Lambda \left[\sum_{i=1}^{n} \alpha_j \varepsilon_j \right] r_t + \left[\sum_{j=1}^{n} \alpha_j \varepsilon_j u_{jt} \right] - \left[\sum_{j=1}^{n} \alpha_j \varepsilon_j Y_j^* \right] \end{aligned}$$

Monetary policy – inflation targeting

Monetary policy instrument is set so as to meet the inflation target – for simplicity assumed to be zero inflation.

$$\pi_t = 0$$

which implies that (setting $\pi_t^e = 0$ in accordance with the inflation target)

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[211] This textbook-style example has been developed with the help of Torben M. Andersen when he was a Visiting Fellow at the Directorate for Economic and Financial Affairs in 2003.

$$r_t = \frac{1}{\Lambda\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j\right]}\left[\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j u_{jt}\right]-\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j Y_j^*\right]\right]$$

Equilibrium output

$$Y_{it} = -\Lambda r_t + u_{it} \quad = \frac{-1}{\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j\right]}\left[\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j u_{jt}\right]-\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j Y_j^*\right]\right]+u_{it}$$

Thus,

$$\frac{\partial Y_{it}}{\partial u_{it}} = 1-\frac{\alpha_i\varepsilon_i}{\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j\right]}<1 \qquad \frac{\partial Y_{it}}{\partial u_{jt}} = \frac{-\alpha_j\varepsilon_j}{\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j\right]}<0$$

$$\frac{\partial Y_{it}}{\partial Y_i^*} = \frac{\alpha_i\varepsilon_i}{\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j\right]}<1 \qquad \frac{\partial Y_{it}}{\partial Y_j^*} = \frac{\alpha_j\varepsilon_j}{\left[\sum_{j=1}^{n}\alpha_j\varepsilon_j\right]}>0$$

Hence, there is I) some crowding out of a domestic demand shock, ii) a negative transmission of demand shocks across countries, iii) a country reducing structural unemployment and hence increasing structural output does not reap the full benefit in terms of an expansion in output, and iv) a structural improvement in a country is to the benefit of other countries. (i.e. there is a positive spill-over effect, suggesting that non-cooperative policies lead to insufficient structural reforms – not all the gains are reaped by the country undertaking the reform).

Note with complete symmetry $(\varepsilon_i = \varepsilon_j$ for all $i)$ we have

$$\frac{\partial Y_{it}}{\partial u_{it}} = 1-\alpha_i \qquad \frac{\partial Y_{it}}{\partial u_{jt}} = -\alpha_j$$

$$\frac{\partial Y_{it}}{\partial Y_i^*} = \alpha_i \qquad \frac{\partial Y_{it}}{\partial Y_j^*} = \alpha_j$$

with the implications that I) crowding out effects are larger in large countries than in small countries, ii) spill-over effects are larger from large to small countries than vice versa, iii) gains from structural improvements are larger in large countries than in small countries, iv) spill-over effects from structural improvements are larger from large countries to small countries than vice versa.

Illustrative case: N=2

$$\frac{\partial Y_{1t}}{\partial u_{1t}} = \frac{\alpha_2\varepsilon_2}{\alpha_1\varepsilon_1+\alpha_2\varepsilon_2}<1 \qquad \frac{\partial Y_{1t}}{\partial u_{2t}} = \frac{-\alpha_2\varepsilon_2}{\alpha_1\varepsilon_1+\alpha_2\varepsilon_2}<0$$

$$\frac{\partial Y_{1t}}{\partial Y_1^*} = \frac{\alpha_1\varepsilon_1}{\alpha_1\varepsilon_1+\alpha_2\varepsilon_2}<1 \qquad \frac{\partial Y_{1t}}{\partial Y_2^*} = \frac{\alpha_2\varepsilon_2}{\alpha_1\varepsilon_1+\alpha_2\varepsilon_2}>0$$

The following additional points emerge on the importance of asymmetries in the "weighted speed of adjustment" $(\alpha_i\varepsilon_i)$: (a) the more flexible foreign labour markets are (i.e. the higher $\alpha_2\varepsilon_2$), the larger the crowding out to domestic demand shocks, and the larger the negative spill-over of foreign demand shocks, (b) the more flexible domestic wages are (i.e. the higher $\alpha_1\varepsilon_1$), the higher the domestic benefit from an increase in the domestic structural output level, and iv) the less the domestic gain from an improvement abroad.

Note that the role of ε is slightly different than usually perceived – a larger ε (equivalent to a smaller sacrifice ratio) is in standard interpretation equal to a more flexible labour market. However, due to the interaction between wages, inflation and monetary policy the result here is that the larger ε, the more do wages respond to a given shock, and the larger is the induced monetary policy reaction other things being equal.

ANNEX III: Recent developments in bargaining systems

Recent developments in EU-15

In earlier issues of this Review, two simultaneous trends in wage bargaining structures were identified: Firstly, wage determination is becoming more decentralised, mostly through informal changes in bargaining systems, and secondly, wage coordination at the national or intersectoral level seems to be a more or less stable feature also after the start of EMU. Are these observations still relevant? Is there any new evidence of changes in bargaining systems related to EMU? In an attempt to provide insight into these issues, this sub-section briefly presents recent developments in wage bargaining structures.

Overall, union membership continues to decline, but, as Checci and Lucifora (2002) point out, the aggregate figures conceal the heterogeneity of countries with low and declining membership and countries with high unionisation. The available data suggests that the pace of decline has decreased as trade unions are merging and restructuring and trying to better respond to their members' preoccupations. Such reorganisation is also common among employers' associations. In Germany, some employers' associations now offer a "light" form of membership that does not involve the obligation to apply the sectoral collective agreement.

Bargaining coverage remained broadly stable in most Member States over the past decade. Significant reductions were reported in Germany and the United Kingdom. In both countries, social partners find it hard to cover new firms, in particular SMEs. In addition, in Germany, many employers, in particular in the East, have left the employers' association. This allows them to avoid the application of collective agreements. In the UK, multi-employer bargaining has further eroded. By contrast, in Denmark, coverage increased as social partners successfully integrated service sector branches and white-collar workers. High levels of bargaining coverage (table below) are furthermore strongly related to extension mechanisms (i.e. provisions that make collective agreements applicable to non-signatories).

Table : Collective bargaining coverage (2001)

	sector			Level (d)	
	Total	**Private**	**Public**	**Multi-employer**	**Single employer**
BE	>90	n.a.	n.a.	n.a.	n.a.
DK	83	71	100	45	25
D (W / E)	n.a.	70 / 55	n.a.	63 / 46	7 / 10
EL	n.a.	n.a.	n.a.	n.a.	n.a.
FR	90-95	n.a.	n.a.	n.a.	n.a.
ES	68	n.a.	n.a.	66	9
IE	88 (a)	n.a.	n.a.	n.a.	n.a.
IT	60 (b)	n.a.	n.a.	n.a.	n.a.
LU	48	n.a.	n.a.	60	40
NL	88	86	100	68	14
AT	78	98	0	95	3
PT	62 (c)	89	81	84	5
FI	90 (c)	n.a.	n.a.	n.a.	n.a.
SE	>90	>90	100	n.a.	n.a.
UK	36	22	73	5	26

a) of companies (EIRO, 2000)
b) ECFIN wage monitor
c) different method of calculation (EIRO, 2002)
d) private sector only, except DE, ES. Double counting in case of multi-layer negotiation.

Source : EIRO, Commission services.

Formal wage coordination at the national or intersectoral level remained indeed dynamic in 2002-03.[212] In Belgium, Finland, Greece, Ireland and Spain, expiring agreements were followed up by the conclusion of new ones. In the Netherlands, for the first time in a decade, a tripartite "social agreement" recommended a wage ceiling. In Portugal, the government proposed a "social pact" for a medium-term orientation of bargaining and wage moderation in June 2003. However, as in the past, the extent to which these agreements are binding for lower-level negotiations varies considerably across countries. In general, some flexibility is provided for taking the specific situation of sectors and firms into account. Promises by the government to decrease taxes or to increase transfers continued to play an important role in promoting agreements; the notable exception being the Irish national agreement for 2003-05, which was for the first time concluded without such "tax sweeteners". In Germany, the "Alliance for Jobs" could not be revived in 2003; in any event, with the exception of the year 2000, the Alliance had not issued any recommendations for wage settlements.

At the same time as coordination continues to strive, decentralisation of bargaining is also a confirmed trend. Variable forms of pay, related to individual achievements and to the situation of the company, are becoming more widespread. The new labour code in Portugal gives individuals the right to sign up to collective agreements. Wage differentiation in public sector collective agreements is sought in the UK, mostly because of recruiting problems in the South-East. In Germany, the Land Berlin left the traditional bargaining union of all public employers, in 2002-03, allowing it to reduce personnel costs. France announced a reform to relax the "favourability" principle by which lower-level agreements can only be more favourable than sectoral agreements.

Bargaining systems in the 10 acceding countries

Average union membership in the Central and Eastern European (CEE) Acceding Countries is well below the EU level (21.9 per cent of employees against 30.4 per cent in the EU). Cyprus and Malta, however, have high union density rates of 70 per cent and 65 per cent, respectively. Also the direct coverage of collective agreements in the Acceding Countries (ACs) is significantly lower than in the EU. The average masks a great variety, though, that ranges from 10-15 per cent in Lithuania to almost 100 per cent in Slovenia (where collective bargaining is mandatory). This low bargaining coverage in a number of ACs is mostly related to low union presence, in particular in small and medium-sized firms in the private sector.

Bargaining coordination across firms and sectors is weak in the ACs, with the exception of Slovenia. However, all ACs have tripartite bodies at national level. In the transition economies, they used to play a privileged role in accompanying and steering the restructuring of the economy and consequently benefit from well-established structures. While, during the early stages of transition, tripartism was often used to implement centralised wage policies, its impact on wage developments is far more limited today. In the CEE, the tripartite bodies continue to issue recommendations on wage developments, but these are not binding for the concrete bargaining that takes place at lower levels. Most tripartite bodies also make recommendations to the government on increases of the minimum wage. In Latvia and Lithuania, this has some impact on the development of the public sector wages, since public sector pay scale is defined in terms of multiples of the minimum wage.

With the exception of Cyprus, the Slovak Republic and Slovenia, sectoral-level bargaining is very weak. The main level of collective wage negotiation in most ACs is therefore the enterprise. In general, the firms of a given sector are quite diverse in terms of productivity and employers are reluctant to delegate bargaining power to their sectoral organisations (which operate, in fact, mostly as lobbies). Consequently, "sectoral" wage agreements are most common in sectors dominated by a single producer or an oligopoly (e.g. railways, energy supply etc.). In Slovenia, two general intersectoral collective agreements are concluded for the private and for the public sector. These set the framework for lower-level bargaining at sectoral and, to some extent, enterprise level. Moreover, company membership in employers' organisations (chambers) as well as collective bargaining is mandatory. In The Slovak Republic, the Tripartite Council for Economic and Social Agreement defines minimum pay increases by sector. Although these are not legally binding, they are usually respected in the bargaining process at sectoral level. In Cyprus, sectoral level bargaining is prevalent.

All ACs with the exception of Cyprus have a statutory national minimum wage. Minimum wages vary between 28 per cent (Estonia) and 74 per cent (Malta) of the average wage. Expressed in PPS, they range from 239 (Latvia) to 752 (Malta), compared to a range from 543 (Portugal) to 1338 (Luxembourg) in the EU.

Economy-wide indexation applies in Cyprus and Slovenia. In Slovenia, however, the indexation rule applicable in the public sector will, from 2004 on, also take EU inflation and exchange rate developments into account. In Poland, public sector wages are indexed, and in Malta, Poland and the Slovak Republic, the minimum wage.

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[212] On the incentives for central coordination cf. Calmfors (2001) who predicts that coordinated wage setting will ultimately break down as union density continues to decline.

Table: Wage bargaining structures in Acceding Countries

	Coverage of wage agreements [a]	Union density [a]	Bargaining coordination at national level	Main level of wage negotiation	eiro centralisa-tion index [b]	Wage indexation	minimum wage, %-age of average wage
Cyprus	65-70	70	weak (several tripartite bodies, but confined to work organisation and mostly consultative)	sectoral (enterprise)	0 – 3 - 1	economy-wide, automatic	a legal MW exists only in some sectors
Czech Republic	25-30	30	Tripartite Council for Economic and Social Agreement may make recommendations on overall wage growth.	enterprise	0 – 1 – 3	no	34
Estonia	29	15	Tripartite Council and National Economic and Social Council may advise on and monitor collective agreements	enterprise	0 – 1 - 3	no	28
Hungary	34	20	Tripartite National Labour Council issues wages recommendations for lower bargaining levels	enterprise	1 – 2 - 3	no	40
Latvia	< 20	30	The National Tripartite Consulting Council's recommendations on the minimum wage have some impact on the public sector pay scale.	enterprise	1 – 1 - 3	no	40
Lithuania	10-15	15	Tripartite Council issues recommendation on minimum wage. The MW in turn affects the public sector pay scale and has indirect influence on private sector pay	enterprise	0 – 1 - 3	no	43
Malta	n.a.	65	Tripartite "Council for Economic and Social Development" can issue recommendations	enterprise	0 – 0 - 3	minimum wage only	65
Poland	40	15	Tripartite Commission for Economic and Social Issues may make recommendations for wage growth	enterprise	1 – 1 – 3	public sect. wages and min. wage	40
Slovak Republic	48	40	The Tripartite Council's "General Agreements" recommend minimum increases per sector	sectoral (enterprise)	0 – 3 - 1	minimum wage only	39
Slovenia	close to 100	41	Intersectoral bipartite "general" collective agreements. Recommendations on wage policy from tripartite Social and Economic Council	intersectoral / sectoral	3 – 2 - 1	economy-wide (by collective agreement)	58 (target)

[a] in % of employees; union density figures and coverage of wage agreements are from eiro (2002): Industrial Relations in the EU Member States and candidate countries

[b] eiro centralisation index: first digit intersectoral – second digit sectoral – third digit company level; scale from 0-3, where 3=dominant, 2=important, 1=existing 0=unexisting.

Source : Commission services.

5. DETERMINANTS OF INTERNATIONAL CAPITAL FLOWS

TABLE OF CONTENTS

DETERMINANTS OF INTERNATIONAL CAPITAL FLOWS

1. Introduction

In the past ten years the growth of financial flows across borders has been tremendous. As a result of financial liberalisation, international capital flows (portfolio flows and direct investments) as well as foreign ownership of assets and firms have increased significantly in the world economy. The creation of the internal market and the common currency in Europe has strengthened these developments within the EU as well as between the EU and the rest of the world.

The purpose of this chapter is to examine determinants of international capital flows. The subject is a very broad one, encompassing many different aspects. We are thus forced to focus on a selected number of issues. In short, the chapter is made up of three building-blocks. First, theories and evidence on capital flows are surveyed. In this context the pattern of FDI flows in the global economy is described. Second, capital flows into the acceding countries are dealt with. Finally, determinants of long run capital movements are considered. Here the role of corporate governance and demographics are analyzed.

Throughout the text an EU perspective is adopted by starting from the EU as an economic unit. Thus, capital flows within the EU or within the euro area are not considered.

In more detail, the chapter is organized as follows. Theories and evidence on capital flows are initially presented. This section serves as the background for the ensuing sections containing in-depth studies of various trends, present as well as expected future ones, concerning capital flows. As foreign direct investments, FDI, have formed a major part of international capital flows in recent decades, an empirical account of FDI-flows in the world economy is presented. Since capital flows into the acceding countries have played a crucial role in the rapid transition of their economies in the 1990s, aspects of this process are explored. Corporate governance has recently turned into an important research area as well as a major policy issue, following the Enron affair and similar cases of corporate scandals in the USA; and it will be a key factor in harnessing financial flows effectively to foster real convergence in the enlarged EU. Thus, possible links between corporate governance and capital flows are explored. As the impact of ageing on the global distribution of saving and investment patterns has emerged as a crucial issue lately, the role of demographics as a determinant of long-term capital flows is examined. In this section the perspective is truly a long term one, making forecasts far into the future. As an important stimulus for the rise in capital flows in recent decades lies in the changing legal environment, an annex provides a thorough account of the EU legal framework regarding capital flows.

2. International capital flows. Theories and evidence

2.1. Empirical review

The 1990s saw a rapid increase in the importance of cross-border financial trade. A volume-based index of the level of international financial integration (IFIGDP) has been developed by Lane and Milesi-Ferretti (2003), which measures the sum of foreign assets and foreign liabilities as a ratio of GDP. The focus on accumulated stock positions is appropriate, since the year-to-year flow data may be quite volatile and fails to take into account the impact of valuation changes on aggregate international exposures.

Graph 1 shows the evolution of this index over 1991-2001 for an aggregate of industrial countries and for a

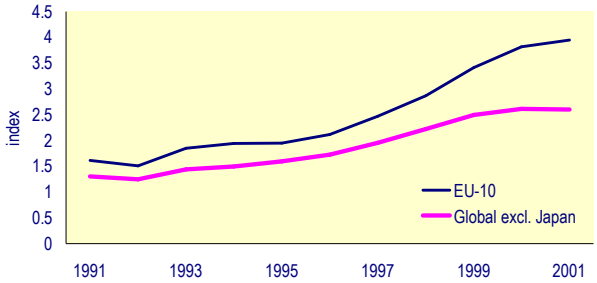
sub-aggregate of EU Member Countries.[213] Graph 1 shows a strong positive trend, with a marked acceleration from the mid-1990s onwards. EU Member Countries show above-average levels of international financial integration. However, this data-set does not identify the relative importance of intra-EU asset trade versus extra-EU asset trade.

It is important to appreciate that this measure encompasses all forms of financial assets. However, the last decade has also seen a critical shift in the composition of international investment positions, with an increasing share of equity instruments in the international balance sheet. This is shown in Graph 2 for the same two aggregates — for the EU subgroup, the share rose from 22 per cent in 1991 to 39 per cent in 2000, but has fallen back slightly with the decline in equity market values since then.

There is considerable cross-country variation in the degree of international financial integration and the relative importance of equity versus debt components. Table 1 shows the country-by-country data for the most recent year available (2001, except 2000 for Sweden).

Increased financial integration has not seen a general trend towards larger net foreign asset imbalances. Although the USA has undergone a very sharp deterioration in its net position, the EU subgroup has remained very close to balance throughout (see Graph 3).

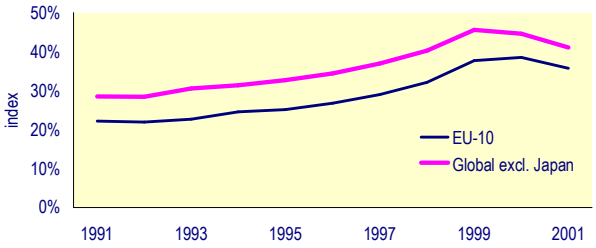
Graph 1 : International financial integration



Note : EU-10 = B, DK, D, E, F, I, NL, A, UK
Global = EU-10, USA, CA, AU, NZ, CH.
Source : Based on IFIGDP index developed by Lane and Milesi-Ferretti (2003). Underlying data drawn from IMF IFS.

[213] The membership of these aggregates is determined by data availability.

Graph 2 : Composition of international balance sheet : Ratio of equity assets and liabilities to total assets and liabilities



Note : EU-10 = B, DK, D, E, F, I, NL, A, UK
Global = EU-10, USA, CA, AU, NZ, CH
Source : Based on GEQSHARE variable developed by Lane and Milesi-Ferretti (2003). Underlying data drawn from IMF IFS.

