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COMMISSION STAFF WORKING DOCUMENT

Assessment of the economic impact of changing the methodology for calculating normal value in trade defense investigations against China

Accompanying the document

Proposal for a
REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

amending Regulation (EU) 2016/1036 on protection against dumped imports from countries not members of the European Union and Regulation (EU) 2016/1037 on protection against subsidised imports from countries not members of the European Union

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Abstract

This report sets out to evaluate what a change in the market economy status (MES) of China in European Trade Defense Instrument cases (TDI) would bring about in terms of potential job effects in the European market.

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Executive Summary

If the European Union were to apply market-economy status (MES) in Trade Defense Instruments (TDI) cases against China, this is expected to lower the imposed anti-dumping duties on imported products from China by around 30 percentage points, compared to an analogue country regime.[1] As a result gross import prices on imported products from China that are subject to TDIs would fall by 20 percent after the duty is imposed. The lower anti-dumping duties on Chinese imports are estimated to result in lower Chinese prices on the EU market and 18 to 28 percent higher average Chinese imports than what they would be in the analogue country regime. According to our estimates, Chinese imports will rise under the MES regime and will substitute for sales of the EU import-competing industry (or competing third countries). The purpose of this study is to assess both the potential direct and indirect employment effects of this regime change in different scenarios, which we discuss in that order below.

In Scenario 1, we extrapolate from ten recent AD cases for which data was provided by the Commission to the total volume of bilateral trade affected by TDI. The simulated (direct) job losses in products (or sectors) currently affected by TDI actions are estimated to lie between 14,000 and 22,000 jobs.[2]

In Scenario 2, we change our angle to take into account all the Chinese products currently subject to TDI (52 cases) (November 2015), for which less detailed data is available, though. Based on averages from recent years, we assume that 2.5%[3] of total imports from China[4] will be covered by TDI and extrapolate to this level. We use this historical average because in the short run the product range affected by dumping will be unchanged. We estimate the resulting (direct) job losses to range between 49,700 and 73,600.

Scenarios 1 and 2 both address the short-run[5] effects of granting MES. They use distinct aggregation methodologies to scale up from the individual cases to estimate the effect for the overall economy and thus provide a robustness check for the direct employment effects. In Scenario 1, the average employment elasticity is applied directly to the current overall level of TDI affected employment, 231,000 jobs. Scenario 2 makes projections from the existing 52 AD cases to derive the volume of affected trade for the respective HS4 sector level and

[1] This average reduction is a combination of lower AD duties in some cases (where the investigation would still conclude Chinese firms are dumping) and elimination of AD duties altogether in other cases.

[2] This is based on the unweighted averages arising from the 10 anti-dumping cases used for extrapolation purposes. Total current employment in sectors protected by China-related TDI is 231,000 (June 2015).

[3] Vandenbussche and Viegelahn (2011) show that the share of products imported by the EU from China and falling under EU anti-dumping protection reached a level of slightly higher than 2% in 2009.

[4] The methodology that we use to arrive at 2.5% is well explained in later sections (p.11), and allows us to assess also the indirect employment effects for which we need to turn to the WIOD database.

[5] Short-run does not refer to a one-year period, but refers to the product coverage of AD which in the short-run can be considered unchanged.

adds the effects up to individual sectors first and to the total economy in a final step. It makes Scenario 2 more encompassing than Scenario 1. A second difference is that the methodology of Scenario 2 also allows for a quantification of the indirect effects, which is not possible at the level of aggregation used by Scenario 1.

In Scenario 3, we consider the possibility that the MES regime may have additional long-run effects also affecting *new* products, not subject to EU TDIs thus far. Dumped imports from China are likely to expand into different product categories that have not been subject to EU dumping investigations before. Scenario 3 effects are not necessarily a prediction of what will happen in the future, but rather an illustration of what could potentially happen in a worst-case scenario. We use US AD cases against China and EU AD cases against other countries to inform us on the sectoral distribution of these potential new cases. In this event, the share of imports from China subject to TDIs is projected to rise to 5.7%, which we show is a sensible long-run upper bound. Adding these potential long-run effects of the MES regime, could result in EU (direct) job losses in import-competing TDI sectors that lie between 117,800 and 175,600. This is what we refer to as the long-run *direct* jobs at risk.

Supplementary to *direct* employment effects, there will probably be *indirec*t EU employment effects. The *indirect* effects refer to spillover effects on downstream or upstream EU producers.

Downstream EU producers normally benefit from cheaper imported inputs from China, in proportion to their input use, and if EU suppliers partially match reduced Chinese import prices this benefit will be even larger. As downstream EU producers would be able to produce at lower cost, they would be able to expand production and have a higher labor demand under the MES regime for China. Using WIOD data, we estimate the *positive* downstream employment effects under MES to *generate* 13,100 (Scenario 2) to 28,400 (Scenario 3) EU jobs in, respectively, the short and long-term.

In contrast, upstream EU producers will probably be adversely affected by the MES regime, as in the EU industry where they sell the bulk of their output, Chinese producers take market share away from European producers (their clients). From the WIOD database, we establish that Chinese firms use fewer EU-sourced inputs than their EU counterparts. This fact allows us to infer that demand for European upstream producers will be reduced under the MES regime. This reduced demand for the output of upstream EU producers, could result in *negative* EU employment effects in the upstream industry. We estimate these upstream displacement effects to cause EU job *losses* in a range of -15,300 to -54,600, depending on the estimates used and the timeframe considered.

In most of our scenarios, our estimates suggest the *indirect upstream* job effects to outweigh the *indirect downstream* job effects. Thus, the *overall indirect* employment effects are most often found to be *negative* arising from the fact that the negative upstream employment effects dominate the positive downstream effects.

Under the assumption that macroeconomic multiplier effects do not exceed one, the sum of direct and indirect employment effects constitute the economy-wide effects when the EU grants MES to China.

Table 1 summarizes the possible upper bound employment effects of granting MES to China under three different scenarios. In Scenario 1 we apply estimates from 10 selected AD cases to the current employment in TDI sensitive sectors. In Scenario 2, we extend the basis of our analysis to all existing AD cases against China (52) and refer to it as "short-run" employment effects. In Scenario 3, we report the hypothetical "long-run" employment effects if dumping by Chinese firms were to become much more widespread than the products currently under investigation.

In Scenario 2 and 3, we report in Table 1 the sum of hypothetical *direct and indirect* employment effects of granting MES to China. These are upper bounds for the entire goods sector (agriculture, mining, and manufacturing) and range between 83,100 and 201,800, respectively.

When breaking these numbers down by member state, the biggest job losses would occur for Germany and Italy. Other EU countries suffer smaller losses and the impact clearly differs across countries. Larger countries tend to incur larger losses, although a member state like Italy seems disproportionately affected since countries of similar population size like UK and Spain appear to suffer much less job losses. Also, the higher the member state's level of per capita GDP, the smaller the job losses appear to be (with the exception of Germany).

In terms of sectoral breakdown, job losses are strongest in the short-run in "Basic & fabricated Metals", in "non-metallic Minerals" and in "Machinery" and in the long-run potentially also in "Rubber & Plastics" and "Food Products". The chemical sector seems relatively less affected by MES for China than other sectors.

The numbers in Table 1 are subject to changes in the special case where the EU aims to maintain the effectiveness of TDIs. When costs and prices in China would be considered as distorted and cannot be used for the calculation of dumping margins and duties, a technique of "benchmark country cost plus union industry profit margin" can be used to calculate dumping margins. With the "lesser-duty-rule" (LDR) in place, this technique would result in an average tariff that is -3.86% lower than in the status quo and would result in EU job losses compared to status quo of around -10 300 jobs in the **short-run** and around - 25 100 jobs in the **long-run.** Removing the LDR in addition to applying benchmark country costs plus UI profit margin**,** would result in an average tariff increase of +7.81% compared to status quo tariffs in current TDIs and would result in additional EU jobs being saved compared to those under original duties of around +20 200 in the **short-run** and around +49 500 in the **long-run**. These would be the EU jobs that can additionally be safeguarded in comparison with the status quo.

Table 1: Summary of the Possible Employment effects of EU granting MES to China in Three Scenarios

3 Scenarios:	Percentage effect		Job loss (upper bound)	Chinese imports covered by AD duties [a] (%)
	Benchmark (CN8) estimates	Product-level estimates		
Limited analysis: only direct effects, only limited set of sectors				
1. Simple extrapolation from the 10 cases to TDI sensitive sectors [b]	-6.11% [c]	-9.7%	< 22,000	N/A
Full analysis: **direct** & **indirect** effects, all tradable goods sectors				
2. Short-run effects based on all *existing* 52 cases on China	-0.121% [c]	-0.193%	< 83,100	2.5%
3. Potential long-run effect with increased dumping in *new* product categories by China	-0.294% [c]	-0.469%	< 201,800[6]	5.7%

[a] The share of Chinese imports covered by AD duties is calculated under the old methodology and are expected to be 40% lower under the new methodology. The percentage stated in Table 1 is therefore rather a share of dumped trade in total trade.

[b] TDI sensitive sectors are sectors where TDI action is present (based on the 52 cases).

[c] The percentages in Scenario 1 weigh all cases equally and are applied to the total employment in TDI sensitive sectors which was 231,000 (June 2015). The percentages in Scenarios 2 and 3 use a sector-specific employment elasticity based on estimates from the 10 cases and then constructs a weighted average effect for the entire tradable goods sector (agriculture, mining, manufacturing) which comprises total employment of 43 million (November 2015).

[6] An earlier draft of this report mentioned an upper bound of job effects of 211 000, but due to some changes in the methodology the effect has now been estimated to be somewhat smaller.

Synthèse du Document

Si la Union européenne devait appliquer le statut d'économie de marché (MES) dans les dossiers d'Instruments de défense commerciale (TDI) contre la Chine, cette décision devrait réduire les droits antidumping imposés sur les produits importés de Chine d'environ 30 points de pourcentage, en comparaison d'une méthode de pays analogue.[7] Par conséquent, les prix bruts à l'importation sur des produits importés de Chine qui sont soumis aux TDI diminueraient de 20 pour cent une fois le droit imposé. On estime que la baisse des droits antidumping sur les importations chinoises engendre alors une réduction des prix chinois sur le marché européen et 18 à 28 pour cent d'importations chinoises en plus qu'avec la méthode du pays analogue. D'après nos calculs, les importations chinoises augmenteront sous le régime MES et remplaceront les ventes du secteur concurrent dans les importations européennes (ou de pays tiers concurrents). Le but de cette étude est d'évaluer les effets directs et indirects de ce changement de régime sur l'emploi dans divers scénarios, que nous commenterons dans cet ordre ci-après.

Dans le Scénario 1, nous extrapolons de 10 dossiers AD récents, dont les données nous ont été fournies par la Commission, le volume total des échanges bilatéraux affectés par des TDI. Les pertes d'emplois (directes) dans les produits (ou les secteurs) actuellement concernés par des mesures TDI atteindraient, selon les estimations, entre 14 000 et 22 000 postes, en l'absence de tout facteur d'atténuation.[8]

Dans le Scénario 2, nous changeons d'angle de vue et nous prenons en compte tous les produits chinois actuellement soumis à des TDI (52 dossiers) (novembre 2015), pour lesquels les données disponibles sont néanmoins moins détaillées. Sur la base des moyennes des années récentes, nous supposons que 2,5 %[9] du total des importations de Chine[10] seront couverts par des TDI et nous extrapolons jusqu'à ce niveau. Nous utilisons cette moyenne historique parce qu'à court terme, l'éventail des produits affectés par le dumping restera inchangé. Nous estimons que les pertes d'emplois (directes) consécutives se situeront entre 49 700 et 73 600 postes.

[7] Cette réduction moyenne est la combinaison de droits AD réduits dans certains dossiers (où l'enquête conclurait encore que les sociétés chinoises pratiquent le dumping) et de la suppression des droits AD dans d'autres cas.

[8] Ceci est basé sur les moyennes non pondérées obtenues dans 10 dossiers antidumping utilisés à des fins d'extrapolation. L'emploi total actuel dans les secteurs protégés par des TDI liés à la Chine est de 231 000 postes (juin 2015).

[9] Vandenbussche et Viegelahn (2011) montrent que la proportion de produits importés de Chine par l'UE et soumise à la protection antidumping de l'UE atteignait un niveau légèrement supérieur à 2 % en 2009.

[10] La méthodologie utilisée pour parvenir à 2,5 % est expliquée clairement dans les sections suivantes (p.11) et nous permet d'évaluer également les effets indirects sur l'emploi, pour lesquels nous devons nous tourner vers la base de données WIOD.