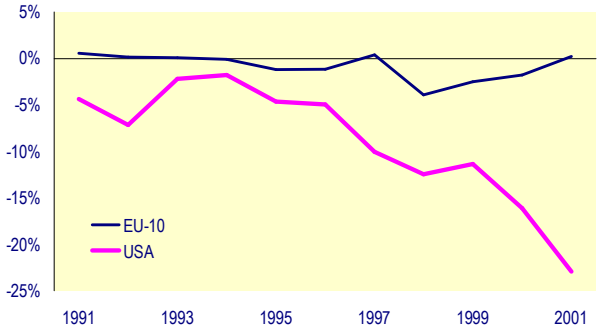
Table 1 : Country by country data

	2001[1]		
	Sum of foreign assets and foreign liabilities as ratio to GDP	Sum of FDI and portfolio equity assets and liabilities as ratio to GDP	Net foreign assets as ratio to GDP
BE	6.6	2.4	0.6
DK	3.1	1.3	-0.2
DE	3.0	1.0	0.1
EL	1.5	0.2	-0.4
ES	2.4	0.9	-0.2
FR	3.6	1.7	0.1
IE	15.0	6.1	-0.1
IT	2.0	0.5	0.0
NL	6.7	3.1	-0.1
AT	3.2	0.6	-0.2
PT	3.3	0.8	-0.4
FI	3.6	2.0	-0.9
SE	3.2	1.6	-0.3
UK	6.5	2.0	0.0

[1] Apart from Sweden, data from 2000.

Source : IMF IFS.

Graph 3 : Net foreign asset positions, as a ratio of GDP



Note : EU-10 = B, DK, D, E, F, I, NL, A, UK
Source : IMF.

2.2 A Typology of Capital Flows

It is useful to construct a typology of capital flows. First, it is important to make a distinction between gross capital flows and net capital flows. In recent decades, the scale of gross flows has expanded at a rapid rate, whereas the order of magnitude for net capital flows is much smaller. There are two factors driving the growth in gross flows. One is that the liberalisation of international trade in financial services naturally engenders two-way gross flows. For instance, bank 1 in country A may place collateral with bank 2 in country B in connection with a loan from bank 1 to bank 2, thereby creating two-way capital flows.

In similar fashion, a multinational financial institution may engage in high volumes of intra-institutional financial flows among its various affiliates. Of course, differences in national tax systems can also generate such flows, with firms and investors designing cross-border portfolios to minimise aggregate tax payments: for this reason, the gross capital flows in and out of offshore financial centres are extremely large.

The other factor is that gross capital flows are also undertaken in pursuit of risk diversification. By selling shares in domestic firms to foreign investors and acquiring equity in overseas enterprises, a country can reduce its exposure to its economic risk and enjoy an income stream that is less dependent on domestic production. Indeed, a benchmark prediction is that diversification should lead to very high levels of gross capital flows. Under certain conditions, a country that represents one per cent of the world economy, should sell 99 per cent of its domestic endowment to outside investors and, symmetrically, the ratio of foreign to domestic assets in its own portfolio should be 99 to 1.

With respect to net capital flows, there are both short-term and long-term factors that may generate an imbalance between capital inflows and capital outflows. Over the economic cycle, net capital flows can permit consumption and investment to temporarily diverge from their long-term trends. A country that wishes to have temporarily high consumption can borrow on international capital markets. Similarly, access to international capital markets means that domestic investment can respond to a temporary positive productivity shock without sacrificing the level of consumption. If such net capital flows are symmetric over the cycle, phases of current account surpluses and deficits are consistent with maintaining a zero long-term net foreign asset position.

2.3 Determinants of Capital Flows

In discussing the determinants of capital flows, the typology above will be followed, by focusing on the theoretical approaches to the study of capital flows.

Gross Capital Flows

As stated, international financial intermediation generates large volumes of gross capital flows. It is well understood that increasing returns characterize some financial intermediation activities such that the location of such sectors is highly concentrated: New York is the clear financial capital of the USA; London holds a large lead in Europe. The importance of such financial centers means that residents in countries A and B may indirectly exchange assets via bilateral trades with financial center C. With increased competition in the European Union and the growth of cross-border financial institutions it is natural to expect the internationalization of financial intermediation to further expand in the coming years.[214]

The diversification motive for gross capital flows can be linked to a number of factors. The liberalisation of external accounts and domestic financial deregulation has prompted an increase in international diversification. With respect to the latter, restrictions on domestic institutional investors (e.g. pension funds) are much less severe now than in the past. Moreover, the introduction of the single currency now allows investors in EMU member countries to invest elsewhere in the eurozone without taking on foreign exchange risk.

International diversification also goes hand in hand with the development of domestic financial systems. With increased tradability of domestic assets (e.g. as family-owned firms or state-owned firms release equity to other investors), the swapping of domestic and foreign assets is made more feasible. The evidence of Lane and Milesi-Ferretti (2003) is that the growth in domestic stock-market capitalizations is the dominant factor in explaining the rise in gross international asset trade.

The growth in international trade in goods and services also helps to explain the growth in gross capital flows. As has been emphasized by Obstfeld and Rogoff (2001), the gains to international risk-sharing are limited by barriers to trade in goods and services: as the latter decline, the impetus to diversify investment portfolios intensifies. We note also that there are also direct links between product trade and asset trade. First, trade credits are a key component of the logistics of the international trading system. Second, FDI is typically both trade-creating and also involves financial transfers. FDI (among the developed nations) is also characterized by a high ratio of gross to net flows.

Short-Term Net Capital Flows

Early intertemporal models of the current account focused on the contribution net capital flows can make to consumption smoothing: a country that is enjoying temporarily high income will run a current account surplus in order to permanently sustain a higher level of

[214] See Grilli (1990) on the geography of international financial centers.

consumption into the future. This is feasible since the acquisition of foreign assets generates a positive stream of international investment income inflows that will supplement domestic sources of income even after the temporary boom is over. By itself, this should generate a *procyclical* pattern in current account surpluses.

However, access to international capital markets also means that domestic investment can be externally financed. If a temporary domestic productivity shocks raises the return to domestic capital, foreign capital will flow into the economy in order to take advantage of the profit opportunity. If this effect dominates the consumption-smoothing mechanism, the net effect will be a *countercyclical* pattern in current account surpluses. Moreover, it is important to appreciate that an elastic supply of foreign capital means that business cycles will have higher amplitude and greater persistence, since the procyclical pattern of net capital flows amplifies the economic response to fundamental disturbances.

Of course, temporary shifts in consumption and investment that are not justified by economic fundamentals will also call forth net capital flows. An exogenous decline in the savings rate can be temporarily sustained without affecting the level of domestic investment by running a current account deficit – for instance, if Ricardian equivalence does not hold, one factor that could generate a fall in the national savings rate is an increase in the government fiscal deficit. Similarly, bubble-inspired domestic investments can also be financed by capital inflows.[215]

A weak or under-regulated domestic financial sector may also lead to inefficient accumulation of external debt, if domestic banks operating under government guarantee merely raise international debt to finance inefficient but politically-favoured domestic enterprises. These examples illustrate that international capital mobility is not necessarily always welfare enhancing in that sub-optimal policies are also made more sustainable by access to external financial markets.

Long-Term Net Capital Flows[216]

Economic research has identified three key variables in determining long-term net foreign asset positions: output per capita, the level of public debt and demographic structure. These three variables should be interpreted as measured relative to global values. Common movements in output per capita, demographic trends and government debt should not affect net foreign assets. Rather they will operate via global variables such as the world real interest rate.

The first determinant, relative output per capita, may affect net foreign asset holdings through several channels. One channel works through different rates of return on domestic and foreign investments. Suppose the domestic marginal product of capital falls, as the domestic economy grows richer. Then domestic investment will fall and home investors will turn to overseas accumulation opportunities.

A second channel implies that an increase in domestic income may lead to a rise in the domestic savings rate. This outcome can be generated in models with habit formation in consumption preferences: as an economy grows, consumption will lag behind output. Even if the rise in the savings rate is temporary, there may be a permanent improvement in the net foreign asset position. The traditional "stages of the balance of payments" hypothesis also suggests a positive relation between relative output per capita and the net foreign asset position.[217]

The second determinant of long-term capital flows is the stock of public debt. Assuming departures from Ricardian equivalence, higher levels of public debt may be associated with a decline in the external position.

The third determinant of long-term capital flows, demographic trends, has recently attracted considerable research interest (see Section 6 as well). In short, countries with an ageing population may prepare for anrise in the ratio of retirees to workers by accumulating foreign assets to supplement domestic income streams.

On the other hand, a country with a high youth dependency ratio may invest heavily in its infrastructure (education, housing etc). In a country with high youth dependency, households with children may attempt to smooth consumption by borrowing or by maintaining low savings ratios. Thus, it should be expected declining net foreign asset positions in countries with rising youth dependency ratios.[218] The effects of demographic factors on the net foreign asset holdings may be a function of the age structure of the working-age population as well.[219]

The mechanisms through which our fundamentals — output per capita, public debt and demography —affect long-term net capital flows as well as inter-act are complicated. In addition, a host of other variable may also generate long-term deviations from a zero net foreign asset position. This is a field of much current research.

2.4 Composition of Capital Flows

Capital flows can take a variety of forms. One basic distinction is between debt (bank loans and bonds) and equity flows (FDI and portfolio equity), since these differ in terms of expected returns and risk profiles. For instance, Lane and Milesi-Ferretti (2003) calculate that countries with a larger share of equity liabilities versus debt liabilities typically pay out a higher average return

[215] See Caballero and Hammour (2002).

[216] This section is based on Lane and Milesi-Ferretti (2002a).

[217] See Halevi (1971), Fischer and Frenkel (1974).

[218] See also Taylor (1994) and Higgins (1998).

[219] See Mundell (1991).

to foreign investors. However, this may be worthwhile in that equity liabilities have attractive risk-sharing properties: in the event of a downturn, part of the losses fall on the foreign investors.

Within the equity category, the distinction between FDI and portfolio equity is quite important. The former carries with it some element of control rights over production decisions in the foreign operation, such that it is not an "arm's length" relationship. Moreover, this features also means that FDI equity investment has implications for international product trade and other international financial transactions (e.g. the foreign affiliate or subsidiary may also raise debt finance). In contrast, international portfolio equity investment is a more passive instrument and is a more liquid category in that positions can be quickly reversed in international stock market trade.

The major components in the international debt category are international bank loans/deposits and international bonds. The former encompasses wholesale inter-bank trade but also cross-border retail banking and international corporate banking. With respect to the latter category, sovereign bonds have been traditionally predominant, although the international issue of corporate bonds has grown significantly in recent years.

The growth in international trade in equity-type instruments in part just reflects the development of deeper domestic financial systems. However, the cross-border share in aggregate equity portfolios has been climbing, such that there has also been a shift towards greater internationalisation of balance sheets. This has been accommodated by a relaxation of regulations that previously forced institutional investors (e.g. pension funds) to primarily hold domestic securities. EMU has also eliminated the currency risk in cross-border equity investments within the eurozone.

The currency composition of debt is also an important factor. It is well known that emerging market economies primarily raise debt in foreign currencies, whereas the USA issues virtually all of its debt in dollars. The risk profile in each case is quite different: a currency depreciation can have contractionary effects for an emerging market economy, since the domestic real value of its foreign-currency debt increases — this channel is not operative for major industrial nations that issue debt in domestic currency. The formation of the euro in this respect has been beneficial especially for the smaller economies and those with high debts that historically had to raise part of their debt in foreign currencies.

The maturity of debt is also critical in understanding the risk profile of a country's international investment position. Again, the contrast between emerging markets and the industrial countries is quite stark, with the former much more reliant on short-term debt and thereby more vulnerable to roll-over risk.

A rising share of equity instruments in the international balance sheets has implications for the relation between cross-border investment positions, international investment income flows and GNP. Consider two countries, each with euro 100 billion in foreign assets. One country exclusively invests in debt, which annually yields 4 per cent, whereas the other exclusively invests in 'growth' equities that pay no dividends but offer an annual capital gain of 6 per cent. In the balance of payments and national accounts data, the former will receive an international investment income inflow of euro 4 billion (raising GNP by the same amount), whereas the latter has a zero international investment income inflow and correspondingly a lower GNP. This example illustrates that income measures are an increasingly incomplete representation of wealth positions, with the shift towards equity-type instruments in international investment patterns.

2.5 Effects of International Financial Integration

International capital mobility fundamentally alters the shape of the macroeconomic environment. In terms of expenditure categories, all else equal, smoother consumption but more volatile investment behaviour could be expected. In turn, relative prices will be affected: swings in net capital flows will also induce shifts in demand for nontradables, with current account deficits associated with real appreciation and surpluses with real depreciation.

Moreover, international capital flows generate sharp changes in dynamic patterns. As was just stated, a current account deficit in a given year may induce contemporaneous real appreciation. However, the corresponding issuing of foreign liabilities means that a future resource outflow is required to pay a return to the foreign agents that financed the current account deficit. This will depress future domestic expenditures and induce a weakening of the real exchange rate. Such a connection between net external liabilities and the long-run real exchange rate has been robustly identified in the data by Lane and Milesi-Ferretti (2001, 2002b).

In addition, the accumulation of a significant net external liability position is a source of potential instability. If a rise in risk aversion among international investors leads them to call in loans or demand a higher required return, the domestic economy may be pushed into a sudden adjustment, with a negative impact on domestic consumption and investment and the real exchange rate. For this reason, net debtor countries typically must pay a risk premium, raising the cost of capital for domestic borrowers.

Even if net positions are zero, gross capital flows also affect macroeconomic performance through a number of channels. In terms of long-term growth, the ability to diversify risk overseas lowers the cost of capital and may encourage domestic entrepreneurs to be more adventurous, selecting riskier projects that offer a higher expected growth rate. In similar fashion, portfolio

diversification encourages greater sectoral specialization.

The internationalization of portfolios plausibly increases the linkages across national economies. Since domestic and foreign consumption rates in part depend on commonly-shared portfolio returns, more similar consumption patterns may be observed. In addition, the increase in asset cross-holdings has contributed to the increase in correlation in financial market returns across economies, since trends in domestic and foreign wealth are more closely linked and global factors exert a greater influence on asset pricing.

Of course, the corollary of greater insulation from internal shocks is that domestic investors become more exposed to external shocks. Moreover, if net worth acts as a constraint on investment decisions, losses incurred overseas may translate into a decline in domestic investment and generate a recession.[220] Similarly, foreign investors may liquidate positions in the domestic economy in order to rebalance portfolios in the wake of losses made elsewhere. In these ways, the growth in gross capital flows raises the international component of business cycles relative to the country-specific element.

The growth in gross capital flows also alters the impact of currency movements for a given net foreign asset position. Tille (2003) provides a simple example about the impact of increasing financial integration on the transmission of exchange rate movements.[221] Consider two cases with the same negative net foreign asset position of minus euro 100 billion. In case A, foreign assets and liabilities are euro 100 billion and euro 200 billion respectively; in case B, these stand at euro 1,000 billion and euro 1,100 billion. Let all foreign assets and liabilities be denominated in the domestic currency. A ten per cent appreciation reduces the value of foreign assets by the same proportion in both cases. However, in case A, this translates into a wealth loss of euro 10 billion, whereas it represents a wealth decline of euro 100 billion in case B: a very significant difference, with corresponding implications for consumption and investment behaviour.

It should be recognized that a significant net external liability position also leaves a country vulnerable to a financing crisis, which can in itself be a source of business cycle volatility. In turn, a sharp turnaround in the trade balance may require a large real depreciation, especially in the presence of nominal rigidities. Such sudden stops in capital inflows have been a recurrent problem for emerging market economies in recent years. There is by now a large literature on the macroeconomics of 'liability dollarization' in developing countries (see Lane 2003b for a review). However, a financing crisis scenario is also potentially relevant for major industrial nations such as the United States, even if the currency composition profile of foreign liabilities is less risky for these countries.

2.6 Capital Flows and International Policy Co-ordination

The growth in global capital flows might suggest a prima facie case exists for greater international monetary policy co-ordination.[222] Indeed, there has been little appetite in recent years for tighter policy co-ordination among the major international economic powers. However, while there is no doubt that financial integration means that domestic policy-makers must pay more attention to international economic developments and policy spillovers when setting policy, it does not follow that formal policy co-ordination is actually required.

In fact, one important result emanating from the recent academic literature is that increased financial integration may actually reduce the gains from international monetary policy co-ordination. Since international diversification links consumption growth rates across countries, even self-interested countries will incorporate economic conditions overseas in setting policies and will be more reluctant to engage in beggar-thy-neighbor manipulations of the terms of trade: domestic investors also lose out if a domestic economic policy harms other economies.

The asymmetry created by non-zero net foreign asset positions may imply larger gains to international monetary policy co-ordination. In Benigno (2001), for zero initial net foreign asset positions, the first best can be well approximated by a policy of targeting domestic producer price inflation. However, such a policy induces excessive volatility in interest rates and hence inefficient cross-country wealth redistributions if initial net foreign asset positions are non-zero. Policy co-ordination in this case can improve welfare.

In addition, substantial non-fundamental movements in exchange rates may occasionally also justify some degree of co-ordinated intervention in currency markets — as indicated previously, the rise in international asset cross-holdings means that the distorting effects of misaligned currencies are plausibly larger now than in earlier periods. Indeed, the ECB and the Federal Reserve have occasionally intervened to stabilize the euro-dollar rate since the inception of the EMU.

Finally, we note international financial integration also implies important cross-linkages between the payments and financial systems of different countries. The smooth operation of these systems therefore requires global co-

[220] Of course, the transmission of such shocks is most painful if the foreign assets were purchased at excessive valuation, such that the negative returns merely represent a return to fundamental value and do not predict any subsequent upswing in asset prices.

[221] See also Lane (2004).

[222] See also the discussion in Begg et al (2002).

ordination in the event of disruption to the 'plumbing' of the international financial system. The September 11 2001 event provided an important challenge to the major central banks in restoring stability to the international financial system. Liquidity operations began immediately and there was close co-ordination between the ECB and the Federal Reserve System in ensuring the operation of the international payments system. The collective gains to restoring confidence to financial markets were underlined by the unprecedented simultaneous reduction in interest rates that took place on September 17, 2001.

3. Foreign Direct Investment. The global picture

As discussed above, international capital movements can take different forms, including foreign direct investment (FDI), equity finance, bonds and bank lending. In the long term perspective, FDI is a most important element. This section provides an empirical account of recent global trends in foreign direct investment.

At the very short end, some USD 1.200 billion of dollars are traded daily on the world foreign exchange markets, in order to finance international trade, to hedge currency risks or to engage in short-term investment or finance transactions.[223] FDI, by contrast, is typically defined as transborder capital investment in which the investor resident in one country obtains lasting interest in, and a significant influence on the management of an entity in another country.

FDI thus comprises the creation of new enterprises (greenfield investment), cross-border merger and acquisition of firms, as well as reinvested earnings of the FDI enterprise and other long- and short-run loans from the parent to the affiliate. FDI flows and stocks conventionally relate to ownership of 10 per cent or more of the voting securities of an incorporated enterprise or the equivalent in an unincorporated enterprise.

Exploiting intangible assets, such as patents, know-how, technology, organisational and managerial skills, in markets or sources of supply other than the enterprise's home country are important drivers for FDI. While annual volatility can be substantial, in general, trends in FDI tend to be less sensitive to short-term macroeconomic fluctuations. Therefore, FDI trends provide a good proxy for the evolution of the international economic integration over time and the rising stakes of economies in each other.

3.1 Global trends and recent developments

According to preliminary data, FDI flows declined in the first quarter 2003.[224] This continues a downward trend, which began in 2000 and largely reflects the cyclical growth trend in the world economy, the fallout from the bursting of the technology bubble, diminished regional and local growth perspectives and the end of an unprecedented privatisation cycle that had started in the early 1990s. Reductions were particularly pronounced between developed economies and in Latin America, while FDI to Asia and central Europe were broadly stable. Asia continues to receive the major share of FDI to emerging market economies, with China receiving more than half of all FDI to emerging markets in the first quarter 2003. However, these short term developments do not fully reflect the long term trend of rising FDI characteristic for the world economy since the beginning of the 1980s.

Over the last two decades, notwithstanding episodes of declining FDI flows, on average the growth of foreign direct investment flows has outpaced the expansion of global trade and output (see Table 2). Today, it is the single most important category of international private capital flows to emerging market economies and developing countries, with equity finance, bonds and bank lending playing a less prominent role.