Les Scénarios 1 et 2 abordent tous deux les effets à court terme[11] de l'octroi du MES. Ils utilisent des méthodes d'agrégation distinctes pour extrapoler à partir de cas individuels afin d'estimer l'impact sur l'ensemble de l'économie et ainsi fournir un test de robustesse pour les effets directs sur l'emploi. Dans le Scénario 1, l'élasticité moyenne de l'emploi est appliquée directement au niveau global actuel de l'emploi affecté par des TDI : 231 000 postes. Le Scénario 2 effectue des projections à partir des 52 dossiers AD existants afin d'en déduire le volume sur le commerce impacté pour chaque niveau sectoriel HS4 respectif et ajoute les effets aux secteurs individuels d'abord, puis à l'ensemble de l'économie dans la dernière étape. Ceci rend le Scénario 2 plus englobant que le Scénario 1. Une seconde différence est que la méthodologie du Scénario 2 permet aussi de quantifier les effets indirects, ce qui n'est pas possible au niveau d'agrégation appliqué par le Scénario 1.

Dans le Scénario 3, nous envisageons la possibilité que le régime MES puisse avoir des effets supplémentaires à long terme, avec un impact aussi sur de *nouveaux* produits qui ne sont pas encore soumis aux TDI de l'UE. Les importations de Chine qui font l'objet d'un dumping sont susceptibles de s'étendre dans plusieurs catégories de produits qui n'ont pas été soumises aux enquêtes de l'UE pour dumping auparavant. Les effets du Scénario 3 ne prédisent pas forcément ce qui arrivera à l'avenir, mais ils illustrent plutôt ce qui pourrait se produire dans le pire des scénarios. Nous nous servons de dossiers AD américains contre la Chine et de dossiers AD européens contre d'autres pays pour obtenir des informations sur la répartition sectorielle de ces nouveaux cas potentiels. Dans ce cas, la part des importations de Chine soumise aux TDI augmenterait jusque 5,7 %, comme nous le montrons dans une estimation supérieure raisonnable à long terme. La combinaison de ces effets potentiels à long terme et du régime MES pourrait engendrer entre 117 800 et 175 600 pertes d'emplois (directes) au sein de l'UE, dans des secteurs TDI concurrencés par les importations. Nous qualifions cet impact de potentielles pertes d'emplois *directes* à long terme.

En plus des effets *directs* sur l'emploi, il y aura probablement des effets *indirects* sur l'emploi dans l'UE. Les effets *indirects* désignent les répercussions sur les producteurs européens en amont ou en aval.

Les producteurs européens en aval bénéficient directement des produits moins chers importés de Chine, proportionnellement à leur utilisation, et si des fournisseurs européens s'alignent partiellement sur la réduction des prix chinois à l'importation, le bénéfice sera encore plus grand. Comme les producteurs européens en aval seront en mesure de produire à un coût moindre, ils pourront étendre leur production et la demande de main-d'œuvre augmentera sous le régime MES pour la Chine. A l'aide des données WIOD, nous estimons que les effets *positifs* du MES sur l'emploi en aval *engendreront* 13 100 (Scénario 2) à 28 400 (Scénario 3) postes dans l'UE, respectivement à court et à long terme.

En revanche, les producteurs UE en amont seront probablement affectés négativement par le régime MES puisqu'au sein du secteur européen dans lequel ils vendent une majeure partie

[11] Le court terme ne désigne pas une période d'un an, mais se réfère à la couverture AD des produits, que l'on peut considérer inchangée à court terme.

de leur production, les producteurs chinois leur prennent des parts de marché (leurs clients). A partir de la base de données WIOD, nous avons établi que les sociétés chinoises utilisent moins de produits provenant de l'UE que leurs concurrentes européennes pour alimenter leur production. Un fait qui nous permet de déduire que la demande sera réduite sous le régime MES pour les producteurs européens en amont. Ce recul de la demande pour la production des fabricants européens en amont pourra entraîner des effets *négatifs* sur l'emploi dans l'UE dans ces secteurs. Nous estimons que ces glissements en amont pourront provoquer des *pertes* d'emplois dans l'UE qui se situent entre -15 300 et -54 600 postes, selon les estimations utilisées et le cadre temporel envisagé.

Dans la plupart de nos scénarios, nos estimations suggèrent que les effets *indirects* sur l'emploi *en amont* dépasseront les effets *indirects* sur l'emploi *en aval*. Dès lors, l'effet *indirect total* sur l'emploi s'avère le plus souvent *négatif* puisque l'effet négatif sur l'emploi en amont excède l'effet positif en aval.

En supposant que les effets multiplicateurs macroéconomiques ne dépasseront pas un, la somme des effets directs et indirects sur l'emploi représente les effets sur l'ensemble de l'économie de l'octroi du MES à la Chine par l'UE.

Le Tableau 1 résume l'estimation supérieure des effets possibles sur l'emploi de l'octroi du MES à la Chine dans le cadre de trois scénarios distincts. Dans le Scénario 1, nous appliquons des estimations issues de 10 dossiers AD sélectionnés à l'emploi actuel dans des secteurs sensibles aux TDI. Dans le Scénario 2, nous étendons la base de notre analyse à tous les dossiers AD existants contre la Chine (52) et nous y voyons les effets sur l'emploi à « court terme ». Dans le Scénario 3, nous rapportons les effets hypothétiques sur l'emploi à « long terme » si le dumping par les sociétés chinoises devait s'étendre bien au-delà des produits actuellement examinés.

Dans les Scénarios 2 et 3, nous rapportons dans le Tableau 1 la somme des effets hypothétiques *directs et indirects* sur l'emploi de l'octroi du MES à la Chine. Il s'agit d'estimations supérieures pour l'ensemble du secteur des biens (agriculture, activité minière et fabrication), qui atteignent 83 100 et 201 800 postes, respectivement.

Si l'on fait la répartition par pays membre, les pertes d'emploi les plus significatives ont lieu en Allemagne et en Italie. Les autres pays de l'Union Européenne subissent des pertes d'emploi moindres, et l'impact est clairement différencié selon les pays. Les pertes d'emploi tendent à être plus importantes dans les grands pays, même si l'Italie semble touchée de façon disproportionnée puisque les pays de taille similaire en termes de population comme le Royaume-Uni ou l'Espagne semblent subir une perte d'emploi moins importante. En outre, l'on note que les pertes d'emploi sont relativement moindres dans les pays où le PIB par tête est plus élévé (avec l'exception de l'Allemagne). En termes de répartition sectorielle, les pertes d'emploi les plus importantes concernent l'industrie des "Produits métallurgiques de base et manufacturés", celle des "Minéraux non-métalliques" et l'industrie de la "Machine-Outil" ainsi que, à plus long terme, potentiellement l'industrie de "Caoutchouc et des Matières Plastiques" et "l'Industrie agroalimentaire". Le secteur de la chimie est relativement moins affecté par le MES pour la Chine que d'autres secteurs.

Les chiffres du premier tableau (Tableau 1) sont sujets à modification dans le cas spécifique où l'Union Européenne met en oeuvre des mesures afin de maintenir l'efficacité des Instruments de Défense Commerciale (TDI). Si l'on considère que les coûts et les prix observés en Chine sont faussés et ne peuvent être utilisés pour le calcul des marges de dumping et les droits de douane associés, alors la technique dite du 'coût du pays de référence augmenté de la marge de profit de l'industrie de l'union' peut être utilisée pour calculer les marges de dumping. Si la 'règle du droit moindre' (LDR) s'applique, cette technique résulte en un droit de douane moyen qui est de 3,86% inférieur au statu quo et une perte à court terme d'environ 10 300 emplois de plus que dans le statu quo et une perte à long terme d'environ 25 100 emplois de plus que dans le statu quo. Si l'on n'applique pas la règle du droit moindre tout en continuant à appliquer la technique du coût du pays de référence augmenté de la marge de profit de l'industrie de l'union, alors l'on obtient une augmentation de 7,81% du droit de douane moyen relativement aux droits de douane associés aux Instruments de Défense Commerciale actuellement en place. Dans ce cas de figure, +20 200 emplois européens sont sauvegardés à court terme relativement à l'emploi associé aux droits de douane actuels et +49 500 emplois supplémentaires sont sauvegardés à long terme. Ce sont ces emplois supplémentaires qui peuvent être maintenus relativement au statu quo.

Tableau 2: Synthèse des Effets Possibles sur l'Emploi de l'Octroi par l'UE du MES à la Chine dans 3 Scénarios

3 scénarios:	Impact en pourcentage		Perte d'emplois (estimation supérieure)	Importations chinoises couvertes par droits AD [a] (%)
	Estimations benchmark (CN8)	Estimations produits		
Analyse limitée : effets directs uniquement, nombre limité de secteurs seulement				
4. Simple extrapolation de 10 dossiers à des secteurs sensibles aux TDI [b]	-6.11 % [c]	-9.7 %	< 22 000	N/A
Analyse complète : effets **directs** et **indirects**, tous secteurs de biens commercialisables				
5. Effets à court terme basés sur les 52 dossiers *existants* sur la Chine	-0.121% [c]	-0.193%	< 83,100	2,5 %
6. Effet potentiel à long terme avec dumping accru dans de *nouvelles* catégories de produits par la Chine	-0.294% [c]	-0.469%	< 201,800[12]	5,7 %

[a] La part des importations chinoises couverte par des droits AD est calculée selon l'ancienne méthodologie et devrait être de 40 % inférieure sous la nouvelle méthodologie. Le pourcentage indiqué dans le Tableau 1 exprime donc plutôt une part des échanges qui font l'objet d'un dumping dans le total des échanges.

[b] Les secteurs sensibles aux TDI sont des secteurs dans lesquels des mesures TDI sont appliquées (sur la base des 52 dossiers).

[c] Les pourcentages dans le Scénario 1 accordent un poids égal à tous les dossiers et sont appliqués à l'emploi total dans des secteurs sensibles aux TDI, qui était de 231 000 postes (juin 2015). Les pourcentages dans les Scénarios 2 et 3 utilisent une élasticité de l'emploi spécifique aux secteurs, basée sur des estimations issues des 10 dossiers, puis établit un effet moyen pondéré pour l'ensemble du secteur des biens commercialisables (agriculture, activité minière, fabrication) qui comprend un total de 43 millions d'emplois (novembre 2015).

[12] Dans une version précédente, on avait un effet de 211 000 emplois, mais à cause de certains changements dans la méthodologie, l'effet as diminué un peu.

1. Introduction

Currently, the EU Commission is analyzing the effects of changing the methodology when calculating dumping margins in investigations regarding China. This study was commissioned to contribute to the debate on the potential economic effects of such a change in the methodology in view of the impending expiration of some provisions in China's Protocol of Accession to the WTO on December 11, 2016. If China were granted market economy status (MES), the Commission would need to change the way it calculates the "normal value" of Chinese exports, which is then compared to the export prices in order to establish the existence of dumping.

Currently, the normal value in China is usually calculated using prices and/or costs from a third country that is considered a market economy, a so-called "analogue country." In current anti-dumping (AD) investigations, the Commission can grant market economy treatment (MET) to individual Chinese exporters which file a request and satisfy several criteria. If that is the case, prices and costs provided by the interested Chinese producers themselves are used to calculate the "normal value", either the price at which the product is sold in China or an estimate of the production cost with an added margin to cover trading costs and a profit margin. Under MES, it would become the norm to use Chinese prices and costs in determining whether dumping is actually taking place and in determining the applicable dumping margin.

In this report we analyze the likely effects on EU employment in the tradable goods sector[13] if all dumping cases involving Chinese firms would be assessed under the MES methodology. The starting point of our calculations is the re-analysis of 10 recent AD cases, for which the EU Commission could compile sufficient data to construct a baseline and a counterfactual set of measures under MES. Currently, the average duty imposed in these cases is 38.5% and the Commission estimates that under the new methodology, duties would not have been imposed in 3 cases and would have been lower in 7 cases. On average, the duties imposed under the MES methodology would be 30 percentage points lower than the actual situation under the old methodology. This average reduction is a combination of lower AD duties in some cases (where the investigation would still conclude Chinese firms are dumping) and the elimination of AD duties altogether in other cases.

Based on this information, we develop a methodology to evaluate the broader employment effects of such a change in methodology to assess dumping involving Chinese firms. Note that we only aim to evaluate the changes in employment in the new regime. We do not aim to predict the absolute effect of AD enforcement on employment. We only

[13] We focus on the tradable sector but cannot exclude that some activities in the upstream and downstream industry are non-tradables.

estimate the counterfactual, the differential effect of the new (MES) versus the old (analogue country) methodology.

In Scenario 1, we arrive at direct employment effects by extrapolating estimates based on 10 AD-cases to all TDI-sensitive sectors.[14] However, in view of the limited number of cases, this is only an incomplete analysis. In Scenario 2, we consider all the Chinese products currently subject to TDI cases (52 cases). In Scenario 3, we additionally consider the possibility that in the future, AD enforcement could spread to more products (a hypothetical long-run scenario).

In the last two scenarios we consider not only the direct employment effects in sectors directly affected by AD duties, but also the indirect employment effects arising from spillover effects on upstream sectors that supply inputs and on downstream sectors that use the directly affected products as inputs.