Following a historic peak at around USD 1.3 trillion in 2000, world FDI inflows (outflows) amounted to USD 651 billion (USD 647 billion) in 2002 – almost three times higher than a decade before and more than 12 times higher than 20 years before. The world's total FDI inward stock stood at USD 7.2 trillion in 2002 – over ten times higher than in 1980 (USD 635 billion). The global FDI inward stock measured as a ratio to global GDP is roughly 20 per cent.[225] Despite the sharp fall in 2001 and 2002, the longer-term trend expansion of FDI flows appears unbroken, albeit at lower growth rates than seen in the second half of the 1990s.

The distribution of FDI flows is highly uneven. Standard economic theory predicts capital to flow from economies where capital is relatively abundant in relation to labour to economies where capital is comparatively scarce. In reality, however, the relatively capital-abundant developed economies account not only for the majority of outflows, but receive also the lion's share of global FDI inflows. The European Union and the USA accounted for almost 70 per cent of global

[223] Bank for International Settlement (2001).

[224] IMF (2003).

[225] The data presented in the text is mainly based on UNCTAD (2003) and earlier editions of UNCTAD's annual World Investment Report.

Table 2 : GDP, trade and FDI. Global growth rates in percent, 1986-2000

	1986-90	1991-95	1996-2000
GDP (in current prices)	11.5	6.5	1.2
Exports of goods and non-factor services	15.8	8.7	4.2
FDI inflows[a]	23.6	20.0	40.1
FDI outflows[a]	24.3	15.8	36.7

Source : UNCTAD (2002). a) Due to statistical discrepancies FDI inflows and outflows are not of equal magnitude.

Table 3 : FDI inward stock, by host economy, 1980-2002, share in %

	1980	1985	1990	1995	2000	2001	2002
Developed Economies	**56.0**	**58.4**	**71.7**	**68.9**	**66.3**	**66.3**	**66.3**
- EU	31.1	27.4	38.4	38.4	37.2	37.5	**37.8**
- USA	11.9	18.9	20.2	18.1	20.1	20.5	19.5
- Japan	0,5	0,5	0,5	1.1	0.8	0.8	0.9
Developing Economies	**44.0**	**41.6**	**28.3**	**31.1**	**33.7**	**33.7**	33.7
- Asia	32.0	29.8	19.5	21.5	21.1	20.2	**20.2**
-- *China*	0.9	1.1	1.3	4.6	5.8	6.1	6.5
-- Hong Kong	25.4	18.7	10.3	7.7	7.6	6.5	6.2
- Latin America and Caribbean	7.2	8.2	6.0	6.8	10.1	10.9	11.0
- Central & Eastern Europe	n.a.	0	0,1	1.4	2.1	2.4	2.5
- Africa	4.6	3.5	2.6	2.6	2.4	2.4	2,5
World	**100**	**100**	**100**	**100**	**100**	**100**	100

Source : UNCTAD; own calculations. Totals may not add up to 100 due to rounding.

inflows and almost 80 per cent of global outflows in the period 2000-02, while developing countries received only 21.5 per cent of inward flows.

The stock figures illustrate the geographical distribution of accumulated flows in the past. The group of developed economies accounts for two thirds of worldwide inward FDI stocks and over four fifths of outward stocks (UNCTAD, 2003). While in absolute terms the flows to developing countries increased substantially over time, the relative share of developing countries in world inward stock fell from 44 per cent in 1980 to 33.7 per cent in 2002. (See Table 3).

The EU is the world's biggest recipient and supplier of FDI. EU FDI outflows to third countries account for roughly one third of global FDI outflows (Eurostat 2003).[226] With outflows being higher than FDI inflows from abroad, the EU is a net investor in the rest of the world. However, the difference between outflows and inflows of FDI has narrowed substantially since its peak at almost € 260 billion in 2000 to € 64 billion in 2002. (See Tables 3 and 4).

[226] The EU figures presented by UNCTAD grossly overstate the external dimension of the EU because they include extra-EU flows as well as intra-EU transborder FDI flows. While this measure gives a good indication of the overall importance of transborder FDI activity in the EU economy in comparison to the rest of the world, the figures for the EU are not comparable to the data provided for other countries. In order to reflect external flows only, FDI flows to and from the EU would need to be corrected for intra-EU flows. Between 1995 and 2001 the proportion between intra-EU transborder flows and extra-EU flows was roughly one to one in terms of outflows, and varied between one to one and four to one in terms of inflows (see Eurostat 2003).

Table 4 : FDI outward stock, by home economy, 1980-2002, shares in %							
	1980	1985	1990	1995	2000	2001	2002
Developed economies	**88,5**	**89,5**	**92,5**	**89,3**	**86,3**	**87,19**	**87,6**
- EU	38,3	41,0	45,2	44,9	49,9	50,39	50,2
- USA	38,2	32,1	24,4	24,2	21,7	21,95	22.0
- Japan	3,5	6.0	12,0	8,2	4,7	4,77	4,8
Developing economies	**11,5**	**10,5**	**7,6**	**10,7**	**13,7**	**12,81**	**12,4**
Asia	1,1	1,6	2,8	6,5	10,2	9,45	9,2
China	Na	0,01	0,1	0,6	0,4	0,52	0,5
Latin America and Caribbean	9,1	7,5	3,6	3,1	2,7	2,67	2,5
Central & Eastern Europe			0,03	0,2	0,3	0,39	0,4
Africa	1,2	1,5	1,2	1,1	0,8	0,7	0,6
World	100	100	100	100	100	100	100

Source : UNCTAD; own calculations. Totals may not add up to 100 due to rounding.

Table 5 : FDI flows per $1000 GDP, 1990-2000, annual averages in US $						
	Inflows			Outflows		
	1990-94	1995-99	2000	1990-94	1995-99	2000
Developed countries	7.1	17.4	50.9	10.9	22.7	52.8
- EU	10.8	25.8	102.9	15.0	39.7	123.2
- Japan	0.4	0.9	1.7	7.2	5.3	6.6
- USA	5.9	16.4	30.7	8.0	13.8	16.8
Developing countries	14.7	29.1	36.7	6.5	10.7	16.5
- Asia	15.7	26.8	33.9	8.5	12.1	21.2
- Latin America and Caribbean	15.1	37.0	48.1	3.5	9.5	11.1
- Central and Eastern Europe	8.4	25.0	38.1	0.4	2.9	5.9
- Africa	8.8	16.4	15.6	3.5	9.5	11.1
World	8.6	20.0	47.7	10.0	19.9	44.4

Source : UNCTAD.

The allocation of FDI is also highly concentrated within the group of developing countries. Over the 1998-00 period, the five largest host countries in the developing world, notably China, Hong Kong, Brazil, Argentina, and Mexico, accounted for more than 60 per cent of total FDI flows to developing countries, and the 10 largest developing host countries received more than 75 per cent. Among developing countries, in 2002, China became the single biggest recipient country of FDI inflows. With FDI inflows at USD 52.7 billion, China outperformed the USA as a host country. Flows to the 47 least developed countries (as defined by the UN) remain marginal, totalling an estimated USD 4 billion, equivalent to some 0.5 per cent of world FDI in 2002 (World Bank 2003).

In relation to the size of their economies, the role of developing countries as hosts for FDI inflows has increased over time, but there remains potential to gain further ground, particularly when the relative differences in the proportion of FDI to populations is taken into account. Tables 5 and 6 present data relating FDI flows to GDP and the size of the population. The FDI intensity of the economy, measured as the share of FDI flows in GDP, has increased during the 1990s for all country categories. The particularly pronounced increase of flows in and out of the EU in 2000 can be attributed to exceptionally high merger and acquisition activity mainly in the information technology sector. With the exception of the most recent years, FDI inflows tended to be more important for developing economies, given that the share of FDI in their economies tends to be larger than in developed economies.

Table 6 : FDI flows per capita GDP, 1990-2001, annual averages in US $

	Inflows				Outflows			
	1990-94	1995-99	2000	2001	1990-94	1995-99	2000	2001
Developed countries	**162.9**	**474.4**	**1429.2**	**583.1**	**249.6**	**619.9**	**1480.2**	**672.9**
- EU	212.2	588.0	2147.5	856.7	295.7	904.0	2571.1	968.7
- Japan	11.0	30.7	65.5	48.7	205.7	188.6	248.3	299.1
- USA	143.0	509.0	1062.4	435.2	196.4	419.3	582.5	398.6
Developing countries	**15.6**	**37.5**	**48.8**	**41.4**	**7.4**	**14.8**	**23.4**	**8.1**
- Asia	13.2	28.1	37.5	28.3	7.4	13.5	24.8	9.6
- Latin America and Caribbean	45.1	141.3	185.6	163.6	10.7	36.5	43.3	14.2
- Central and Eastern Europe	17.3	55.9	78.6	80.8	1.0	6.8	12.4	10.9
- Africa	6.2	11.9	11.0	21.1	3.9	4.4	2.3	-3.7
World	88.5	101.5	245.7	110.0	40.1	100.7	244.0	100.7

Source : UNCTAD.

Table 7 : Changes in national regulations of FDI, 1991-2002

	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**
	Number of countries that introduced changes											
	35	43	57	49	64	65	76	60	63	69	71	70
	Number of changes											
	82	79	102	110	112	114	151	145	140	150	208	248
	Of which											
More favourable	**80**	**79**	**101**	**108**	**106**	**98**	**135**	**136**	**131**	**147**	**194**	**236**
Less favourable	2	-	1	2	6	16	16	9	9	3	14	12

Source : UNCTAD (2003), based on national sources.

The proportion of FDI inflows to the size of the population has increased over time. On average, however, it is significantly higher in the developed economies than in the developing world. This is partly a reflection of the overall capital scarcity in developing economies, but may also be interpreted as an indication of the relatively higher degree of international integration of the more advanced economies.

3.2 Main drivers of FDI

The FDI expansion since the 1980s was to a large extent prompted by the widespread abolition of capital controls and the opening up for inward FDI. This development continued in the 1990s and was reinforced as a consequence of the economic downturn in 2000. Asia is one of the most rapidly liberalising regions. Table 7 counts the number of countries that introduced changes in their investment regimes, and identifies the number of changes designed to make FDI more attractive.

Cross-border merger and acquisition (M&A) activity rather than greenfield investment was a major driver of FDI flows in recent years, in particular between the developed economies. However, following a historic peak in 2000, both the number and the value of cross-border M&As fell substantially in 2001 and 2002, partly explaining the overall fall of global FDI flows.

For illustration, Table 8 shows the evolution of the number of deals and the total value of cross-border mergers worth over USD 1 billion since 1987.

Particularly large M&A deals in 1999 and 2000, mainly in the telecommunications sector, explain the steep rise of FDI in these years. With the boom phase in this industry taking a break, it could be argued that FDI levels are back to more "normal" trend levels. In addition to the global economic slowdown, the sharp fall in equities and reduced corporate profits contributed to the reduction in cross-border M&As.

Table 8 : Cross-border mergers worth over $1 billion, 1987-2002

Years	Number of deals	Value (billion dollars)
1987	14	30.0
1988	22	49.6
1989	26	59.5
1990	33	60.9
1991	7	20.4
1992	10	21.3
1993	14	23.5
1994	24	50.9
1995	36	80.4
1996	43	94.0
1997	64	129.2
1998	86	329.7
1999	114	522.0
2000	175	866.2
2001	113	378.1
2002	81	213.9

Source : UNCTAD.

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Proximity and trade openness are important factors explaining the geographic flow of FDI. According to the OECD (2003) a significant share of FDI in the OECD area takes place between countries bound by regional trade agreements and among geographically close countries. For instance, EU Members States tend to register higher inflows from each other than from third countries, and a large fraction of the FDI flowing to Canada and Mexico originates from the USA.

3.3 FDI by industries

The sectoral composition of FDI has shifted over time. While historically FDI played a prominent role in the extractive industries, the production and services sectors have become progressively important for FDI activity. Since the second half of the 1990s, services have clearly surpassed manufactures as the most important sector, playing the predominant role in the FDI flows between developed economies. (see Table 9).

The high share of the services sector in FDI inflows to developed economies in 1999 and 2000 can largely be explained by the surge of cross-border M&As in the telecommunications sector as well as in the finance sector. The weight of FDI in the services sector has increased also in developing countries, but the traditional sectors continue to play an important role, with roughly 40 per cent of FDI inflows being invested in the primary and secondary sectors. (see Table 10).

This empirical picture is complemented by the evolution of the sectoral breakdown of cross-border mergers since the 1980s. While in the late 1980s, 62 per cent of all major cross-border mergers took place in the manufacturing sector, this figure has diminished gradually to one third in 2001.[227] At the same time, mergers in financial services and communications increased substantially. In 2001, almost half of all the major mergers took place in these industries.

3.4 Summary

In a global perspective, the EU is the biggest actor in the field of FDI. The outflow and the inflow of FDI from and to the EU are larger than for any other country. Cross-border mergers and acquisitions, more favourable FDI regimes and a cycle of privatisation have been main driving forces behind the global flow of FDI in the past. There are reasons to expect the flow of FDI to continue to expand further in the future, albeit at lower levels than in the end of the 1990s.

[227] Cross-border mergers above USD 1 billion.

Table 9 : Inward FDI flows by Industry, 1999-2001, shares in %

Industry	1999-2000 (annual averages)			2001		
	Developed economies	**Developing economies**	**Total**	**Developed economies**	**Developing economies**	**Total**
Primary	2.1	8.9	3.3	10.2	7.6	9.6
Secondary	21.0	30.8	22.6	16.6	33.0	20.5
Tertiary, of which:	71.0	56.3	68.5	64.9	58.4	63.3
- Finance	27.5	12.1	24.9	20.2	17.0	19.3
- Communication and transport	12.2	7.9	11.5	9.6	11.8	10.2
Total	100	100	100	100	100	100

Source : UNCTAD (2002).

Table 10 : Cross-border mergers by sectors, 1987-2001, shares %

	1987-90	1991-95	1996-2000	2001
Agriculture and mining	2,4	3,9	1,2	1,1
Manufacturing	61,8	50,9	36,0	33,6
Services, of which	35,9	45,1	62,9	65,2
- *Finance*	19,0	26,4	23,6	**30,5**
- *Communication and transport*	2,4	4,2	19,8	**18,9**

Source : UNCTAD (2002).

4. Capital flows to the acceding countries

4.1 Introduction

International financial flows to the acceding countries have been a key engine of the real convergence process in these economies. In particular for the former socialist countries, renewed access to capital markets has been a prerequisite for the rapid transformation they were able to embark on in the last decade. Foreign capital allowed the running of a significant current account deficit, reflecting high investment needs and the containment of social costs of transition. But it also was an engine to regain access to global product markets, and to import production technology.

So far, inflows have for the most part been within those limits, which have allowed them to stay sustainable, even if fiscal policies have had in most countries the important role of contributing to or ensuring such external sustainability. This was in particular of critical importance in those countries which opted for a fixed exchange rate regime.

The run-up to accession and the introduction of the euro – as well as continuing economic and financial transformation in these countries – may have a profound impact on the size, structure and variability of financial flows. Capital inflows are set to remain an important driver of economic growth during the early years of EU membership. But these flows, increasingly, will be taking place in a different context – one of deeper and more diverse domestic financial markets and, potentially, strong domestic credit growth. Building on past success, in this market setting, demands will be placed on the quality of both structural and macroeconomic policies.

To shed light on these issues, the discussion that follows reviews empirical evidence from the past decade – linking the experience with capital flows to broad patterns of policy reform across the country group. It takes note of various factors – from privatization phasing to domestic market depth – that will likely cause a shift in the composition of flows in the early years of EU membership. Such changes offer new economic opportunities. But equally, they have the potential to pose new policy challenges: these, too, are considered in a concluding section.

Table 11 : Key figures of the financial account (% of GDP)

	Current account		Foreign direct investment				Portfolio investment				Other investment			
			Abroad		In the country		Credit		Debit		Credit		Debit	
	1997-2001	2002	1997-2001	2002	1997-2001	2002	1997-2001	2002	1997-2001	2002	1997-2001	2002	1997-2001	2002
CZ	-4.5	-6.3	-0.2	-0.4	8.0	13.3	-1.6	-3.3	1.5	1.3	-3.2	2.8	1.2	-0.5
EE	-7.8	-12.7	-1.9	-2.0	8.0	4.5	-1.1	-1.9	3.0	5.3	-4.3	0.5	5.9	6.0
HU	-3.3	-4.0	-0.9	-0.4	4.3	1.3	-0.3	-0.1	1.8	2.8	-2.7	-2.4	2.4	-0.7
CY	-4.5	-5.4	-1.5	-1.3	1.3	4.4	-3.2	-6.5	3.7	1.9	-5.4	21.4	12.0	-10.7
LV	-8.6	-7.8	-0.3	-0.1	5.6	4.7	-3.0	-2.6	1.2	-0.1	-2.7	-5.8	8.6	12.2
LT	-8.8	-4.8	-0.1	-0.3	4.8	5.2	-0.2	-0.9	2.4	0.9	-1.1	1.2	3.6	1.2
MT	-6.7	-4.6	-0.6	0.0	11.5	-9.6	-9.4	-10.9	0.1	0.0	-21.5	-11.5	26.8	40.9
PL	-5.1	-3.6	0.0	-0.2	4.2	2.2	0.0	-0.6	1.0	1.5	-1.2	-1.9	1.6	-0.6
SK	-7.4	-8.2	0.1	0.0	4.7	16.9	-0.6	1.1	2.6	1.2	-0.3	3.0	1.7	-0.9
SL	-1.3	1.7	-0.3	-0.5	1.4	8.4	-0.2	-0.4	1.2	0.1	-1.1	-4.0	3.1	3.0
AC-10	-4.9	-4.4	-0.3	-0.3	4.8	5.2	-0.6	-1.2	1.5	1.6	-2.1	0.1	-0.4	-1.0

Source : IMF, National Central Banks, partly estimated.

4.2 Capital flows in the transition decade

4.2.1 The legal framework

Legal restrictions on cross-border capital flows of the ten acceding countries (AC-10) have been gradually lifted over the past decade, even if this process has been uneven in speed among countries and is not yet completed for all of these.

However, at the latest by the date of accession, all remaining restrictions on the financial account will have to be liberalized pursuant to Article 56 and 57 of the EC Treaty. Afterwards only some restrictions on certain transactions in real estate (agricultural land for all countries except Cyprus and Malta of 7 years and in Poland for 12 years and secondary residences in all except the Baltic countries for 5 years) will be permitted for a certain transition period, as provided for by the Treaty on Accession.

As of now, the overwhelming part of transactions has been liberalised. Only in several countries restrictions, mostly on operations of residents in deposit accounts abroad and on the admission of or transactions in foreign securities are still in place. Cyprus at present still has restrictions, which go beyond this limited range.

4.2.2 Overview of capital flows

Current accounts of the acceding countries showed over the past decade sizeable deficits. They varied, for the total of the AC-10, between around 2 billion to 3 billion. ECU in 1994 and 1995 to more than 19 billion EUR in 1999, 2000 and 2002. These deficits for the total of the AC-10 showed a slight upward trend: whereas for the average of the 5-year period of 1993 to 1997 they amounted to 3.3 per cent of GDP, for the period of 1998 to 2002 the deficits inched up to an average of 4.8 per cent of GDP

In 2003, figures for the first semester seem to support this trend towards rising current account deficits and corresponding financing needs. Behind this average are, for the last 5 years, deficits of nearly, or more than, 8 per cent in the three Baltic countries, and relatively low figures for the Czech Republic (4.4 per cent), Hungary (3.6 per cent) and particularly Slovenia (1 per cent) (see Table 11 and Graph 4.)

In a global perspective, these financing requirements are fairly small in absolute terms, though, in reflecting the limited size of the economies concerned. For example, the aggregated current account deficit of the acceding countries in 2002 is equivalent to just around 3.5 per cent of all capital outflows of the euro area in 2002.