Once we obtain the overall job effects, we engage in a breakdown of the overall job effects by sector and by EU member state.

In the final section of the report, we investigate the job effects in the special case where the EU aims to maintain the effectiveness of TDIs. When costs and prices in China would be considered as distorted and cannot be used for the calculation of dumping margins and duties, a technique of "benchmark country cost plus union industry profit margin" can be used to calculate dumping margins. We consider job effects under this technique both when keeping the "lesser-duty-rule" (LDR) in place and when removing the LDR. Job effects will be estimated for both the short-run and the long-run.

The remainder of this report is organized as follows. In Section 2 we provide a brief literature review. In Section 3 we outline the four analytical steps that our analysis will take, which is followed by a more detailed description of each step of the analysis in Sections 4 to 7. In Section 8 we summarize our findings and provide an overview of the estimated potential employment effects for the 3 scenarios that vary in product-coverage. In section 9, we discuss the estimated job effects at sector-level and for each EU member state. Finally, in section 10, we discuss measures that the EU can apply to maintain the effectiveness of TDIs.

[14] TDI stands for Trade Defense Instruments.

2. Literature survey

There is a small but growing literature on the employment effects of trade policy changes. Most studies have focused mostly on the import-competing industries. For example, Konings and Vandenbussche (2008) have shown that anti-dumping protection helps smaller European firms to maintain their market share and avoid layoffs.

But TDI can have additional effects beyond the direct effects on products that are protected. This has been shown by several papers. While Vandenbussche and Zanardi (2008) estimated the EU's imports subject to AD duties to lie around 2%, they point out that the total amount of trade affected by the trade policy is larger due its deterrent effect on other trade flows. The imports under protection have a "chilling" effect on other existing trade flows, not subject to measures. As a result, EU trade flows would be 8% higher if anti-dumping policy was lifted altogether. The finding that anti-dumping protection results in "missed trade" is confirmed by Prusa and Besedes (2013) who show the "death of trade flows" as a result of trade protection. This suggests any reduction in tariffs, does not only affect the *intensive* margin of affected trade flows e.g. "how much" is shipped, but also affects the *extensive* margins of trade e.g. "how many" products that are subject to protection (Klenow and Rodriguez-Clare, 1997; Goldberg et al., 2010).

Another study showing that TDI have an effect on the extensive margin was given by Vandenbussche and Viegelahn (2011). They show that for the last decade, the EU product coverage of anti-dumping cases has increased, now including sectors and products that were not subject to protection before. The share of products covered with anti-dumping has gone up from 1.2% in 1999 to over 2% in 2009.

Migyagiwa et al. (2015) show that the future evolution of anti-dumping cases against a trade partner heavily depends on the relative market size. Countries of equal economic size are less likely to start anti-dumping wars, due to the costly effects of reciprocal measures, which often occur (Blonigen and Bown, 2003). All these papers show that trade policy is a dynamic phenomenon and its coverage tends to vary over time with opposing forces. The outcome of these trends is ultimately an empirical issue.

A recent paper by Acemoglu et al. (2014) on the employment effects of trade with China for the US, estimates an import penetration elasticity that is negative and significant, suggesting that an increase in Chinese imports displaces US workers in industries with high import penetration.

The more downstream effects of a change in the import regime have been studied even less. Viegelahn and Vandenbussche (2015) is one of the few papers that get into this. They show that European anti-dumping protection has negative effects on downstream industries that use the protected product as an input. The imposition of antidumping measures on the inputs used in production raise marginal costs. This increase in marginal cost is then imperfectly passed-through to output prices which subsequently results in lower markups of

input-using firms. Reversing their result, it suggests that trade liberalization or a regime switch in which imports become cheaper is likely to have beneficial effects on downstream European producers. Access to cheaper Chinese inputs is likely to raise demand for downstream EU producers and hence raise labour demand in these firms. A similar conclusion was reached by Blonigen (2015) for the steel sector who showed that industrial policy on upstream US producers, negatively impacts the competitiveness of downstream steel exporters. Likewise, studies by Konings and Vandenbussche (2013), Hoekman and Leidy (2001) found that input-users suffer from upstream TDI protection.

The literature thus seems to suggest that the indirect effects of TDI are important to study and quantify. As countries' value chains are becoming increasingly international, trade policy is likely to have an impact on sourcing as well as offshoring patterns (Van Biesebroeck and Zhang, 2014).

From a theoretical point of view, several trade models developed in the literature can guide our priors (Melitz, 2003). A reduction in tariffs, as can be expected from the granting of MES to China, induces consumers to substitute away from relatively expensive European products towards cheaper Chinese imported products. The magnitude of this *substitution* effect in demand will depend on the elasticity of substitution between the European and the Chinese products. Thus, for import-competing European firms, the substitution effect will dominate and will result in a decline of output for these firms as a result of a more liberal trade policy regime towards China. Based on a standard trade model's prediction, we expect the *direct* employment effects to the EU industry to be negative and strongest in those firms selling a similar product to the Chinese one (Willig, 1996). The question that remains is however, to what extent *indirect* effects add to or offset the direct negative employment effects.

What are the effects on upstream firms that are supplying the EU import-competing firms? Lower AD duties on China, will have a negative demand and output effect on EU import-competing industries, which in turn will spillover to all its suppliers in the value chain. In the absence of an offsetting force, lower Chinese duties thus result in lower demand and output effects on upstream European suppliers. These indirect upstream effects will add to the direct negative employment effects faced by EU import-competing firms.

What are the effects on downstream firms? Whenever EU firms use Chinese imports as inputs, theory predicts that a *market expansion* effect will occur for these downstream industries.[15] The mechanism runs as follows. When European downstream producers use cheaper Chinese inputs as inputs in their production, this lowers their marginal cost of production and hence lowers their output price. This reduction in output price will raise demand for downstream European products. This results in an increase in labour demand and positive employment effects in downstream sectors (Goldberg et al., 2010). Even when

[15] A CES model of trade predicts full pass-through of the marginal cost reduction to output price and thus the market expansion effect is likely to be large. A quadratic utility model of trade predicts pass-through of 50% whereby European producers do not fully pass on the cost savings to consumers, but instead allow their markups to rise (Vandenbussche et al., 2012).

European downstream producers continue to use European inputs in production after a duties' reduction on similar Chinese inputs, the price of these European produced inputs is likely to fall. The reason is that European input producers will be subject to downward price pressures as a result of the stronger competition from Chinese like products. This "matching" of European prices to Chinese input prices will add to the downstream positive employment effects as all downstream EU producers will now have lower input prices, including the ones that use European inputs.