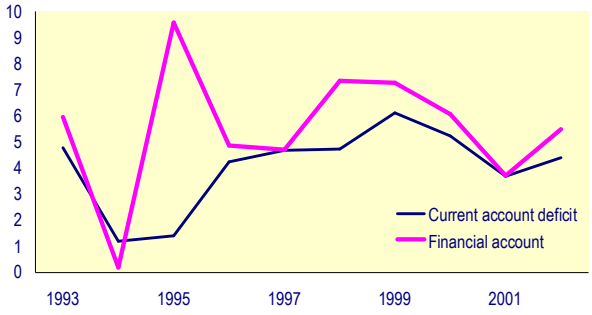
Table 12 : Foreign direct investment - inflows

	% of total investment (GFCF)		% of current account deficit		% of AC-10 total FDI inflows		Growth rate 2000-02 over 1997-99
	1997 - 2000	**2002**	**1997 - 2002**	**2002**	**1997 - 2002**	**2002**	
CZ	28.7	50.6	177.4	210.7	27.1	43.0	108.0
EE	30.2	15.6	105.6	35.4	2.6	1.3	27.8
HU	18.2	5.8	131.3	32.3	12.7	3.9	-3.1
CY	7.5	23.2	29.5	81.1	0.7	2.0	240.5
LV	14.8	13.3	62.6	60.2	2.2	1.8	-5.2
LT	29.9	32.1	54.9	107.0	3.2	3.3	4.4
MT	48.4	-41.7	173.9	-208.5	2.6	-1.7	-45.7
PL	17.7	11.4	83.0	61.5	41.5	19.0	23.9
SK	15.2	56.7	61.5	206.9	5.8	18.6	733.6
SL	5.5	36.9	101.0	n.m.	1.6	8.6	356.9
AC-10	19.4	23.7	98.2	118.9	1000	100	62.8

Source : IMF, National Central Banks, partly estimated.

These relatively high deficits reflect the high demand for foreign capital against the background of the transition process that these countries (with the exception of Cyprus and Malta) had to undergo. Foreign, mostly private, capital quite smoothly financed these deficits over the past decade (see Table 12 and Graph 5). The surplus in the financial account has in each year since 1995 been at least at the levels of the current account deficits.

Graph 4 : Current and financial account, AC-10 (% of GDP)

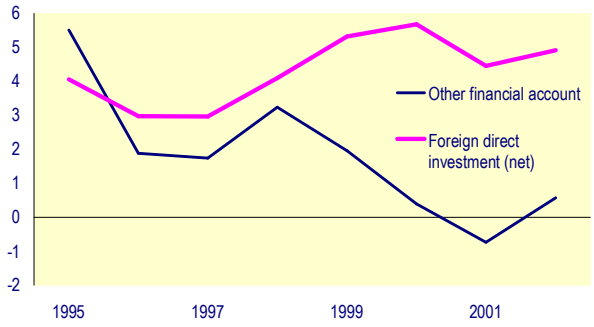


Source : Commission services.

4.2.3 The role of FDI

The composition of the financial flows has been significantly, and increasingly, directed towards foreign direct investment (FDI). Over the past several years, for the acceding countries as a whole, FDI inflows have amounted to around 5 per cent of GDP. This also meant that the current account deficits in the acceding countries could be increasingly financed exclusively by FDI. From 2000 to 2002, FDI inflows were in each year even larger than the respective current account deficits (see also Graph 5).

Graph 5 : Financial account, AC-10 (% of GDP)



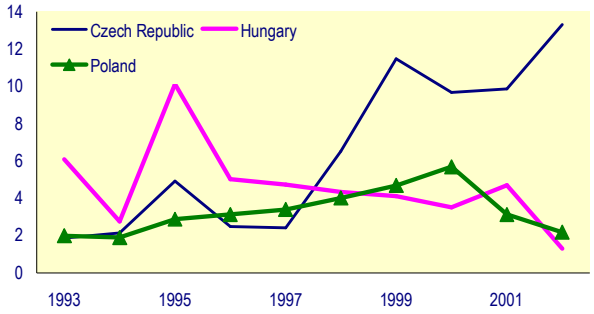
Source : Commission services.

This strong development of FDI was mostly due to the respective trends in the Czech Republic, which attracted extremely high volumes of FDI over the past years, amounting to nearly twice the current account deficits for the 1997 to 2002 period. But also in Hungary and Malta FDI more than covered the current account deficits. On the other end, Latvia and Lithuania (with somewhat more than 60 per cent) and particularly Cyprus (less than 40 per cent) witnessed a relatively smaller contribution of FDI to the financing of the current account deficits (see also Table 12). With the exception of Hungary and Malta, all acceding countries saw a rise of the value of FDI (in EUR) in the last 3-year period compared to the previous one. This rise has been quite spectacular for the Czech Republic, Cyprus, the Slovak Republic and Slovenia.

This dominant role of FDI contrasts to the average structure of the financial account elsewhere in Europe.

For example, the euro area recorded in the years 2001 and 2002 on average only 33 per cent of its total financial inflows (liabilities) in the form of direct investment in the euro area. It is the result of a series of factors conducive to FDI and restraining other forms of financial flows: FDI has been clearly driven by the large-scale privatisation of state-owned enterprises in former socialist countries. Even if exact numbers for the aggregate of the ten countries do not exist, it is clear that the lions share of FDI was due to the takeover of such companies by foreign investors. Other forms of FDI ("greenfield" or "brownfield" investments) have consequently played a much smaller role in initiating foreign direct investment. Graph 6 shows the respective annual values of FDI as a percentage of GDP in the three largest economies, hosting nearly 82 per cent (in EUR terms) of all FDI to all acceding countries over the last decade.

Graph 6 : FDI inflows (in % of GDP)

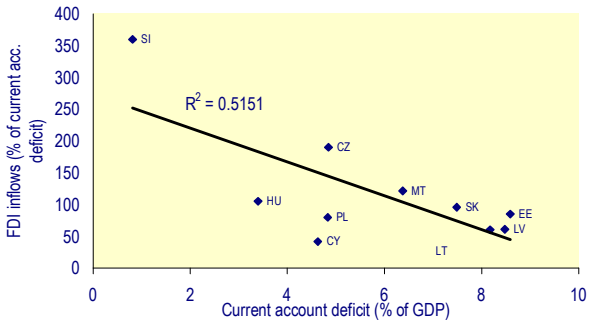


Source : Commission services.

Hungary had very strong inflows in the first half of the decade, but since then FDI inflows are on a declining trend. In the Czech Republic the picture is reversed, with exceptionally high FDI inflows in the past 5 years. Finally, for Poland the trend was steadier, and more subdued, than in the other two mentioned countries. The respective differences in the Graphs reflect the volumes and patterns of the respective privatisation programmes.

FDI has, on average, played a larger relative role in foreign financing, the smaller the volume of foreign financing has been. Graph 7 shows the relationship between the size of the current account deficit in terms of GDP and the percentage of FDI in the current account deficit over the 1997 to 2002 period. There is a fairly robust negative correlation between these (R^2=0.51). However, without the exceptional case of Slovenia (depicted by the top-left entry), the relationship, though still inverse, becomes much weaker and statistically close to insignificant. Yet the absence of any indication of a positive relationship does not support the hypothesis of FDI as itself largely current-account-deficit creating, rather than just financing that deficit.

Graph 7 : Current account and FDI, AC-10 (1997-2002)



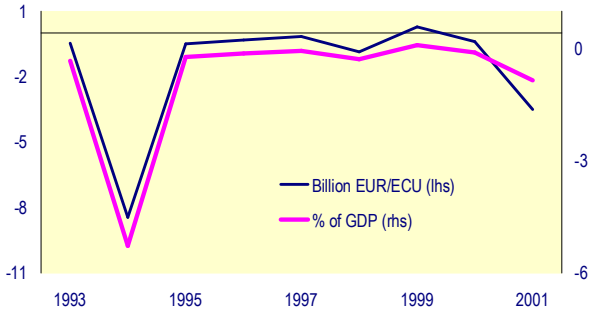
Source : Commission services.

4.2.4 Other forms of capital movements

Other kinds of capital movements have played a small and relatively decreasing role in the foreign financing of these economies. In the Czech Republic these other forms even amounted to a net outflow of capital between 1997 - 2002, against the background of strong inflows in the years before and increasing FDI inflows over the past years. The exceptionally high volume of non-FDI capital flows in 1995 was mostly due to very strong inflows of bank deposits in the Czech Republic.

This relatively small volume of other forms of capital flow reflects overall not only the fairly small size of the banking sector and of capital markets in most acceding countries, with Cyprus and Malta being notable exceptions, but also remaining legal restrictions on such transactions – as well as the increasing convergence of interest rates and share prices to levels and cycles in industrialised countries: this has entailed correspondingly less potential for hedging or speculating through portfolio diversification. Also the government sector has practically given up any role in channelling foreign capital in the economies of the AC-10. Over the past years government net asset changes have been insignificant and mostly slightly negative, meaning a small outflow of capital by the government sector (see Graph 8).

Graph 8 : AC-10 : Financial account - general government net assets

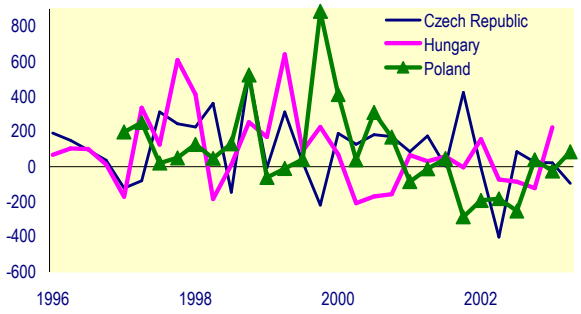


Source : Commission services.

Here, too, is a reflection in the capital flow pattern of shared policy priorities across these countries: government influenced the composition of flows not so much through the sequencing of liberalisation as through the impact of its own withdrawal from markets – both as an owner of enterprises and as a potential intermediary of capital flows.

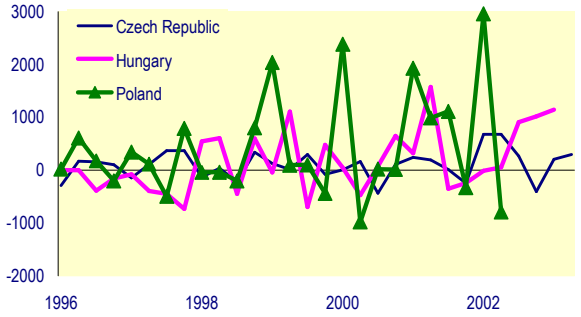
The limited size of capital market financing in these countries has not yet allowed a sizeable flow of portfolio investment into the AC-10. Graphs 9 and 10 show the development of capital inflows into the large three countries among the AC-10 (Czech Republic, Hungary, Poland) in the form of equity and debt securities. Over the period 1998 to 2002 those 3 countries accounted for 86 per cent (equity) and 70 per cent (debt) of all AC-10 inflows. Overall there is no clear obvious trend for these three countries, neither as regards the volumes of such transactions over time nor as regards the correlation among the countries. However, portfolio flows to Estonia and Lithuania were, although small in absolute terms, quite sizeable in relative terms – and far higher then the average for the AC-10 in total. As mentioned above, compared to the size of the total financial account, the amounts were fairly small, and, at least in relative terms – even decreasing over time.

Graph 9 : Equitity securities (inflow/liabilities; Mio EUR/ECU)



Source : Commission services.

Graph 10 : Debt securities (inflow/liabilities; Mio EUR/ECU)



Source : Commission services.

Country cross-correlations, based on quarterly values are fairly low (see Table 13). It is mostly slightly positive, with the exception of equity securities for the Czech Republic and Hungary with a small negative correlation. They are slightly larger, on average, for debt securities than for equity securities, at first sight somewhat surprising given the very different interest rate patterns in the three countries in the relevant period. Hence, at least on a quarterly basis, portfolio flows seem to having been mostly shaped by country-specific factors, rather than global assessments affecting the whole region.

Table 13 : Portfolio investment (inflows/debit, quarterly values) Cross-country correlation

	Equity securities			Debt securities		
	CZ	**HU**	**PL**	**CZ**	**HU**	**PL**
CZ	1			1		
HU	0.25	1		-0.14	1	
PL	0.00	0.16	1	0.34	0.21	1

Source : IMF, National Central Banks, partly estimated, own calculations.

4.2.5 Volatility of flows

Despite, in terms of global financial markets, the small sizes of financing requirements of acceding countries and the ongoing process of transition and stabilisation in most of these, financial flows into these countries have shown only moderate levels of variation over time. Looking at annual numbers, thereby smoothing out some normal intra-year variation, the variation coefficients for broad categories of the financial account among countries are not particularly high (see Table 14).

As expected, they are higher for portfolio investment and particularly other investment (including the typically quite volatile cross-border bank assets and liabilities) than for FDI, and for capital outflows than for inflows. Across countries, the pattern is less clear: neither the variation of the current account deficit nor the size of the economy plays a systematic role in explaining the variation in the financial account. On the other hand, the size of the current account deficit seems to systematically add to instability over time in financial flows, as here the respective correlations are relatively high.

Table 14 : Financial account : variation* over time (1995-2002)

	Current account	Financial account	Direct investment		Portfolio investment		Other investment	
			Abroad	**In country**	**Assets**	**Liabilities**	**Assets**	**Liabilities**
CZ	0.50	0.73	0.81	0.70	1.30	0.34	2.68	1.60
EE	0.55	0.44	0.90	0.52	1.37	0.95	0.92	0.70
HU	0.36	1.08	0.68	0.37	0.99	1.23	1.09	2.49
CY	0.42	0.74	0.79	0.95	0.84	0.86	7.95	1.44
LV	0.57	0.39	3.89	0.36	1.16	N/A	0.97	0.52
LT	0.32	0.34	1.25	0.63	1.87	1.00	1.93	0.57
MT	0.50	0.59	1.00	1.45	0.85	17.81	2.17	1.30
PL	0.66	0.54	1.73	0.42	4.74	0.81	4.15	2.62
SK	0.60	0.67	47.08	1.20	8.14	1.01	391.96	2.44
SL	3.14	0.62	1.16	1.45	1.13	0.78	1.27	0.52
AC-10	0.39	0.25	0.63	0.41	1.00	N/A	1.01	0.60

[c] Annual standard devation/absolute value of mean.
Source : IMF, National Central Banks, partly estimated, own calculations.

However, there have been several periods over the past several years, during which (net) financial flows to certain countries have been fairly abruptly compressed, such as in the Czech Republic in Summer/Autumn 1997, Estonia in early 1999 or Lithuania in Autumn 2000. The reasons and consequences of these episodes varied from country to country, partly caused by changes of investors' expectations in the light of domestic overheating or by the impact of the economic crises in Russia.

Episodes that were more shaped by international contagion, rather than domestic imbalances, were rather short-lived. The mentioned cases of Estonia or Lithuania might fall into this category, whereas the case of the Czech Republic had more the character of a domestic stabilisation and adjustment crisis, to which international capital flows reacted. The economic fallout of the crisis was rather sizable and extended for the Czech economy. Yet in all instances, it was mostly international bank transactions (changes of assets and liabilities of domestic banks) that were the channel of these rapid changes in foreign financing, whereas other forms of capital flows held up fairly well.

4.2.6 The past as guide to the future?

In sum, a hallmark of policy performance in the acceding countries has been their scale of access to international capital flows, and the effectiveness with which these have been channelled, typically, to productive investment. These inward flows have played a key role in accelerating their economic transformation – including notably the transition of the former socialist economies from varying degrees of central planning to readiness for EU Member States in little more than a decade.

How far will the future repeat the past – both in the pattern and composition of capital inflows, and in influence of market factors on the challenges that policy-makers face? Clearly, the pattern and composition of flows across countries will continue to reflect major specific factors in these economies – including notably EU accession and their specific stage of economic transition. And here there are several respects in which the timing of EU entry may coincide with a watershed in the form of financial flows and their influence on the policy environment.

One consideration, in the former socialist economies, is that the process of privatising former state-owned enterprises has already come very close to an end in many countries and is relatively advanced in the others. Hence, the sell-off to foreigners, which constituted a main driving force for FDI, will decline. On the other hand, the balance of payments will increasingly reflect the rising stock and rising profitability of foreign investment: investment income payments have strongly risen between acceding countries and the rest of the world, mostly in the form of acceding countries' debits, reflecting their position as net capital importers (see Table 15).

In 2002 for the average of acceding countries net income payments amounted to 1.9 per cent of GDP, compared to an average of 1.5 per cent for the period of 1997 to 2001. However, the average masks considerable country differences; in 2002 net income payments were more than 5 per cent of GDP for the Czech Republic and Estonia, whereas all other countries saw much smaller numbers, and Cyprus even net income inflows. The very high credit and debit figures for Malta are due to the unique role of a large foreign-owned manufacturing company on the island.

Table 15 : Balance of payments : income (% of GDP)

	Credit		Debit		
	1997-01	**2002**	**1997-01**	**2002**	**1995 = 100**
CZ	3.3	3.1	-5.6	-8.5	458.5
EE	2.6	3.1	-5.7	-8.2	871.0
HU	2.2	1.8	-5.6	-4.2	107.7
CY	5.1	5.0	-5.4	-4.5	124.6
LV	3.1	3.4	-2.7	-3.6	586.1
LT	1.3	1.2	-3.3	-2.7	589.2
MT	21.4	21.7	-22.2	-21.9	344.2
PL	1.3	1.1	-2.0	-1.9	117.8
SK	1.5	1.4	-2.8	-3.4	303.5
SL	2.2	2.2	-2.0	-2.5	273.7
AC-10	2.2	2.0	-3.5	-3.9	197.4

Source : IMF, National Central Banks, partly estimated.

A further consideration is that the rapid development underway in financial sectors in these countries, both in size and in standards of prudential supervision, has set the stage for higher debt-creating capital inflows. And, of course, the path towards EU membership, ERM II participation and the prospects of euro adoption might also trigger further adjustments in portfolios by international investors, driven by changing risk assessments and changing financial markets' prices. One aspect of EU membership, moreover, is that these countries will be increasingly net recipients of EU transfers. The size and structure of the current account balance, as well as its financing, might be affected thereby.

The past is prelude. The pattern and composition of flows discussed above serves in part only as a guide to the future; and many changes that have been taking place over the last few years will help shape a changed financial environment in the early years of EU membership. To the extent that changes in the macroeconomic and financial market environment show regularities across the countries, this new setting may present both opportunities and challenges to policy-makers that differ systematically from the past – the subject discussed in the next section.

4.3 Capital flows and policy challenges in a convergence setting

4.3.1 Capital inflows and the market setting

Capital inflows in the new Member States are set to remain strong – with EU membership offering a setting for continuing rapid integration through both trade and capital flows. But continuity and change are likely to go hand in hand. The composition of flows, and the domestic market setting in which they are absorbed, will evolve in ways that are important for the policy frameworks – particularly in the case of the former socialist economies:

- With a continuing decline in risk premia, growing access to credit, and rising permanent income expectations, a strong growth of domestic bank credit to the private sector is emerging across the Baltics and central Europe – albeit in many cases from a low base.
- At the same time, the domestic nonbank financial sector in all countries will likely continue to expand. From case to case the growth may be in leasing units, or insurance companies, or again in private pension funds. Capital market structures, clearly, are set to evolve further.
- As the domestic financial structure continues to evolve – and indeed with fiscal deficits remaining in some cases sizable – the composition of investment inflows may well change: over time, holdings of liquid claims are likely to grow in relative terms; and again it is in the former transition economies that the scope for change is the greatest, given a current setting of heavily bank-dominated systems.
- The composition of net external financing may shift also for reasons of industrial structure: as major privatization offerings taper down across the region, companies based in these economies may increasingly make direct investments in third countries, as they continue to move up the technology and value added chains.

Such market changes offer important opportunities. Foremost among these is the scope to progressively strengthen domestic corporate governance structures. This is a challenge in all countries, and certainly in the former transition economies – where it remains important to avoid any tendency toward Berglöf's and Pajuste's (2002) cycle of "Emerging owners, eclipsing markets" – that is, a set of governance incentives dominated excessively by the interests of foreign majority shareholders. While internal company management in these economies advanced dramatically over the past decade, there is obviously still progress to make as regards outward-looking governance: corporate governance in the sense that – with notable lapses – has been developing in advanced capital markets. This depends on steady progress in areas such as accounting and auditing, and the treatment of minority shareholders. In some cases, the rule-book is impressive, and effective implementation is the issue rather than policy design. In a word, domestic corporate governance structures need to become firmly embedded.