In sum, the literature has shown that TDI have both direct and indirect employment effects. Thus, part of the challenge in this report lies in empirically identifying the sign and size of the upstream and downstream employment effects and to what extent they can offset or add to the direct employment effects in TDI sectors directly affected by the MES trade regime towards China. In addition, evidence suggests that trade policy is not static, but has extensive margin effects on product coverage. Thus another challenge consists in making a reasonable assessment of the long-run extensive margin effects of trade policy, where we allow the product coverage of China in TDI to vary in the future from what it is currently.

3. Outline of the analysis and Graphical Representation

The analysis proceeds in four consecutive steps with a natural progression, as each step takes the output of the previous step as input. We present a graphical representation of the steps involved at the end of this section. The objective is to obtain an estimate for the differential employment effects on the EU if it were to grant China MES in AD investigations.

Step 1: Revisiting the expected employment effects in the 10 selected AD cases
We start with an independent assessment of the possible *direct* employment effects in the 10 anti-dumping cases the Commission selected for the purpose of this study which allowed us to use detailed (confidential) information. For this purpose we estimate behavioural elasticities on (a) bilateral import demand and (b) employment with respect to bilateral imports for the ten recent AD cases where counterfactual duties under MES could be established.

Using two alternative sources for trade data, COMEXT (CN8) and the data collected by case handlers (product-level), allows for the establishment of two alternative sets of parameters, which allow to sketch a confidence range rather than a point estimate throughout the entire subsequent analysis.

An extrapolation from these 10 cases to the entire employment currently affected by bilateral TDIs allows for a first, rather rough quantification of the overall direct effects, referred to as scenario 1 in the study.

Step 2: Assessing the likelihood each EU sector will face dumping by Chinese firms
In order to receive more realistic, comprehensive results, three elements are missing:

1. An overall quantification of the spread out: Earlier research shows that 2.5% and, respectively 5.7% of all bilateral trade before measures are a reasonable order of magnitude for the short and long term.
2. Sectoral distribution of the spread-out: In the ten cases described in step 1, on average 22% of bilateral imports under the corresponding 4-digit HS product categories are affected. This number is used to sketch a counterfactual distribution of potential spread out under MES: In the short run, 22% of all sectors currently affect by bilateral TDI are assumed to be dumped.[16] In the long run, other sectors are assumed to be affected on top of that, though by a lesser percentage of the bilateral trade. The distribution of these sectors is inferred by TDI cases by either the EU or China with third countries. The resulting overall percentage of bilateral trade is the one mentioned above under point 1.

[16] 44% if there are multiple cases in one HS4 product category.

The short-run scenario assumes that product coverage remains the same which we refer to as scenario 2. The long-run scenario assumes the possibility of new AD-cases in the future in products that thus far have not occurred under EU TDI cases, which we refer to as scenario 3.

3. In order to link to upstream and downstream sectors, the information at the detailed 4-digit HS product category level is aggregated up to the sector classification used by the World Input Output Database (WIOD).[17]

Step 3: Generalizing the direct employment effects of Chinese MES for the *entire* economy

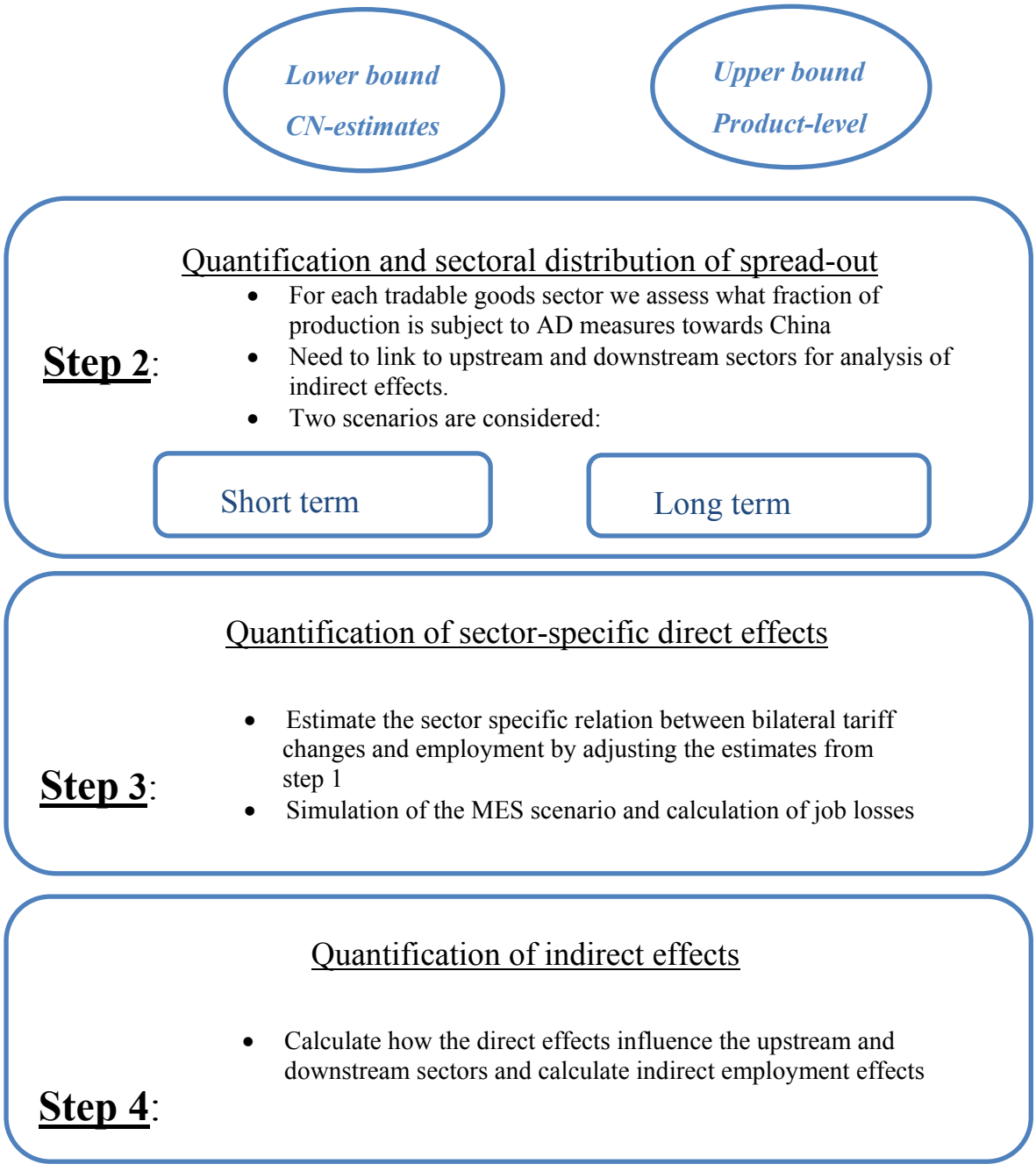
We estimate sector-specific relations between bilateral tariff changes and employment by adjusting the estimates from step 1 estimates for sector characteristics. Sector specific parameters, so-called semi-elasticities are estimated. These describe the quantitative relationship between bilateral tariff reductions and sectoral employment. Taking into account sector specific import penetration rates by China and by third countries, allows for sector specific parameters.