Domestic capital market development also has the potential to channel foreign inflows more broadly to enterprises offering high risk-adjusted returns. Thus far, for most of the acceding countries, a predominant solution for private sector borrowers has been to tap

market financing through parent companies. To some degree this contributes to a two-tier market; and SME borrowers, or nationally-owned companies (especially in less advanced regions) have found it more difficult to benefit from foreign investment. As a corollary, such investment has been concentrated in certain sectors and in government debt where there is a significant traded market – as in Hungary or Poland. There are mutual benefits to investors and domestic firms – and also the potential benefit that this process of broadening may reduce the risks of localized overheating or of bubbles in currently favoured real estate markets.

An important complexity in design for all of the acceding countries is to take into account those aspects of capital market development where it makes sense to think regionally (or, indeed, globally), rather than perfecting compartmentalized local markets. In this regard, issues such as transparency and accounting emerge as crucial.

The increasing integration and depth of traded money and capital markets can bring, potentially, other benefits. It should strengthen channels for monetary policy transmission, and help ensure that policy restraint does not impact unduly particular sectors of the economy. As investment flows help open up a wider institutional range in financial systems – injecting, as needed, the specialist skills this entails – greater institutional diversity should enhance systemic stability.

4.3.2 Financial convergence and the challenges for policy

Market changes along these lines will thus bring important benefits: as further steps along the road of financial convergence, they should help foster sustained and more broadly-based growth in the real sector. But, as foreign inflows continue, and the domestic financial setting continues to develop rapidly, the emergence of a more diversified – and more liquid – market setting will also entail evolving policy challenges. There are, clearly, uncertainties about the pace with which domestic credit will expand, as well as the pattern of capital inflows. If the past is a guide, in this region and elsewhere, then policy mix tensions may at times lead to unwarranted real appreciation – while some experience of market imperfections (overshooting, bubbles) cannot be excluded.

Experience among emerging market economies underscores that these uncertainties and risks deserve priority attention among policy-makers. Some are purely in the hands of the international capital market - with its potentially great benefits but well-known imperfections. But others are very much in the lap of policy-makers – and the challenge of mastering fiscal tensions and honing a balanced policy mix is perhaps foremost among these. Here, the lessons of financial history make all too clear that the stakes are high: an unfortunate constellation of market factors and policy drift has the potential to set back real convergence very seriously. The notorious "lost decades" experienced in other regions speak to this concern. With the anchor of EU entry, and the proven skills of policy-makers, the acceding countries have every opportunity to prove exceptional in this respect – as indeed the majority of these countries did as they navigated the uncharted waters of transition.

In this setting, four policy priorities deserve attention in all of the acceding countries, to ensure that capital inflows continue to contribute to strong and sustainable growth:

- standards of corporate transparency and disclosure – and governance issues such as the treatment of minority shareholders – can help ensure that capital is tapped for new ventures, including by small- and medium-sized enterprises, and promote the tapping of European and global markets;
- in the real economy, renewed attention is needed to the flexible working of markets - especially the labour market. Throughout the new Member States, wage-setting mechanisms deserve careful attention – and also crucial is the nexus of insolvency procedures, collateral enforcement, and effectiveness of the judicial systems. These elements are key to ensure an attractive setting for domestic as well as external financiers – but also for assuring real sector flexibility;
- prudential supervision – including over nonbanks and conglomerates – needs to ensure strengthening standards of risk assessment – so that an overly rapid decline in risk premia or broader market exuberance do not lead to undue concentrations of risk in a few sectors, or to asset prices bubbles. With a major cross-border element in ownership and flows, this is a setting in which supervisory co-operation at the macroprudential level, as well as the microprudential, will be of paramount importance; and,
- last but far from least, fiscal and monetary policies have to assist preserving macroeconomic balance at a time when domestic and cross-border credit to the private sector may be expanding rapidly; by improving the targeting of public expenditure so resources are freed up for restructuring and infrastructure development; and by assuring a transparent monetary framework, with policy directed toward relatively low and stable inflation.

A central challenge, in other words, is to craft policy frameworks that are firm enough to foster stability, yet prove resilient at times of stress – thus ensuring that shocks do not wreak lasting damage in the real economy. Across the region, a second generation of financial market and insolvency reforms is indeed getting underway, along with the implementation of the acquis communautaire and international standards and codes. It is important to note that the choice of macroeconomic policy regimes, and the timing of

regime transitions, offers important degrees of freedom here.

5. Are international capital flows driven by corporate governance?

The following makes the point that good corporate governance and transparent financial reporting can be a significant force behind international capital flows. This should not deny the importance of macroeconomic policies, exchange rate considerations or other factors, such as the freedom of cross-border movement for capital, a basic regulatory and technological framework - the enforceability of international contracts and a technical ability of offering or withdrawing capital to or from another country. However good corporate governance can enhance economic growth and reduce investor's risk concerns, and can therefore be paramount in determining international capital flow choices.[228]

5.1 Corporate governance and growth

There are a host of findings underlying the role of corporate governance for economic growth. A lack of shareholder influence on corporate strategies renders company management less efficient.[229] Solid shareholder rights have been found to be the cause of superior investment performance (Gugler et al. 2001). Good corporate governance facilitates corporate restructuring, as corporations turn more quickly to new areas of growth or declare bankruptcy, when management is unable to invest resources profitably.[230] As economic growth may be destabilising for economically dominant interest groups, good corporate governance in a broad sense is needed to prevent incumbent managers from lobbying governmental authorities for protection and economic change inhibiting policies.[231]

Corporate governance and growth should go hand in hand as trusting investors might be more willing to confer their money to corporations where managers' strategies and actions are properly supervised or were companies have earned a reputation for shareholder control. Inadequate corporate governance structures generate a less responsive company management and delay necessary adaptations of outdated business models. After all, human nature resists change and corporate managers might prefer to maintain things as they are.

Corporate governance questions arise mainly from the separation of ownership and managerial control, which is a central feature of modern capitalism. As a general rule, high-quality corporate governance structures align the interests of the manager and the owners appropriately. In theory, investors and management could enter a contract specifying how company funds are managed and how profits are divided in every contingency. In an ideal world, this contract would be complete, i.e. stipulating exactly what management has to do in all circumstances and exactly how much of total profits are to be received by whom. In reality, uncertainty about the future means that contracts between investors and management cannot be complete.

Thus both managers and the investors must agree on residual control rights, i.e. the right to make decisions in circumstances not fully foreseen by the contract. The ex ante incentives for managers to maximise investment returns depend crucially on the process through which profits are expected to be divided ex post. These incentives induce management to add or demolish value, as rational agents cannot be expected to allocate resources optimally if they are not properly rewarded by the company's governance system.

5.2 Corporate governance and investor risk

Many examples document the linkage between corporate governance and investor risk assessments. While economic fundamentals lead to the Asian crisis of 1997-98, weakness of legal institutions and lack of corporate governance exaggerated its severity in several emerging markets (Johnson et al. 1999). One lesson is therefore to strengthen corporate governance by institutional arrangements (Eichengreen 1998).[232] The feeble small investor protection in many countries outside the USA - making investors vulnerable to fraud – can also be utilised to explain the home bias of US investors (Dahlquist et al. 2002). There is also evidence of higher company valuation in countries with better minority shareholder protection (La Porta et al. 1999).

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[228] "Investor" is used here interchangeable with the terms "owner" and "shareholder".

[229] For example Emmons and Schmid (2001) find a connection between underinvestment, company overstaffing and the worker co-determination model in Germany.

[230] See for example the Japanese experience as described by Peek and Rosengren (2003).

[231] See for example He et al. (2003).

[232] However, Singh et al. (2002) reject that view by stating in the abstract of their paper: "The thesis that the deeper causes of the Asian crisis were the flawed systems of corporate governance and a poor competitive environment in the affected countries is not supported by evidence."

Box 1: Getting Corporate Governance Right[1]

The following provides a concise overview on basic principles to be considered when implementing sound principles for corporate governance. They include both incentives for managers to maximise shareholder value and mechanisms for protections of (small) shareholders.

Performance-related compensation schemes should be carefully designed and implemented, as some variants (e.g. short-term stock options) can lead to abuse. Ideally, incentive schemes should have a long-term focus and should not only aim at "objective" criteria – like the company share price - which could be open to manipulation. A further reason for caution in the use of these schemes is that their asymmetric nature - with good performance rewarded but no penalties for failure – can encourage excessive risk taking.

A competitive market for managerial skills helps to assess and value potential individual managers more efficiently. However, the effectiveness of such a market is limited by the fact that new managers are most often recruited by existing managers within the company.

Management's fiduciary duties to shareholders, which include "reasonable" care, diligence and loyalty, should be clearly defined, together with liability regimes opening the possibility of seeking compensation for past actions that have harmed investors' interests.

Internal control procedures are integral to effective corporate governance practices and set the "tone at the top". Proposals in this area include (i) making senior management more responsible for establishing and maintaining an effective internal control system with appropriate oversight by corporate monitoring bodies; (ii) adopting codes of conduct, which provide information and guidance to those within a company about the company's standards of ethical behaviour; (iii) establishing or improving processes to monitor compliance with policies and procedures that are implemented to prevent and/or detect illegal acts; and (iv) improving the environment for so-called "whistle blowers".

Measures to facilitate voting by shareholders should encourage more active oversight of a company. Non-controlling (and especially small) shareholders experience what has been termed "rational apathy", because their voice is too small to influence the decision-makers in a company. Larger shareholders have a greater incentive to scrutinise management and stand more chance of success in efforts to remove the managers. Accordingly, these mainly institutional shareholders could be encouraged to vote in shareholder meetings, to raise issues of concern to shareholders in general, and even to solicit votes against management proposals. The voting process could also be facilitated by exploiting new technologies, like the Internet, to disseminate information and invitations to general meetings.

Diffuse ownership of shares magnifies the principal-agent problem by limiting the scope for collective action among shareholders. A possible solution would be to facilitate concentration of voting rights such as in hostile takeovers (HT). In a typical HT the bidder acquires control of the target firm and is then in a position to replace the management. However, HT are difficult and expensive (often made so by regulatory actions) so that only major management performance failures are likely to be addressed. A major risk associated with large shareholders is that they are likely to represent mainly their own interests, which need not coincide with the interests of other investors or the firm. Therefore, another proposal to enhance shareholder control has been to assign a special investigative right for minority shareholders, which can be an important deterrent against wrong-doing.

A company board has fiduciary duties towards shareholders and the company, and should consist both of inside and outside directors, elected by shareholders. Proposals have been made to strengthen the role of independent directors, by ensuring that they (a) comprise a majority on a company's board; (b) have accounting or financial management experience; (c) qualify as "independent" only in stringent circumstances, excluding any potential candidate who has a "material relationship" with the company; (d) have not been an employee of the company; and (e) should not be an employee or affiliate of a present or former auditor of the company.

The proper balance between management incentives as well as control procedures combined with measures facilitating shareholder voting and special rights for minority shareholders might help to transform corporate governance into a tool for furthering shareholder interests and creating thereby value added for the society.

[1] This section is inspired by Zingales (1997), Shleifer and Vishny (1996) and Becht et al. (2002).

The prevention of fraud within a company depends on the nature of the relationship between the investor and the management. A corporate governance environment in which managers enjoy a significant information advantage can give rise to discretion, which might then be used for expropriating the investor. This can be achieved in a crude way, e.g. by management setting up independent vehicles and selling output (or even the assets!) of the company to that vehicle at below market prices, or through a more subtle form, e.g. through excessive remuneration and/or perks for the management.

However, fraud is not the preserve of management. Large shareholders can also conspire with the management to defraud smaller shareholders or alternatively current shareholders may seek to take advantage of prospective shareholders by agreeing to publish misleading information on the company, in order to be able to sell their stakes for a high price (see Box 1 for some basic principles).

5.3 Financial reporting and capital flows

International funds prefer to hold more assets in transparent markets than in obscure environments and openness makes herding among investors less likely.[233] Transparent financial reporting is therefore another pillar in attracting and retaining foreign capital.

Financial reporting is typically regarded as a tedious exercise, except by those professionals responsible for producing company accounts. However, a financial reporting system, which does not properly reflect the use of resources, results in sub-optimal allocation and creates (or aggravates) principal-agent problems in financial markets. An additional consequence of inadequate financial reporting is that company performance is vulnerable to sudden reassessment if and when the (hidden) information subsequently emerges, with implications for shareholders, creditors, employees, and even retirees whose pension funds may be dependent on company performance.

Good financial reporting closes the gap between information available only to insiders or good connected locals and the unsuspecting outside investor. Intransparent financial reporting fosters corruption, which in turn might affect the composition of a country's capital inflows by diminishing its share of foreign direct investment (FDI), making a country more vulnerable to a currency crisis (Wei 2000).[234]

The importance of financial reporting has increased in the context of a modern financial system.[235] The process of liberalisation and deregulation since the 1980s has led to a general relaxation of controls on financial-sector activities and fostered the creation and application of many new financial techniques and products. These have, in turn, facilitated an ongoing trend of disintermediation, whereby market-based finance is growing at the expense of relationship banking. As disintermediation increases the risk of information asymmetries in financial markets, adequate public disclosure becomes more significant. Indeed, sentiment in modern financial markets is increasingly driven by published earning figures and forecasts, forming the basis of investor's perceptions of value and risk. In this context it is worth noting that globalisation has increased the demand for internationally comparable levels and contents of information disclosure.

5.4 Enforcement

However, a good "law on the books" is not enough. Enforcement of corporate governance rules and disclosure requirements is another important aspect and many economies suffer from a weak legal follow up on exposed infringements.[236]

It has been argued that market discipline and reputational concerns provide sufficient incentive for companies to disclose all relevant information in a timely manner. However, recent corporate scandals have cast doubt on this argument. A more favoured approach at the current juncture is to use the threat of heavy legal sanctions or personal honour guarantees to discourage any financial wrongdoing by company managers.

Two flaws can be found in this approach. The first is the difficulty for outsiders to verify whether the disclosed information is or is not correct. The second flaw relates to disclosed information's interpretation, as the same financial fact can be reported in various ways and what is viewed as "aggressive reporting" by one regulator may be viewed as "fraudulent" or "reckless" by another. This is not to suggest that this approach cannot be a part of a solution. In the USA, the Sarbanes-Oxley Act requires managers to certify all financial results and threatens heavy punishments for fraudulent misrepresentation of company accounts. More generally, however, it is essential to maintain an appropriate balance between any threatened sanctions for wrongdoing and the capacity for risk-taking by management.

5.5 EU initiatives

The recent corporate scandal involving European based food retailer Ahold has proven that the EU is not immune to corporate malfeasance. However, the EU did not await these developments to start working on a series of related issues as seen in the following selective overview. Already in the Financial Service Action Plan

[233] See Gelos and Wei (2002).

[234] An assessment of the different forms of capital flows and their vulnerability to sudden withdrawal is given by Williamson (2000).

[235] See Crockett (2002).

[236] See on this point for example Berglöf and Pajuste (2002).

(FSAP), measures were proposed which reinforce safeguards for financial stability and market integrity, like with the Market Abuse Directive, which covers both insider dealing and market manipulation.

Central to fair financial reporting are high quality accounting standards. The EU has addressed this need with the adoption of the International Accountancy Standards (IAS) Regulation in June 2002. This requires EU listed companies to publish consolidated accounts in 2005 based on the IAS. The Commission is currently preparing to endorse most of the IAS standards. In a related development the IAS Board and the equivalent US accounting standards board, the FASB, have agreed to work together with the goal toward convergence of their respective accounting standards.

In addition, the EU has shifted its focus towards additional reform of corporate governance by publishing two communications in the spring of 2003: The communication on corporate governance included an action plan, proposing among other issues:

- to strengthen shareholder rights (i) by enabling an easier access to company information, (ii) by encouraging shareholder control - through facilitating voting in absentia and cross-border voting,
- to put a special emphasis on independent non-executive directors by strengthening their responsibilities in the areas of directors remuneration and audit committees,
- to make the company board collective responsible for the contents of financial statements and key non-financial statements.

Another Commission communication has been issued on statutory audits dealing with public oversight issues and possibly opening a discussion on the question of an EU co-ordination on auditor oversight. Another aim of the communication is to address auditor independence and quality assurance.

5.6 Outlook

Good corporate governance, transparent financial reporting and enforcement of the relevant laws influence economic growth rates, investor risk assessments and attract international capital flows. The EU has initiated significant projects in that regard. However, important as it may be today, the significance of corporate governance might increase even further in coming years as declining population growth rates in maturing economies might force those countries to look beyond their immediate neighbourhood for investment opportunities.

Capital flows into distant emerging markets amplify the significance of corporate governance and financial reporting for ageing countries' investment decisions. Therefore, apart from broader stability concerns, good corporate governance might well become a strategic foreign policy goal for western policy makers in the decades to come. In return, those emerging economies creating investor confidence, may acquire through the accompanied capital inflow a crucial element for their economic growth, enabling them not only to catch up with mature economies in terms of economic wealth, but to overtake many of them.

Box 2 : The Location of Corporate Headquarters: Drivers, Facts and Consequences

Countries and regions do not only compete for foreign direct investment, but also for corporate headquarters (HQs) themselves. The following discusses significant drivers for corporate HQ site choices, presents an empirical picture of recent global HQ location trends, and looks at the consequences of the establishment of corporate HQs for a region. The location of corporate headquarters, representing a firm's strategic centre and most important decision unit, benefits the chosen region in a number of ways, for example a sufficient number of HQs in one place can function like a magnet in attracting HQs from other corporations as well.

Factors driving HQs' location choices

Basic features driving corporate HQ's choices comprise geographical, technical, cultural and tax considerations as well as historical "pure chance" factors, which - once having resulted in the establishment of a regional cluster for corporate HQs – can reach a significance of their own.

As the top management team cannot stay aloof from the outside world, geographical considerations like the remoteness to main company markets as well as air and land transportation links via airports play a fundamental role in a corporation's choice for its HQ. Technical issues in the form of reliable telecommunication and other infrastructure have their relevance as well. Availability of artistic performances, entertainment facilities and adequate schooling for the children of the HQs' (often) international staff might be another relevant consideration. The legal environment and taxation issues are other factors as HQs in low tax areas might reduce the firms' overall tax load. Company executives may consider the individual tax rate applicable to them personally as an additional factor and corporate governance related deficiencies could turn it into a crucial one.

Another major explanatory aspect is derived from elements of the "new economic geography"[1]. The theory implies that positive externalities associated with clustering can establish a virtuous path of self-sustained growth, such as the case in an agglomeration of corporate HQs. Thus, once a location acquires a critical mass of company HQs, centripetal forces attract additional HQs from other locations, allowing the cluster to establish an increasingly dominant position. Therefore, historical or "pure chance" factors can be a significant element in the development of regional clusters of corporate HQs. Such path dependent development can

persist for long periods of time, even if the initial causes (e.g. openness, language, and education) cease to be explanatory factors. Although centrifugal forces (e.g. congestion, labour costs and technology) can send clusters into decline over time, only deep crises, such as political turbulence or civil wars, are clear-cut factors of rapid decay.

An empirical picture of HQ locations

A recent UNCTAD study gives an indication of the self-enforcing attractiveness of a location for corporate HQs[2]. From January 2002 to March 2003 the UK attracted more newly established or re-located HQs (181) than the whole of the USA (126). This UK strength might also be a reflection of its dominant position as an international financial centre (the city of London), which supplies a great number of trained, ambitious individuals as well as a high quality infrastructure environment. Propelled by this factor, the EU recorded more than 40 per cent of all newly established or relocated HQs world-wide, while the euro area, not including the UK, saw more HQ establishments or re-locations than either the USA alone or all developing countries combined.

Other, more specific examples of this self-sustained economic geography effect might be seen in the concentration of HQs in Singapore and the Netherlands, which both have been able – despite their small domestic economies – to attract more or just fewer corporate HQs in the reporting period than the much larger Germany. The following table gives an overview:

Table : Corporate Headquarters : recent trends

Recipient economy/region	**Number of established or relocated HQs between January 2002 and March 2003**
World	829
Developed countries	624
Developing countries	191
EU	364
UK	181
Euro area	153
USA	126
Australia	54
Singapore	46
Hong Kong, China	44
Germany	37
Netherlands	34
China	29

Source : UNCTAD, own calculations for EU and euro area, own ordering.

HQs' consequences for a region[3]

Advantageous HQ location effects for a region emanate from different sources, as (1) employees contribute to the local tax base by working directly in the company HQ and in attached support facilities, (2) HQs develop and attract human resources, and (3) HQ related purchases influence other interlinked service sectors.

(1) HQ staff consists of a top management team, representing the core of the strategic and operating core of a firm and employees co-ordinating activities in different areas. In addition corporate support functions might be established consisting of Research and Development (R&D) centres as well as production units. Consequently employment opportunities for executives and managers as well as for high quality researchers and engineers emerge in the chosen region.

(2) Human resource development can be cited as another positive externality for the region as HQs act like a management training institution and attract aspiring (young) people.

(3) A HQ might have extensive links to other - often knowledge intensive - service sectors of the local economy through its purchases of legal, financial and IT services, but also through the need for hotel and accommodation. Spillover effects are thereby created enabling local businesses to gain know-how. HQs are also often sponsors of activities in culture, sport and education.

However, the re-location of a HQ into a region can lead to price increases for housing, restaurants and other services sought-after by the HQ and its employees. While price increases on services provided by mobile factors (like waiters and taxi drivers) should induce an influx of related service providers, mostly eliminating that effect, (largely) fixed factors, like houses, land, restaurant sites and shopping locations, cannot easily be expanded and its owners might therefore very well benefit from price increases.

[1] See for example Fujita et al. (2000).

[2] See UNCTAD press release 21 July 2003 "World market for corporate HQs energing"; additional details have been provided by UNCTAD.

[3] This section draws from Braunerhjelm (2003).

6. Long term international capital flows: The role of demographics[237]

According to the latest Eurostat and UN demographic projections (Eurostat 2000, UN 2000), the coming decades will witness large differences, at the individual country level, in both the timing and extent of the well documented ageing phenomenon which is predicted to occur.[238] On the basis of a no-policy change assumption, these demographic trends have the potential to result in slower rates of GDP and investment growth, lower public and private savings and large shifts in the respective shares of world output held by developed and developing countries. With such fundamental changes in the relative positions of countries in terms of savings/investment balances, the world may witness both protracted swings in current account and net foreign asset positions over the coming decades as well as substantial changes in relative real interest rates and exchange rates during the adjustment process.

6.1 Demographics and capital flows

The growing imbalances in world-wide financial flows are an ongoing focus of concern for international organisations and policy makers. The IMF does not exclude the possibility that present external imbalances are the result of erroneous private sector decisions and financial excesses.[239] This view is supported by the doubling of the average US current account deficit as a share of GDP over the period 1998-2002 compared with the previous 4 year period, which suggests that cyclical elements are undoubtedly a significant part of the present story.

Fears regarding the overall sustainability of the world-wide pattern of imbalances is also partly based on the observation that they have largely occurred between regions with relatively similar economic structures and levels of economic development. This pattern also appears to be in contrast to the pattern of imbalances between Europe on the one hand and their overseas colonies in the late 19th century, when development finance was the primary driver behind net capital flows.

However, the contention of this section is that while the present pattern of current account balances undoubtedly reflect cyclical excesses associated with the "bubble" like conditions in the USA in the late 1990s, there are strong grounds for believing that more structural, long term, forces are at work as well. These existing imbalances will be slow to unwind over the coming decades. In fact, despite their similarity, Europe, Japan and the USA have undergone, and will continue to be faced with, quite different demographic, technological, labour market and fiscal trends. Therefore, it is still open as to what extent these 'sustained current account imbalances' reflect genuine external disequilibria or whether they should be regarded, at least partly, as a normal international adjustment to permanent, country-specific, shocks.

The central contention is that the strongly diverging demographic developments in Japan over recent decades allied to significant restrictions on capital flows to large parts of the developing world could have been major structural factors explaining the savings and investment divergences experienced world-wide over this period. If this view is supported by the empirical evidence this would have deep implications for the volume, geographical destination and rates of return earned on external capital flows over the coming decades as more economies start to age in a manner similar to that of Japan.

As predicted by standard life cycle models, the current account balance of countries which are ageing relatively faster compared to the world average are likely to be in surplus, since the savings rate in these countries falls less rapidly than the domestic investment requirements. Given the fact that divergent demographic trends tend also to be rather prolonged, one would therefore expect to see a build-up of foreign assets over extended periods of time.

Of course there are other possible factors explaining capital exports from Japan and more recently from Europe to the USA, such as, for example, sustained differences in labour force participation rates, with strong increases in the US participation rate compared with rather stable trends in Japan and Europe. However, other influences, especially the process of technological convergence (assuming that this process has not, as some commentators have suggested, come to an end in the second half of the 1990s) and divergent fiscal developments between Europe, Japan and the USA (at least in the case of Japan), point in the opposite direction.

The analysis in this section, on the basis of the net stocks of wealth / debt for the different areas, tries to evaluate the relative importance of different explanatory factors, especially the demographic determinants, and come to some conclusions regarding the likely evolution of net foreign assets over the coming decades.

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[237] The analysis in this section draws heavily on the "External Wealth of Nations" dataset created by Lane and Milesi-Ferretti (2001). This dataset covers the period 1970-98 and classifies the external assets and liabilities of 66 industrial and developing countries into three main categories, foreign direct investment (FDI), portfolio equity and debt instruments. The dataset relies mainly on stock data, supplemented by cumulative flows data and with the portfolio equity and FDI flows data introduced with appropriate valuation adjustments.

[238] European Commission (2002).

[239] IMF (2002).

6.2 Explaining the historical behaviour of net foreign assets (1970-98)

The changes experienced over recent decades in the net external wealth holdings of the five areas covered by ECFIN's Ageing Model (i.e. the EU, the USA, Japan and with the rest of the world split into fast- and slow-ageing groups of countries) are due to a large array of cyclical and structural factors, many of which are difficult to quantify, especially for the second half of the 1990s when the bubble conditions in the USA clearly played a large role. Despite this uncertainty, there is a large degree of acceptance in the literature that there are a number of key structural determinants of changes in external wealth positions, with these variables directly affecting savings and investment patterns in the respective countries and in turn relative current account movements

Future changes in external wealth/debt positions are largely determined by shifts in the relative position of countries with respect to output per capita, government debt and demographic changes. Common, as opposed to relative, movements of the latter variables should not however impact on net foreign asset positions and would instead be expected to be reflected in movements in global real interest rates. In addition, the assumptions one makes regarding the degree of global capital market integration and relative differences in the generosity of public pension systems are also felt to be important factors in explaining the long run pattern of international capital movements:[240]

- GDP per capita: Relative changes in GDP per capita are positively related with movements of the net foreign asset position of developed economies, with growing prosperity leading both to increases in the domestic savings rate and to foreign investment opportunities becoming relatively more attractive due to the potentially higher rates of return. In other words, domestic investment becomes progressively less profitable as capital productivity tends to decline as economies grow wealthier. The opposite effect is often found in developing economies, with increases in living standards typically, in the initial phases of development, leading to higher external borrowing due to an easing in the credit restrictions which a large proportion of these countries are faced with.
- Debt: In terms of relative changes in the debt levels of countries, in the absence of full Ricardian equivalence, both developed and developing countries tend to exhibit a negative relationship, in the sense that higher levels of debt are associated with lower levels of net foreign assets.
- Demographic variables: Demographic factors are also a significant determinant of changes in net foreign asset positions, with the nature of the relationship being similar for both developing and developed economies. For example, there is a positive relationship between expected changes in the old age dependency ratio and the level of accumulated net external assets, with workers saving more in anticipation of longer retirement durations and investing less domestically due to the lower demand for replacement investment in conditions where populations are growing more slowly or actually falling in size. With the prospect of shrinking labour forces leading to reductions in the productive capacity of economies over the coming decades, future retirees in those countries most affected will become increasingly dependent on the income stream from their accumulated foreign assets in order to supplement their domestic sources of income. On the other hand, changes in the youth dependency ratio are negatively related to changes in the net external asset position of countries, with high youth ratios tending to reduce domestic savings rates and often leading to increases in domestic investment in areas of an economy's social infrastructure such as education and housing.[241]

Historical developments in net foreign asset positions (in terms of both levels and geographical destination) also require an understanding of issues such as differences in the systems for financing pension income across countries and assumptions regarding the degree of global capital market integration:

- Differences in pension financing systems, especially in terms of the breakdown between PAYG (Pay-as-you-go) and funding and also with regard to the relative generosity of the public part of the system, are factors with a potentially strong impact on savings and investment patterns in the respective countries. It is widely accepted that the EU's public pension system is relatively generous compared with other areas of the world and that the share of EU retirement income coming from the build-up of private pension assets is substantially lower compared with the USA and to a lesser extent Japan

[240] See Taylor (1994), Higgins (1998), Herbertsson and Zoega (1999) and Lane and Milesi-Ferretti (2001).

[241] According to Lane and Milesi-Ferretti (2001), "The relation between net foreign assets and demographic structure also accords with the thrust of the theoretical literature: a decline in the net foreign assets occurs if there is an increase in the population shares of younger age cohorts, whereas the net foreign asset position responds positively to an increase in the share of workers nearing retirement, with a maximum effect for the 50-54 age group. It is also interesting to note that the over-65 age group exerts a negative effect, consistent with the running down of net foreign assets".

where more traditional forms of savings such as bank deposits appear to play a large role.[242]

- Turning to global capital market integration, a model assumption of full world-wide integration is unrealistic given the empirical evidence that the slow-ageing, mainly less developed, group of countries (with roughly ½ of the world's total population) have made very little progress in recent decades in increasing their degree of financial market openness. An assumption of limited world-wide capital mobility has the important implication that as age-related capital movements start to grow in the developed world in future decades, the choice of investment locations may be largely limited to other developed economies and the fast-ageing group of developing countries.

Individual countries and groups of countries have features, which bear heavily on the trends for net external capital movements. For example, while over the period as a whole there have been large changes in old age and youth dependency ratios in all world areas, in relative terms the most striking change has been in Japan's old age dependency ratio which more than doubled, compared with more modest developments elsewhere. Japan also stands out in terms of relative changes in public debt levels and negative changes in trend per capita growth rates. The EU differs in terms of the relative generosity of its public PAYG pension system and the associated small share of pension income, which is privately funded. The striking feature for the USA is its significant and expanding growth rate differential compared with other developed countries, with for example the EU's catching-up process over the 1960s and 1970s starting to falter in the early to mid 1980s, and with Japan starting to diverge in the 1990s.

Finally, the most noticeable features for the fast- and slow-ageing countries are the absence of any significant catching-up over the period as a whole, especially with the USA, and the highly erratic pattern of trend growth rates for the slow-ageing group. In addition, the limited integration of the slow-ageing countries into the world's financial system impacted not only on the countries themselves but also had the effect of limiting the volume, and the rate of return potential, of external capital flows from the rest of the world.

Disentangling the individual effects of the different factors on net external asset positions is problematic in a model based analysis, as relative changes in per capita income (and the implicit rate of return differentials which underpin such changes) are closely intertwined with the ageing phenomenon itself. However, it is possible with ECFIN's ageing model to roughly isolate the impact of the different factors on the savings / investment and current account positions of countries since the early 1970s.[243]

For example, in the case of the demographic changes, the model was used to assess what proportion of the current account changes could be attributed to demographic factors in the five geographical areas covered by the model (i.e. the EU, the USA, Japan, fast- and slow-ageing countries) over the last 30 years. This analysis was carried out by running the ageing model with the life expectancy and the birth rate changes, which actually occurred over the period. On the basis of these demographic changes and using low coefficients for the effect of dependency ratio changes on private savings, and a constant capital to output ratio to capture the investment effects, the model was able to roughly isolate the age related component of the current account positions of the respective areas. In fact it turns out that the demographic factors alone would have overpredicted the changes in net foreign asset positions around the world over this period. Given this result, other factors were obviously working to dampen the effect of population changes on capital movements.

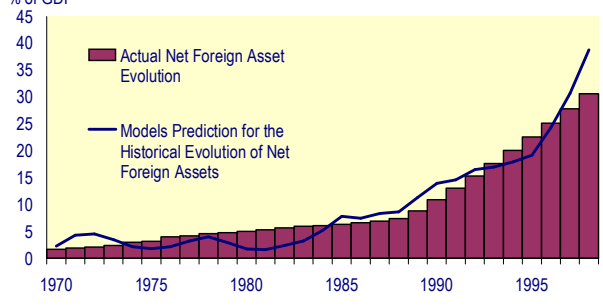
Consequently, in order to get a more accurate fit for the historical developments, the non-demographic determinants discussed earlier, namely GDP per capita, debt, pension system differences and restricted capital movements to developing economies had to be considered. When these variables were included in the simulations, the model was able to broadly replicate the changes in the net foreign asset positions of the five areas over the period 1970-1998, with Graph 11 for Japan showing the good tracking performance of model

[242] This EU average position does not, however, apply to a number of individual EU member states. The UK and the Netherlands, for example, have large, privately held, pension fund assets.

[243] It should be underlined that changes in demographic factors are not only important in terms of determining medium-to-long run balance of payments developments. They are also, via their effects on the net foreign asset positions of countries, an important long-run determinant of changes in real exchange rates. According to Lane and Milesi-Ferretti (2000), "international investment income flows associated with, non-zero, net foreign asset positions require some degree of real exchange rate adjustment in the long run", with the key question to be answered being "whether countries that receive net payments from abroad (because they are net external creditors) tend to have more appreciated real exchange rates and, conversely, whether countries that make net payments abroad (because they are net debtors) have more depreciated real exchange rates". On the basis of both cross-section and time series empirical evidence, Lane and Milesi-Ferretti conclude that there is a significant response of the real exchange rate to changes in the net external asset position of countries, with both variables predicted to move together over the long-run.

model.[244]

Graph 11 : Historical tracking ability of ECFIN's Ageing Model : Japan's Net Foreign Asset Position - 1970-2000



Source : Commission services.

It turns out (see Box 3) that of the five factors analysed, it was demographics, growth rate differentials and the assumption regarding capital mobility which were the crucial determinants in explaining the trend evolution of net foreign asset positions of the five areas and the associated current account imbalances.

Firstly, ageing and capital market liberalisation led to a sharp increase in the volume of world-wide capital flows over recent decades. Secondly, the nature of capital liberalisation (i.e. it was largely a developed world phenomenon) allied to growing growth rate differentials within the developed world in favour of the USA, explains the geographical concentration of those capital movements into the USA.

These two conclusions are illustrated clearly in the model simulations described in Box 3. For example, when the simulations were carried out under an assumption of full global capital mobility, and taking into account all the other relative differences in terms of growth, debt, pension systems and demographics between the respective areas, the result was a prediction for the period 1970-98 of positive net foreign asset positions for the EU, the USA and Japan (i.e. persistent current account surpluses), with substantial debt positions for the fast- and slow-ageing countries (i.e. persistent current account deficits).

Compared with what actually happened, the big differences in international investment patterns were:

- Firstly, the slow-ageing countries experienced actual net capital inflows from the rest of the world which were only one-tenth of that which the model would have predicted on the assumption that capital markets were fully open at the world level, and
- Secondly, the USA experienced significant current account deficits over this period as opposed to the prediction of the model of small surpluses.

These model prediction errors were, in the case of the slow-ageing group, fully driven by the assumption of full capital mobility and in the case of the USA, it was the combination of restricted capital movements to the slow-ageing group allied to the USA's growing relative attractiveness as an investment location compared with other developed economies which explains the sharp differences between the actual outturn and the model prediction (see Box 3).

To summarise, in terms of isolating the crucial determinants of current account changes globally over the last 30 years, the key conclusions of this model-based analysis are as follows:

- Demographic developments have become an increasingly important determinant of changes in global current accounts over the last 15-20 years.
- Significant restrictions on capital movements to large areas of the developing world impacted strongly on the volume and the geographical destination of external capital flows.
- With restrictions on global capital movements and with a widening in growth rate differentials in the developed world in favour of the USA, a disproportionate share of the additional age-related capital flows were absorbed by the USA. This growing tendency towards current account deficits in the USA was exacerbated in the second half of the 1990s by the perceptions of the financial markets that growth rate differentials had widened even further in favour of the USA.

6.3. Future trends

The results from the above analysis of international capital movements over the last 30 years point to the potential for significant changes in age-related financial flows over the coming decades. Because of the persistence of demographic trends, it is unlikely that a major reversal of current patterns will occur in the immediate future.

In this context, it is the recent trends in Japan which need to be most carefully scrutinized. Japan is the first of the developed economies to be significantly affected by ageing and it is 10-15 years ahead of the others in terms of timing. While the growing savings-investment imbalances in Japan in the second half of the 1990s were to an extent affected by the "bubble" conditions in the USA, on the basis of the change over 1985-1995, it is clear that trends have been influenced significantly by the ageing of the population and by the associated build-up of foreign assets to fund retirement income.

This trend for Japan is particularly important for the EU and for a number of the fast-ageing economies over the coming decades since, based on an index of the old age dependency ratio, major demographic changes started to occur in Japan in the early 1970s, with the overall increase in the ratio over the period 1970-00 being of an equivalent percentage size to that which is expected to

[244] See Röger (2003) for a complete analysis of the five areas.

occur in the EU and other countries over the coming decades.

A combination of a faltering growth process (which is undoubtedly bubble induced and age-related) allied to a lack of enthusiasm for reform has proven to be an exceptionally negative cocktail for Japan over the last decade. Japan is a potent reminder to other ageing developed economies of the need to adopt an ambitious reform agenda in the face of ageing, with a growth-oriented policy framework essential if these economies are to avoid a similar mixture of subdued domestic investment growth rates and large and increasing outflows of capital. While there is already some evidence of a lowering of EU investment rates in recent years, given the relatively more generous PAYG pension system in Europe and the historically lower savings propensity compared with Japan, the extent of future capital flows are likely to be of a smaller order of magnitude in the EU.

At the global level, assuming that there are no changes with regard to government debt or recent productivity trends and that policy measures aimed at changing pension systems and deepening global capital market integration are excluded, the key underlying determinant of future financial flow predictions will be the demographic changes which are expected to occur over this period.

On this basis, if the latest population projections prove accurate and if the historical links between changes in net foreign asset positions and their structural determinants hold in future decades, substantial changes are in prospect over the period 2000-50 for the wealth/debt positions of the different countries and regions around the globe.

In addition, with the ageing-induced pressure for a widening of growth rate differentials amongst the developed economies and an absence of truly globalised capital markets, the USA is likely to experience a protracted period of current account deficits with the opposite trend for the EU and Japan. This is not to imply that there will not be a correction of the current US deficit position but it does suggest that, once the cyclical aspects have been addressed, the underlying structural position will remain negative. This is due to the fact that even with only a proportion of the "new" economy story remaining in tact, with an absence of alternative investment locations, due to the EU and Japan facing uncertain growth prospects and with the slow-ageing group essentially cut off from the world's capital markets due to excessive risk premia attaching to investing in these countries, the US current account will not correct as much as some commentators are predicting.

Furthermore, to the extent that the slow-ageing group of countries fail to enact the confidence building measures necessary to create an environment conducive to large foreign capital inflows, the type of bubble-like conditions experienced in Japan in the late 1980s and the USA in the second half of the 1990s and the downward pressure on rates of return could become more persistent concerns for global policy makers.