Subsequently, these parameters are used to simulate the employment effects of lower AD tariffs under MES.

Step 4: Adding *indirect* employment effects

WIOD Input-Output-coefficients are applied to quantify indirect employment effects in upstream and downstream sectors

[17] The sector classification of the ten cases cannot be linked to WIOD, Furthermore, these ten cases are a limited snapshot in terms of sector coverage.


Lower bound
CN-estimates
Upper bound
Product-level
Step 2:
Quantification and sectoral distribution of spread-out
For each tradable goods sector we assess what fraction of production is subject to AD measures towards China
Need to link to upstream and downstream sectors for analysis of indirect effects.
Two scenarios are considered:
Short term
Long term
Step 3:
Quantification of sector-specific direct effects
Estimate the sector specific relation between bilateral tariff changes and employment by adjusting the estimates from step 1
Simulation of the MES scenario and calculation of job losses
Step 4:
Quantification of indirect effects
Calculate how the direct effects influence the upstream and downstream sectors and calculate indirect employment effects

Parameter Estimations based on recent AD cases against China

- Two complementary datasets allow for a range to be estimated throughout the study:

Step 1:

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employment elasticities in the 10 AD-cases with respect to Chinese imports. Together, these elasticities will provide us with the necessary multipliers that allow us to calculate the EU employment effects of a change in the status of China under the anti-dumping law which we call Scenario 1. This change in trade policy regime is likely to result in a lower incidence of dumping, in lower AD duties on Chinese imports and in lower Chinese border prices. Our objective is to assess the direct employment effects of this potential regime shift, on EU firms operating in similar sectors compared to the Chinese imported products. The information derived from the 10 AD- cases in this first step will then serve as an input in the following steps of the analysis.

The sample of ten cases is part of a full population of 52 cases with measures currently in force vis-à-vis China. These are all cases for which it was possible to establish a hypothetical dumping margin under MES. While they constitute only about 20% of the total number of current cases, they account for more than 40% of the current employment safeguarded by bilateral AD measures.

4.1 Benchmark Model

STEP 1A: Elasticity of Import-demand for Chinese imports

First, we estimate "import-demand elasticities" that capture the sensitivity of Chinese imports into the EU to a change in the Chinese import price. In the event of a tariff decrease, the Chinese import price is likely to fall, which will stimulate EU demand and will have a positive effect on Chinese imports. For each of the 10 cases we were handed, we estimate expected import effects of granting MES to China. The data that we use for this purpose are data at the 8-digit product-level (COMEXT, EUROSTAT) that correspond with the product classification of the products involved in the 10 anti-dumping cases. We use annual data from 2000 and 2014 which gives us meaningful results on the elasticities.[19] From Comext we obtain all the bilateral trade flows in the CN8 products affected by AD-protection from any bilateral trade partner into any European member state. Then we kept only the import flows in these antidumping products coming from China.[20] In our dataset we verified that the CN8

[18] Erkel-Rousse and Mirza (2002) discuss the importance of import-demand elasticities in trade.

[19] The elasticity estimates that we obtain are comparable to Kee et al. (2014) in most cases.

[20] The period spans from the year 2000 to 2014.

codes that corresponds to the AD-cases, did not change during subsequent classification revisions.[21]

We then use these data to regress Chinese imports in volumes into the EU in each anti-dumping-case *i*, on Chinese import prices as well as on an average import price from all the other countries in the world importing the same product into the EU, in the following way

$$\log(\text{IMP})_{\text{China\_i,t}} = \alpha + \boldsymbol{\beta_i}.\ \log(\text{price})_{\text{China\_it}} + \delta.\log(\text{price})_{\text{Others\_it}} + \in_{\text{it}} \qquad (1)$$

The estimated coefficient $\boldsymbol{\beta_i}$, provides us with an estimate of import-elasticity in every anti-dumping case:[22]

$$\frac{\partial \log(\text{Imp})}{\partial \log(\text{price}_{\text{china}})} = \boldsymbol{\beta_i}, \text{ import demand elasticity of Chinese import prices}$$

Controlling for the average price level of imports from the rest-of-the-world as we do in (1), does not substantially affect the estimated coefficients. The reason for this is that in the 10 AD-cases under scrutiny, the share of Chinese imports in total imports of the product is particularly high and much higher than for other products in the same sector. For comparison, the average Chinese import penetration at the Nace rev.2, 2-digit sector level to which these products belong is much lower. Therefore the rest-of-the-world's import share in the 10 AD-cases is much smaller than in other products. We also experimented with the inclusion of year dummies to account for unobserved shocks over time, but this did not substantially alter the estimates on $\boldsymbol{\beta_i}$.

The import-demand elasticities that we get on the basis of (1) can usefully be compared with available import-demand elasticities at HS6 level in the literature (Kee et al, 2008, World Bank) and the results are not that different.

In our estimates of the import-demand elasticities we control for the country of origin (e.g. China) in the trade flows and we turn to a more detailed product level e.g. CN8 versus HS6-level.

Estimates range from an elasticity of -0.17 in the case of "Compressors" (case AD519) to an elasticity of -2.02 in the case of "Solar Glass" (case AD598) which can be seen from column 1 in Table 3. In the Appendix, we report the regression results for each case.[23]

[21] From Ramon, EUROSTAT, we verified all subsequent CN8 classification changes between 2000 and 2014 to make sure product codes did not change.

[22] In the estimation we control for outliers in the price and quantity data and experimented with regressions in levels and first differences where the latter additionally controls for measurement error resulting in lower estimates.

[23] These estimates are at the CN8 product-level (from one country of origin, China) and typically much lower than the (import)-demand elasticities at sector level (Broda and Weinstein, 2004).