Box 3: Tracking the evolution of net foreign assets : the role of global capital market restrictions

As explained in the main text there was a large increase in the volume of capital movements over the last number of decades driven by growing capital market liberalisation and more recently by a sharp increase in age-related international capital flows. The question to be addressed is whether the combination of a life cycle model (such as the one used for the simulations in this section) allied to various capital mobility assumptions can account for the observed trend evolution of net foreign assets among the various regions of the world over the last 30 years, taking into account the relative magnitude of the demographic, growth, debt and pension system differences which existed in the five areas covered by the model. In broad terms, the model needs to explain why external imbalances between Europe, Japan and the USA have continuously widened in recent decades, reaching unprecedented levels, and why the fast- and slow-ageing rest of the world regions have shown very little change over time in terms of the evolution of their trend external position, despite being permanently indebted over this period. In particular how important a role can an assumption of full capital mobility or one based on restricted capital movements play in understanding these developments.

Full capital mobility assumption: Can the broad patterns for the respective areas be explained using an assumption of perfect world-wide capital mobility? The first thing to stress is that the demographic projections imply that over a long transition period, stretching over decades, there will be changes in the relative size of national labour forces as well as differences in the propensity to consume. Because of higher labour force growth, the marginal product of one additional unit of capital invested in a slow-ageing country will decline less than in a fast-ageing country. Under free capital mobility, this induces capital outflows to slow-ageing countries until rates of return are equalised. The extent to which capital exports occur depends on savings behaviour in the fast and slow-ageing regions. Various factors influence the aggregate savings rate. Though the net result is likely to be a decline in the savings rate in ageing countries, capital outflows can nevertheless be substantial because of both lower replacement investment needs in fast-ageing regions and due to the investment opportunities offered by slow-ageing regions. Apart from the magnitude of capital outflows the duration of external imbalances is also an important issue given the extreme persistence in labour force growth rate differentials between the fast- and slow-ageing regions of the world.

Consequently, with an assumption of full capital mobility, a clear pattern of international investment emerges, with the industrialised regions of the world exporting capital to developing countries and with the demographic changes dominating the evolution of net foreign asset positions in the five regions. However, both for Europe and Japan, foreign asset accumulation is dampened in the 1970s and 1980s because of higher total factor productivity growth. In addition, the peak of net foreign assets in

Japan is substantially lower than that predicted by the demographic change because of the high government debt in that country. However, as explained in the main text, if the model is run with an assumption of perfect capital mobility and taking into account all the structural determinants discussed in the text, both the magnitude and timing of capital flows across the five regions is grossly at odds with the observed evolution. The model clearly overpredicts the accumulation of foreign assets in Japan and Europe and it predicts a small positive net foreign asset position in the USA in contrast to the observed large net liability position. These capital exports from the EU, the USA and Japan would in turn need to be absorbed by an increase in the net liabilities of the fast- and, more importantly the, slow-ageing countries in the rest of the world. According to the model, with full capital mobility, the net liabilities of the slow-ageing group would grow strongly as a share of GDP, with foreign indebtedness reaching a level of about 120 per cent in 1998, which in fact is nearly 10 times the actual level of foreign debt accumulated over the last 30 years.

Restricted capital mobility assumption: The poor results using the full capital mobility assumption explains why imposing restrictions on international capital flows between the developed and the developing worlds (especially the slow-ageing group of developing countries, with the model imposing restrictions which are ten times higher than for the fast-ageing countries[1]) greatly improves the ability of the model to explain the historical pattern of net foreign assets. Firstly, liabilities in the fast-ageing and slow-ageing groups are now stabilised close to their actual levels and secondly, with capital restrictions in place for the latter two groups this also dampens the overall volume of net foreign asset accumulation in the EU, the USA and Japan. However, while the net external surpluses of the latter areas are lower than in a scenario of full capital mobility, the lower volume of world-wide capital flows must nevertheless to a large extent be balanced within the more developed group of countries, with the result that the USA (with its more favourable relative growth rates compared with other developed economies and with those differentials perceived to widen over time) absorbs an increasing proportion of the net savings from Japan and to a lesser extent the EU and some of the fast-ageing developing countries and emerges in an overall net debtor position.

[1] The observed low volatility of net foreign assets in both the fast-ageing and slow-ageing countries suggests the existence of trading frictions for international financial transactions in these countries. Restrictions for international capital flows seem to be larger in the slow-ageing countries, given the strong over-prediction of the model for net liabilities for the slow-ageing countries. We therefore assume strong capital market imperfections for the slow-ageing group and only mild frictions for fast-ageing countries. Concretely it is assumed that a worsening of the net foreign asset position of 1 per cent leads to an increase in the risk premium of 0.4 per cent in the slow-ageing and of only 0.04 per cent in the fast-ageing countries.

7. Summary

During the past twenty years international capital flows have expanded rapidly. They constitute a characteristic feature of today's increasingly integrated world economy. Most likely, international capital flows and changes in the ownership of assets across borders will attract the interest of policy-makers and economists alike in the coming years. Here the focus has been on a limited number of issues regarding capital flows in the present global economy.

According to current economic research the determinants behind capital flows are many. First of all, liberalisation of external flows of capital has opened up the growth of cross-border transactions. The adoption of the euro has meant a great step towards closer financial integration in Europe, eliminating foreign exchange risk within the euro area. Recent growth of domestic financial markets and of international trade has fostered international financial integration. Asset trade and product trade goes hand in hand, although the volume of asset trade today is far larger than that of product trade.

Long-term capital flows have been fostered by several factors. The growth of income per capita, rise in public debt and demographic changes are commonly regarded as the most important ones. These variables stand out as proxies for a number of underlying channels.

Capital flows can take many forms. An important distinction should be made - as is the standard approach in the finance literature - between debt and equity. Debt flows consist mainly of bank loans and bonds, and equity flows of foreign direct investments (FDI) and portfolio equity. The volatility of these various flows is different. Commonly FDI flows are considered to represent long-term investment decisions and to be important drivers behind economic growth.

In the past twenty years a rapid rise in the volume of foreign direct investment (FDI) has taken place in the world economy. It has been faster than the growth of global trade and production.

Highly developed countries are heavily involved in FDI activities. The EU and the USA are the most important actors. Actually, the flows of FDI from and to the EU are larger than those for any other country. This pattern is expected to hold in the foreseeable future as well.

Capital flows play an important role in the present process of merging Eastern and Western Europe. A large inflow of capital into the acceding countries has been a significant feature in the transformation of these economies, in particular into those countries that were part of the former Soviet empire.

Current account deficits have been financed by inflows of foreign capital. Here FDI has played the central role. On average these flows have corresponded to about 5 per cent of GDP in recent years with considerable cross-country variation among the forthcoming members of the EU.

The former members of the socialist bloc in Eastern Europe initially chose varying macroeconomic policy routes when moving towards a market economy.

Countries such as Poland chose shock therapy and, in due course, floating exchange rates, while others such as Estonia adopted a fixed exchange rate regime (currency boards) and domestic liberalisation. Some experimented with voucher privatization; while some were slow to impose hard budget constraints on state-owned enterprises. By now all countries have typically taken similar routes concerning capital flows and foreign ownership, in spite of initial differences. They have chosen full external liberalisation of capital flows and - if at different speeds - allowed widespread foreign ownership, including of their banking systems.

This policy approach is the main explanation for the composition of the inwards capital flows. In short, domestic owners could not mobilise the financial resources needed to take over and inject new capital into formerly state-owned companies. Thus, the privatisation of state-owned companies in Eastern Europe induced large FDI flows. Foreign ownership and control replaced domestic government ownership. Other forms of capital inflows have typically been of minor importance. Portfolio investments have so far been small due to the lack of well-developed financial markets.

What will happen in the future to capital flows into the acceding countries? As the process of privatisation runs down over time, and domestic financial markets evolve - becoming more diversified and more liquid - the determinants of capital inflows will evolve accordingly. The financial situation will also change due to approaching EU membership, expectations of EU transfers and of future growth performance. Most likely the growth of domestic bank credit will be high. Substantial budget deficits will likely induce capital inflows.

The future - that is the convergence process between the acceding countries and the EU - will pose a number of challenges to domestic policy makers. Corporate governance, corporate transparency and financial reporting and financial supervision are promising areas for improvement. More broadly, the acceding countries may, to some degree, be analyzed as emerging economies. The 1990s have witnessed major problems in many emerging economies that have liberalized their capital flows while maintaining weak financial institutions and weak financial markets and pursuing macroeconomic and financial policies that turned out to be inconsistent with exchange rate stability - or gave hostages to fortune in the event of major shifts in the fixed rate. The outcome has been large financial imbalances driven by capital inflows and eventually financial crises and distress.

There are striking differences between the acceding countries and other emerging markets, notably in the area of financial sector development and supervision. Here the acceding countries have gradually implemented the EU acquis for regulation and supervision and have opened their markets to large-scale foreign ownership.

Still, the experience from emerging markets holds some lessons. Notably that the acceding countries - by pursuing well-crafted policies - can avoid the "lost decades" that have been all-too-common an experience elsewhere. Fiscal and monetary frameworks - and, importantly, the implementation of prudential policies - should be oriented to ensuring that EU entry is smooth, and that the early years of membership see strong real convergence in a setting of financial stability.

Corporate governance issues have emerged as highly topical in recent years, following a number of scandals involving the USA as well as European listed firms. These issues stem primarily from the fact that ownership and control of a large company as a rule is separated, giving rise to principal-agent problems. Basically, the challenge is to improve the position of individual shareholders - including vis-à-vis majority stakeholders - giving them a stronger influence over the rewards and incentives of the firm.

There are important international aspects of corporate governance. In short, countries with good corporate governance systems should be able to attract international capital flows on better terms than countries with weak systems that invite fraudulent behaviour. The large inflow of capital into the US stock market has partially been explained by stronger small investor protection in the USA than outside the USA. In the future, with rising competition for capital inflows, these issues may become even more important determinants of capital flows.

Revealed weaknesses in corporate governance have invited several policy measures. The EU has already taken a number of steps to reform corporate governance in Europe like the Financial Services Action Plan (FSAP) and the Market Abuse Directive. Presently work is underway to strengthen accountancy standards, auditor independence and shareholder rights. In short all these reforms are aimed at improving the standing of the individual shareholder. Such measures will make EU more attractive for capital inflows.

In the coming decades major differences in the demographic structure across the world economy will emerge. These changes in ageing are likely to have profound effects on the stocks and the flows of international capital. The present global financial imbalances - most prominently the large US current account deficits - have initiated a debate among economists and policy-makers concerning the proper interpretation of these patterns. Are they the reflection of some form of bubble phenomena with no fundamental explanation or do they respond to different long run patterns in demographics, growth and labour market performance?

DG ECFIN has developed a model for addressing these issues. Calculations based on the model suggests that demographic trends have impacted on current accounts performance in the past decades, that restrictions on international capital flows have had major influence on international capital flows and that the USA has received a substantial part of age-related capital flows.

A forecast can be made from the model for the period 2000-50 - a truly daunting forecasting period. On the assumption that no policy changes are made and recent productivity trends remain stable, demographic changes will be the key variable driving financial flows and thus financial holdings in the world economy over this period. These results from the model have also policy implications. Countries that "grow old" should take steps to make their economies more attractive to capital inflows.

To sum up, rapid financial integration in recent decades has impacted on the macroeconomic performance in the global economy in many ways. International capital flows may serve both as a source of growth as well as reinforcement and transmission of disturbances. Today they play an important part in the adjustment mechanisms to disturbances by smoothing consumption. Sudden shifts in the flow of foreign finance can also create major domestic challenges, as demonstrated by financial crises in several emerging economies in the past decade. In the future, large financial imbalances among developed countries may cause abrupt changes in capital flows and exchange rates, leading to over- and undershooting.

Looking into the future, policy frameworks will remain crucial in ensuring that capital inflows are channelled in a productive manner, and that strong growth in external and domestic sources does not give rise to macro-financial stress. The policy recipes doubtless will evolve over time, as they have in the past. But the exceptional progress of the past decade also provides encouragement and a source of confidence as policy-makers take on these challenges.

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ANNEX : Capital movements in the legal framework of the community

The tremendous rise in cross-border financial flows in the past decades has a legal or institutional foundation. The Bretton Woods system embodied the idea that capital flows were a threat to monetary and financial stability and to national policy autonomy. The experience of the 1930s was interpreted as a proving that international capital flows were destabilising domestic economies. Thus capital flows were the subject of exchange controls and regulations during the 1950s and 1960s, keeping cross-border financial transactions at a minimum.

Gradually, accompanying the breakdown of the Bretton Woods system and the rise of the eurodollar market and new financial technologies, financial accounts were liberalised. The process was a time-consuming one. During this period, mounting financial imbalances in the world economy stimulated the growth of the eurocurrency and eurobond markets, which in turn contributed to the breakdown of residual legal restrictions. Nonetheless, some industrialised countries did not fully liberalize until the end of the 1980s and the early 1990s.

A detailed description of the present legal regime concerning capital movements within the EU as well as between the EU and the rest of the world is given in this annex.

1. Introduction

The Treaty of Rome, which came into effect on 1 January 1958, was based on the principle of four freedoms: the free movement of goods, of persons, of services and of capital. The fundamental Treaty provisions concerning capital were included in Article 67(1), which established the obligations for Member States to lift restrictions on the free flow of capital, but only "to the extent necessary to ensure the proper functioning of the Common Market". While the freeing of trade appeared to be a more immediate objective of the Common Market, the Treaty further specified that financial services should be liberalised concurrently with the progressive liberalisation of capital movements. This explains why the accomplishment of the free movement of capital materialised much later.

While some categories of capital movements benefited over two decades from varying degrees of liberalisation, the full liberalisation of capital movements within the Community was finally accomplished on 1 July 1990 with the entry into force of Directive 88/361/EEC.[245] When the Maastricht Treaty on European Union entered into force on 1 January 1994, Article 67(1) of the Treaty and Directive 88/361/EEC implementing that article have been replaced by the new Articles 56 to 60.

Essentially, these articles innovated from two angles. Firstly, they are declared directly applicable into the legal order of Member States since secondary legislation (e.g. EC directives) or national transposition measures are not needed anymore. Secondly, they also provide for the full liberalisation of capital movements between Member States and third countries. The unconditional character of this external liberalisation means that capital movements involving third countries are free as far as the Community is concerned, irrespective of the level of liberalisation reached by such third countries.

Although the fundamental principle of freedom is enshrined in Article 56 EC, which stipulates that all restrictions on capital movements are prohibited, Articles 57 to 60 EC offer several possibilities either to limit this principle of absolute freedom of capital movements or to be exempted from it. Besides this set of exceptions relating specifically to the provisions of Article 56 EC, other Treaty exceptions of a more general nature can also apply on the freedom of capital movements.

Broadly, admissible exceptions can be distinguished according to their eligible user and, accordingly, the level of legislation involved (i.e. national or Community). On the one hand, Member States have the right to refer unilaterally to these exceptions with a view to maintain or introduce restrictions either in national legislation or in their own international commitments. On the other hand, the Community has the right to amend the existing capital movements regime between third countries and itself, but only with respect to specific categories of capital movements transactions listed in the Treaty. Through these exceptions, Member States and the Community can impact negatively on foreign ownership of EC-established assets, since inward investment may be affected.

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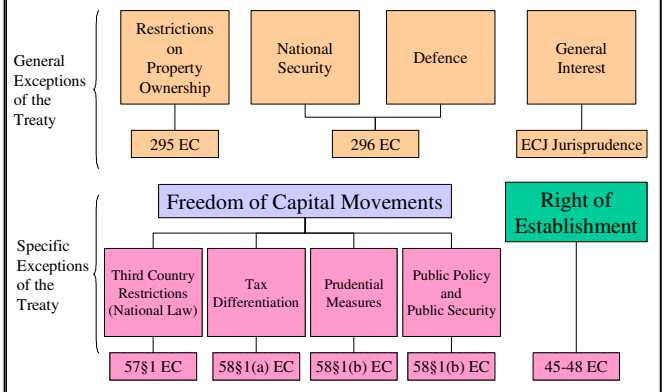
[245] Annex I to this directive sets out a nomenclature of capital movements under Community legislation, which remains valid for the purpose of defining what constitutes a capital movement.

2. Third country restrictions applicable by EC Member States

First, there exist a number of specific restrictions on capital movements:

- While Article 56 EC fully liberalises capital movements to and from third countries by default, Article 57(1) EC clearly indicates that this freedom is not unlimited since Member States have the right to maintain restrictions that existed as at 31 December 1993 under national law in relation to "direct investment – including in real estate – establishment, the provision of financial services or the admission of securities to capital markets".
- Considering the relative lack of fiscal harmonisation at Community level, as well as the prospects of a further integration of the Single Market in the framework of the economic and monetary union, Member States felt it necessary to introduce in the Maastricht Treaty the provision of Article 58(1)(a) EC, which allow for a certain degree of fiscal differentiation of taxpayers according to their place of residence (fiscal non-residents benefit from tax exemptions in most Member States) or the place where the capital is invested (usually, foreign investments will be discriminated against through a less favourable tax treatment).
- Prudential rules, being essentially restrictions to the freedom of capital movements, can be considered as admissible insofar as they are covered by the specific exception provided for that purpose by Article 58(1)(b) EC. Although the design of these rules are primarily Member States' responsibility, the existing financial legislation at Community level is the most relevant source of information with respect to national prudential rules that could be considered as compatible with the above article. Nonetheless, in the absence of EC directives, unregulated financial services have also to abide by capital movement rules, as soon as these are involved.
- Furthermore, Article 58(1)(b) provides also for the right of Member States "to take measures which are justified on grounds of public policy or public security". These concepts have an evolutionary character, and the number of specific national concerns that could fall within their meaning might expand or contract accordingly.

Box A1 : Third Country Restrictions Applicable by EU Member States



Given the concise formulation of these exceptions in the Treaty (in particular the lack of definition of concepts) as well as their primary responsibility with respect to the interpretation of the above provisions, Member States seem to benefit from a significant margin of discretion to invoke these exceptions to forbid, or at least control, specific capital movements by foreign operators. However, the present case law of the European Court of Justice (henceforth ECJ) demonstrates that such Treaty exceptions may not be considered as discretionary tools at the disposal of Member States to derogate from their Treaty obligations, since measures judged compatible with Treaty rules are increasingly very tightly defined and specific (e.g. fiscal differentiation arrangements under Article 58(1)(a) EC, or public policy/public security considerations under Article 58(1)(b)).

Specific restrictions to the right of establishment. Articles 56 to 60 EC exclusively govern capital movements (and payments). However, 'establishment' is also a subset of 'direct investment' under Community legislation. According to the EC definition, direct investment includes in particular "establishment and extension of branches or new undertakings belonging solely to the person providing the capital, and the acquisition in full of existing undertakings".

Therefore, Article 58(2) EC establishes a link between both Treaty freedoms by stating that "the provisions of this Chapter shall be without prejudice to the applicability of restrictions on the right of establishment which are compatible with this Treaty". Formally, Articles 43 to 48 EC define the regime on establishment applicable within the Single Market on Member States' persons. Although this regime does not provide for a specific treatment of third country persons, these are de facto subject to the (non-discriminatory) Single Market requirements and restrictions enshrined in Articles 43 to 48 EC, but also to any specific restriction existing in Member States' national legislation and Community law.

General exceptions of the Treaty. Besides the above specific categories of restrictions on the freedom of capital movements and the right of establishment, the Treaty provides also for more general exceptions in its final provisions.

- Article 295 EC states that the Treaty is neutral with regard to the system of property ownership existing in Member States. While its abstract character has sometimes led to extended interpretation, this provision simply means that the legal order of Member States may provide for private and public ownership (e.g. for public utilities companies). However, recent ECJ rulings confirmed that Article 295 EC does not allow Member States to dismember the right of ownership in a way that national authorities would retain special control rights after privatisation of public-owned companies.
- On the basis of Article 296 EC, Member States may derogate from their capital movements obligations when national security is threatened either in general or in connection with the production of or trade in defence material. Typical measures that could serve that purpose are restrictions on investment in defence material manufacturers.

General interest considerations. Furthermore, although general interest is not formally mentioned in the exceptions of the Treaty, the ECJ developed this notion in various rulings. By nature, it appears to be close to the concept of public policy and public security, but with a potentially broader scope of application. The use of general interest-related exceptions by some Member States developed in the past ten years, against a background of liberalisation at EC level of public utilities sectors (e.g. energy, post, telecommunications) as well as of privatisation of public-owned enterprises active in these sectors.

Broadly, adopted measures imposed direct and indirect restrictions to foreign investment in the above-mentioned sectors or companies. The long list of national restrictions includes in particular: authorisation procedure for investment (above certain thresholds), veto rights on important decisions of management bodies (e.g. merger, acquisition, disposal of assets), limitation of voting rights, privilege to appoint a certain number of board members, etc. Usually, such restrictions are termed 'golden shares', although the concept of 'special rights' is more appropriate insofar as the previous term refers only to a specific legal means to enforce such rights.

Box A2 : 'Special rights' related ECJ rulings

In the past years, the ECJ ruled a few times on general interest-related restrictions. In 2000, it condemned Italy for investment restrictions contained in the 1994 Law on Privatisation on ENI and Telecom Italia. In 2002, Portugal was condemned for its framework law on privatisation, which provided for the possibility of restricting foreign participation in many sectors. France was also condemned for holding a 'golden share' in the petroleum company Elf-Aquitaine, which established a system of prior authorisation for all shareholdings exceeding certain voting rights ceilings as well as a veto right to oppose any decision to transfer or use as security the assets of four subsidiaries of the company.

In contrast, the ECJ authorised Belgium to maintain its 'golden share' in Distrigaz and Société Nationale de Transport par Canalisations (both active in the gas industry), which provides for the possibility to oppose any major strategic company's decision which could adversely affect the country's interest in the energy sector. In this case, the ECJ considered that these special powers were justified, in particular, by the exclusive application of rights to certain decisions on strategic assets of the companies in question (acquisition of capital is free) as well as the direct link with public service obligations incumbent on both companies.

In 2003, the ECJ condemned Spain for its Privatisation Law of 1995 which provided for a prior authorisation requirement for dissolution, sale of assets, change in business aims, and the acquisition by any investor of 10 per cent of the capital of privatised companies (voting rights were suspended for the excess). Prior administrative authorisations were introduced for a limited duration in 6 of the 28 privatised companies. At the time of the ECJ ruling, special rights imposed on Tabacalera (tobacco) and Argentaria (banking) had lapsed, while they were still valid for Endesa (electricity), Telefónica (telecommunication), Repsol (oil), and Indra (banking).

At the same time, the 'special share' held by the government of the United Kingdom in British Airports' Authority plc (owner of seven domestic airports) was ruled incompatible with Treaty rules. This 'special share', inserted in the by-laws of the company in the course of its privatisation, limits all interests in the company to 15 per cent of voting shares and provides for an authorisation procedure in particular on the disposal of assets and winding-up. In contrast to other 'special rights' so far, these did not result from a genuine state measure (such as a law or an implementing decree) and did not grant privileges to the state (but imposed restrictions on all potential investors). Through this ruling, the ECJ significantly broadened the scope of application of the notion of 'investment restrictions'.

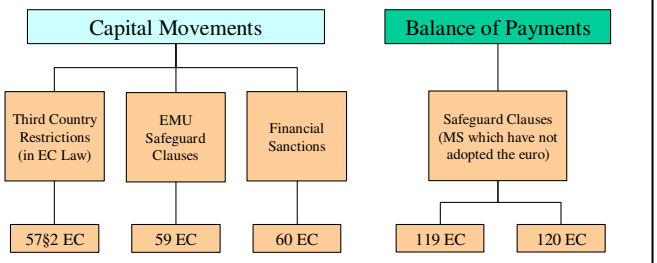
These important ECJ rulings clarified significantly how restrictions on investment could be implemented in national measures accompanying the privatisation of public utilities undertakings. Other pending rulings on similar cases, dealing with different legal means to enforce restrictions or with other economic sectors, should allow the ECJ to further clarify the compatibility of general interest-related restrictions on investment with the Treaty.

3. Third country restrictions applicable by the European Community

Existing third country restrictions in Community legislation. As discussed earlier, the provisions of Article 57(1) EC provide, in particular, for the possibility for Member States to maintain restrictions on capital movements that existed as at 31 December 1993 under national legislation, in relation to the specific transactions mentioned in that article.

Similarly, Article 57(1) EC provides also for the right for the Community to continue to apply vis-à-vis third countries any restrictions on capital movements existing as at the same date under Community law, in relation to "direct investment – including real estate – establishment, the provision of financial services or the admission of securities to capital markets". In particular, this provision allowed the Community to give third countries access to certain areas of the Single Market only to the extent that it could obtain in return comparable advantages for its own economic operators.

Box A3 : Third Country Restrictions Applicable by the European Community



Amendment to third country restrictions. While paragraph 1 of Article 57 EC provides for the right to maintain restrictions on specific capital movements transactions existing before the entry into force of the present regime on 1 January 1994, paragraph 2 of the same article provides for the possibility to either further liberalise or restrict these transactions. In fact, such measures would mostly impact on the right of establishment (direct investment) and the freedom to provide services, in areas where the rights of foreign operators are currently regulated through Community legislation.

Other Community restrictions. Article 57 EC is the most relevant source of third country restrictions applied by the Community for the protection of its economic operators through the regulation of Single Market access. Although other Treaty articles also allow the Community to restrict investment and establishment of foreign operators, they are less relevant for our purpose insofar as they constitute either safeguard clauses or security and foreign policy measures (and since they would probably not impact primarily on foreign direct investment and establishment):

- Should extremely disturbing capital movements with third countries endanger the operation of economic and monetary union, Article 59 EC provides for the possibility to adopt restrictive measures for a period not exceeding six months.
- Among the actions that can be undertaken when a Member State experiences serious balance-of-payments difficulties, Articles 119 and 120 EC provide for the possibility to reintroduce 'quantitative restrictions' or 'protective measures' against third countries (in particular in the field of capital movements).
- In the context of the Common Foreign and Security Policy of the European Union, Article 60 EC provides for Community sanctions against specific third countries. In practice, these measures usually materialise in the shape of freezing of bank accounts or a ban on foreign direct investment in targeted third countries.

4. Community regimes on investment and establishment.

Article 57 EC provides for the most relevant Treaty-based legal basis which entitles the Community to regulate foreign investment and establishment in the Single Market. In many areas, foreign operators benefit by default from the freedom to invest guaranteed by Article 56 EC. In contrast, some horizontal EC regimes have an impact on foreign investors' presence in the Single Market and several economic sectors are regulated at EC level through secondary legislation (e.g. directives, regulations) which contains in particular direct and/or indirect restrictions on foreign ownership of EC firms.

The main horizontal Community regimes in the field of investment are:

- Competition policy: The Treaty provides for a comprehensive set of provisions on competition policy which establishes competition rules and merger control on a Community wide basis. The basic principles of this competition regime are found in Articles 85 to 90 EC. There are no different rules applying to investors from third countries as compared to EC investors, and decisions are taken on an ad hoc basis.
- Taxation policy: In the scarce binding Community provisions on taxation, few provisions affect investment from third countries. The most relevant one provides for the application by Member States of similar tax rules in case of mergers, divisions, transfers of assets and exchanges of shares, and the grouping of parent companies and subsidiaries. Foreign companies (i.e. not established in the EC) do not benefit from this special treatment.

As far as sector-related Community regimes are concerned, the most relevant are:

- Air transport: A direct restriction to foreign ownership results from the concept of 'Community air carrier', which is found in the EC legislation. Free market access is reserved for air carriers having their principal place of business and registered office in a Member State, and effectively controlled by Member States and/or

nationals of Member States, either directly or through majority ownership. Furthermore, several air transport-related activities are protected by redress facilities against third countries applying an unfair treatment on Community air carriers.

- Maritime transport: Foreign ownership is restricted since the freedom to provide services to maritime transport within and between Member States, and between Member States and third countries is reserved for 'Community shipowners', which means in particular, shipping companies established in accordance with the legislation of a Member State and whose principal place of business is situated, and effective control exercised, in a Member State.
- Inland waterways transport: Transport of goods or persons within and between Member States and in transit through them is reserved for carriers established in a Member State which vessels are owned by nationals of a Member State or legal persons majority-owned by Member States nationals. Furthermore, the conditions for access by Member States' vessels to the arrangements under the Revised Convention for the navigation of the Rhine (which primarily involves five Member States and Switzerland) are similar to those applicable within the EC, as described above.
- Energy: With respect to prospection, exploration and production of hydrocarbons, the Community may grant Member States the right to deny market entry to entities from a third country, if the latter does not grant Community entities a treatment comparable to that granted by the Community to third country residents. Moreover, according to the multilateral Energy Charter Treaty, the Community will endeavour to grant investors from other contracting parties 'most favoured nation' treatment as regards investment in energy-related sectors in the Single Market.
- Audio-visual: At present, there are no Community rules which would directly restrict investments from third countries in the Community audio-visual sector or prevent a branch or subsidiary of a third country company from operating in the Community. However, the relevant Community framework provides for various measures which impact indirectly on third country investment and establishment. According to the European Convention on Transfrontier Television, Community broadcasters must reserve a majority of their transmission time for 'European works', i.e. essentially originating from Member States and other European countries party to this convention (performance requirements). Moreover, Community financial support assigned to the development of European audio-visual works and training in digital technologies is reserved for Community-controlled companies and Member States' nationals (financial incentives).
- The Community framework on financial services establishes certain indirect restrictions on direct investment in and establishment of financial institutions by third country entities. When Community credit institutions, insurance companies, or securities firms are not granted by a third country effective market access (comparable to the one granted to similar institutions from that third country) and national treatment in the carrying-on of their respective activities, Member States must redress the balance through suspension or limitation of pending authorisation requests relating to planned direct investments from firms established in that third country (reciprocity requirement). As third country restrictions have been waived by the Community under the GATS, these remain exclusively binding for non-WTO members.

5. International Member States and EC commitments

As described above, the Community regime on capital movements not only establishes the fundamental principle of freedom of transactions and related payments, but also provides for the right of Member States and the European Community to maintain or introduce specific restrictions, in particular vis-à-vis third countries. While the completion of the freedom of capital movements meant also an advanced stage of economic and financial development and integration for the Community, this took shape during a more general process of international economic policy co-operation which impacted, in particular, on the treatment of capital movements and payments (e.g. IMF Articles of Agreement, OECD Code of Liberalisation of Capital Movements, GATS commitments in the field of establishment, EC/Member States bilateral agreements).

Depending on the forum involved, either EC Member States took part individually in the liberalisation process as sovereign countries (e.g. OECD Code of Liberalisation), or the Community and its Member States were the relevant parties (e.g. GATS). Logically, commitments entered into by EC Member States as members of international organisations have to be consistent with the Community framework on capital movements. Therefore, such national commitments generally represent a combination of restrictions enshrined in or resulting from Community legislation (see above 'sector-related Community regimes') and interpretations and implementations of EC Treaty restrictions (see above 'third country restrictions applicable by EC Member States').

Because international agreements diverge in geographical scope and methodology, the grouping of both types of liberalisation commitments (depending on existing restrictions under Community and national law) by all Member

States reflects imperfectly the comprehensive Community regime on capital movements vis-à-vis third countries, but constitutes a reliable estimation instead. Moreover, it gives information on the respective nature and intensity of restrictions adopted independently by EC Member States according to Treaty exceptions, and allows us therefore to derive some general conclusions on the potential internationalisation of ownership of assets within the European Community:

The OECD Code of Liberalisation of Capital Movements. While OECD members subscribe to a general undertaking to fully liberalise capital movements on a cross-border basis, the code allows them to lodge and maintain reservations for specific transactions with a view to define freely their own pace of liberalisation. Although the code is a legally binding instrument, commitments cannot be enforced insofar as no jurisdictional body was foreseen.

In the list of reservations lodged by EC Member States, foreign direct investment is by far the most affected inward transaction in most sectors and countries. On the one hand, reservations relate in priority to strategic economic policies of the Community governing, in particular, investment and establishment (e.g. air transport, shipping, financial services). On the other hand, reservations applying to economic sectors where foreign direct investment is not restricted in accordance with Community policies and legislation generally reflect the need for some EC Member States to protect strategic domestic sectors from third country investors (e.g. agriculture, fishing, mining, professional services, tourism, gaming).

In the field of real estate transactions, the short list of reservations does not seem to fit with the numerous national rules which govern real estate acquisition in most EC Member States. Even though it is generally liberalised insofar as it relates to direct investment and establishment, the purchase of agricultural land and secondary residences is often subject to 'authorisation procedures' which are not well-defined restrictions. With regard to short-term transactions carried out on financial markets, most reservations are long standing measures of prudential nature applicable to insurance companies and private pension institutions, which usually affect the acquisition of third country assets.

The General Agreement on Trade in Services. The GATS is the services element of the World Trade Organisation, which establishes a basic set of rules for world trade and investment in services. Apart from general undertakings to guarantee 'most favoured nation' (MFN) treatment, market access and national treatment, members enter into sector-specific liberalisation commitments that are binding and subject to enforcement. Given the issue under consideration, commercial presence (e.g. subsidiaries, branches, representation offices of the parent company) must be highlighted among the several modes of services supply since it is the only one which deals directly with establishment and thereby with investment in the host country and possible restrictions thereof.

As far as MFN treatment is concerned, the bulk of sector-related exemptions concerns audio-visual services and internal waterways transport and simply reflect the preferential EC treatment enshrined in the Community framework. The rest of MFN exemptions generally result from the preferential treatment (e.g. right of establishment) granted either by the EC or specific EC member States through bilateral agreements with specific third countries.

Market access and 'national treatment' commitments are also subject to limitations lodged either indistinctly by all EC Member States (which form therefore a restrictive Community regime towards third countries) or only by some EC Member States (in pursuance of their Treaty right to maintain certain third country restrictions). Community restrictions on market access relate essentially to services considered as public utilities at a national or local level, insofar as these may be subject to public monopolies or exclusive rights in accordance with EC competition rules. As to restrictions lodged by specific EC Member States, they generally apply to direct investment and are implemented through 'authorisation procedures' that seem to give national authorities a large margin of discretion.

Besides the above general commitments and limitation thereof, sector-specific commitments are expressed with respect to a detailed GATS nomenclature of eleven aggregated categories of services.

Very broadly, the Community and its Member States have been liberal, if not very liberal, with respect to third country presence in the field of 'business services' (except for aircraft rental/leasing in accordance with Community ownership and control requirement), 'construction and related engineering services', educational services', tourism and travel related agencies', distribution services', 'environmental services', and 'recreational, cultural, and sporting services'. Establishment of third country entities in the EC is generally possible in the 'financial services' sector (i.e. insurance, banking and other financial services), although Member States have lodged a fairly large number of national limitations to market access (e.g. specific establishment requirements, service supply limitation, economic needs test, authorisation procedure) which discriminate against at the time of and after establishment.

In contrast, the Community offer has been very modest so far for 'health related and social services' (essentially for health related services), 'transport services' (no liberalisation commitment for maritime transport, internal waterways transport, air transport – in view of existing third country restrictions in the EC legislation – rail, space and pipeline

transport – probably for economic and political reasons), 'communication services' (no liberalisation commitment for postal services, courier services, and audio-visual services).

Multilateral and Bilateral Agreements of the European Community and Member States with Third Parties. Since 1 January 1994, Community competence on capital movements to and from third countries clearly derives from the relevant Treaty articles. However, if Treaty coverage is formally indisputable, Article 57(1) EC grants some residual competence on specific external capital movements to Member States (see 'Third country restrictions applicable by EC Member States') insofar as it acknowledges their right to freely soften or remove restrictions, without any actions of the Community in this process. For the above reasons, the Community as well as its Member States have entered separately into third country agreements providing for specific arrangements on capital movements between both parties:

- Bilateral Agreements signed between the EC and third countries contain specific provisions on capital movements and payments. Usually, the limited ambition of these provisions is ensuring the free movement of capital relating to direct investments made in companies formed in accordance with the laws of the host country. For the Community, such a modest commitment is generally redundant with its more advanced liberalisation commitments at international level. In contrast, for many third countries with administered capital accounts, it represents a liberalisation commitment which goes beyond existing commitments at international level (e.g. GATS).
- Bilateral Investment Treaties (BITs) between EC Member States and third countries have a different purpose insofar as they generally cover the treatment of investors, compensation rules in case of expropriation, and a dispute settlement mechanism. Usually, these treaties allow EC Member States, in particular, to grant specific third countries a better treatment of their investments (in the Member State involved) than the one which is provided by default by national legislation (establishment of specific third countries' entities in these Member States is eased by these BITs). As Community investment regime develop further (through Community legislation or international liberalisation commitments, e.g. vis-à-vis the GATS), Member States' numerous BITs are sometimes not fully compatible with the Community framework.

6. Conclusions

Admissible exceptions to the EC freedom of capital movements may be classified in two groups. The first group consists of Treaty exceptions which necessitates a preliminary implementation in the Community legislation (in order to define the nature and scope of restrictions), followed by a transposition in the legal framework of Member States. The second group of Treaty exceptions gives Member States the right to directly define and apply these restrictive measures. As the Treaty does not provide for a notification of these restrictions to the Commission, the comprehensive list of restrictions to capital movements for the Community as a whole is difficult to establish with certainty, in particular with respect to direct investment originating from third countries.

In theory, this imperfect identification of third country restrictions existing in the Community (national and EC level combined) could be clarified through the liberalisation commitments expressed in international agreements. These agreements may also be classified in two groups. The first group contains agreements where the European Community, through the Commission, makes a proposal for itself and on behalf of its Member States, i.e. the GATS and all bilateral agreements between the EC and third parties. The second group contains agreements where Member States are parties, without any official representation of the EC as such under these agreements, i.e. the OECD Code of Liberalisation of Capital Movements and all bilateral agreements concluded between Member States and third parties. While genuine Community restrictions are generally faithfully translated into international commitments, this is less obvious for Member States' specific restrictions, due to differences in operating principles of agreements involved (in particular in the areas of methodology, terminology, and enforcement rules). In spite of these weaknesses, liberalisation commitments and restrictions thereon lodged by the EC and its Member States in multilateral agreements (GATS in particular) give a good estimation of existing restrictions on third country ownership of EC assets.

In Community legislation, third country restrictions are scarce and are only found in six specific sectors: air transport, maritime transport, inland waterways transport, energy, audio-visual, and financial services. Furthermore, only the first three ones are protected from third country ownership through Community ownership and control requirements (not only is this the case at world level in these sectors, but also restrictions are similar or more severe outside the Community). The other sectors are subject to less stringent indirect restrictions on third country market access (some of these being safeguard clauses). However, this limited number of third country restrictions in the Community framework is without prejudice of Member States' right to maintain third country restrictions existing in their national legislation as at 31 December 1993, as provided for by Article 57(1) EC.

At national level, there is a fairly large number of third country restrictions remaining. Among these, many are indirect restrictions discriminating against third country entities, but without preventing them from establishment in

the Community. In contrast, as indicated in the Community position under the GATS, the lack of liberalisation commitments for some important economic sectors (notably rail, space, and pipeline transport, postal, courier, and audio-visual services) reveal some Member States' reluctance to accept significant third country presence in these areas, and most probably the existence of third country restrictions at national level (although the situation can be contrasted between Member States).

Against this background, any further liberalisation of investment regimes towards third countries in the Community as a whole may result either from the removal of restrictions existing in the Community framework (in the specific sectors mentioned above), or the removal of restrictions maintained unilaterally by Member States in their national legislation. Whether at Community or national level, these changes might be induced by any Community offer during negotiation rounds under international agreements, such as the GATS.

Besides this progress, deliberately planned in the context of the Community's international trade policy, the ECJ might be requested by the Commission to pronounce on the compatibility with the Treaty of third country restrictions adopted by Member States. By declaring specific restrictions illegal, such ECJ rulings would also force Member States involved to ease or remove these. In this respect, important areas of uncertainty with respect to the compatibility with the Treaty of restrictive measures on capital movements are: special control rights of Member States in privatised/private companies or economic sectors (which strongly impact on intra-EU investment in public utilities sectors) and discriminatory tax treatment resulting from the fiscal carve-out provisions of the Treaty (which constitute a very powerful, albeit indirect, impediment to direct investment and establishment).