Next, we multiply the import-demand elasticity, β, with the "percentage change of the Chinese import price that would happen under the MES regime". In the event of MES, we expect the AD-duties would be lower. This can be verified in Table 3, where we show in column (2) the AD-duties that apply under the analogue country methodology where we rounded the decimals, and in column (3), where we show the AD duties that would apply if China would obtain MES. What Table 3 shows is that duties are typically lower under the MES regime than in the analogue country regime. This implies that Chinese imports (import duty paid or after the duty) would become cheaper to EU consumers when moving from the analogue country regime (AC) to an MES regime. The extent to which gross prices (after the duty) are lower with a lower imposition of the AD-duty is given by the following formula:

$$\Delta \mathrm{p}_{\mathrm{gross}} = \frac{\mathrm{p}_{\mathrm{net}} + \mathrm{duty}_{\mathrm{MES}}}{\mathrm{p}_{\mathrm{net}} + \mathrm{duty}_{\mathrm{AC}}} - 1 \qquad (2)$$

Rewriting (2) implies that $\Delta p_{gross} = \frac{\Delta tariff}{p_{net} + duty\_AC}$. This results in a percentage change in gross Chinese import prices (after the duty) that corresponds with the percentage point changes in the EU AD-duty.[24] The changes in gross output prices after the duty that correspond with a fall in AD-duties, is given in column (5) of Table 3.

Next, we multiply the expected Chinese gross import price change in column (5) in Table 3 by the import-demand elasticity, β, to obtain a Chinese imports multiplier in column (6). This multiplier gives us a "percentage increase in Chinese imports as a result of MES", whose expression is shown below and whose value per case can be found in the last column of Table 3.

$$\text{Chinese Import Multiplier} = \beta_{\mathrm{i}} \; {}^{*}\Delta \; \%\ \mathrm{price}_{\mathrm{China}} \text{ under MES regime}$$

= percentage increase in Chinese import volumes into EU, resulting from granting MES

Important to note is that in Table 3, we assume full pass-through of AD duties into Chinese prices in all trade policy regimes. This assumption corresponds most closely to the legal interpretation of the anti-dumping law e.g. the imposition of the tariff is expected to raise Chinese prices to EU consumers by at least the full amount of the tariff. The EU anti-dumping law rules out "absorption" of tariffs by Chinese exporters (see article 12 of Regulation 1225/2009).

[24] An example can illustrate this. Suppose the import price before protection is 100€ and that AC duty is 25% and MES duty 10%. Then the percentage tariff change between the two regimes is 15%. However, it would be wrong to say that import price under MES would be 15% lower than under AC. The correct way to think about this is that 15€/125€=12%. Thus, the difference paid in terms of tariffs needs to be divided by the gross price in the AC regime. This suggests that a 15% tariff reduction when comparing AC to MES, corresponds to a 12% reduction in gross prices.

The import-demand multiplier that corresponds with this benchmark scenario thus reflects a full pass-through of tariffs to consumers.

Table 3: Tariffs and Prices of Chinese Importers (Benchmark)

Case	Import-demand elasticy	Tariff under analogue country	Tariff under MES	Δ tariff	Δ p_gross	Chinese Import Increase due to MES
	(1)	(2)	(3)	(4)	(5)	(6)
AD511 (Persulfates)	-0.616**	72%	21.8%	-50.2%	-29%	18.2%
AD516 (FeSi)	-1.30**	26%	15.6%	-10.4%	-8%	10.3%
AD519 (Compressors)	-0.17**	76.5%	13.2%	-63.4%	-30%	5%
AD522 (Citric Acid)	-0.76**	36%	6.6%	-29.4%	-21%	16%
AD528 (Candles)	-0.68***	12%	4.0%	8.1%	7%	4.8%
AD560 (Ceramic Tiles)	-0.32***	31%	8.0%	-23%	-17%	5.4%
AD584 (O. Coated Steel)	-0.750***	40%	0.0%	-40.2%	-29%	21.3%
AD585 (MTF)	-1.19***	43%	16.1%	-26.9%	-19%	22.7%
AD598 (Solar Glass)	-2.02***	37%	0.0%	-37%	-27%	54%
AD614 (Tartaric Acid)	-0.71***	11.3%	0.0%	-11.3%	-10%	7.1%
source	8-digit CN data on Chinese imports	EU data on the cases	EU data on the cases	(col.3) – (col.2)		(col.1) * (col.5)

Notes: The estimates in (1) are short-run elasticities and were obtained from 8-digit product level data from COMEXT. The regression results are reported in the Appendix. Significance levels: * for 10% level, ** at 5% and *** at 1% level. In (4) is the difference in AD-tariffs if China were granted market economy status (MES). In (6), the import multiplier gives the percentage change in Chinese imports resulting from a gross price change that corresponds fully to the tariff change.

STEP 1.B.: Elasticity of European Employment with respect to Chinese Imports

Once we obtain the effect of lower AD duties on Chinese imports, we turn to the estimation of employment elasticities. This will tell us how rising Chinese imports affect EU employment in the AD-cases we have at hand. To estimate the sensitivity of EU employment to Chinese imports, we use confidential EU data for the period before protection. Next to Chinese imports, we include additional control variables that are likely to affect EU employment such as EU production, (domestic EU sales + EU exports) and imports from the

rest of the world.[25] This way, when estimating how a change in Chinese imports affects EU employment, we control for the additional sources of variation that can account for EU employment changes but that cannot be ascribed to the evolution of Chinese imports. The estimated regression is in levels with the following specification:

$$\log(\text{Emp})_{\text{EU\_i,t}} = \gamma + \boldsymbol{\rho}.\ \log(\text{imports})_{\text{China\_it}} + \mu.\ \log(\text{imports})_{\text{Others\_it}} + \delta.\log(\text{EU exports})_{\text{it}} + \sigma.\log(\text{EU domestic sales})_{\text{it}} + u_{\text{it}} \quad (3)$$

The EU employment elasticity can then be obtained as the estimated coefficient on Chinese imports as follows:

$$\frac{\partial \log(\text{Emp})}{\partial(\text{Imports}_{\text{China}})} = \boldsymbol{\rho}, \text{ overall employment elasticity of Chinese imports}$$

Due to the short time span that we have, with observations up to three years prior to the investigation period, we cannot estimate the employment elasticities on a case-by-case basis since that would only give us 4 observations per case (i) which we consider too few for a reliable estimate. Instead, we estimate the employment elasticity, **ρ,** across all ten cases. Its value is listed in column (1) of Table 4. The resulting elasticity is -0.346 when controlling for EU production (which is the sum of EU domestic sales and EU exports).[26] This regression result is shown separately in the Appendix Table A.3.

The employment elasticity is then multiplied with the "percentage change in Chinese imports under the MES regime compared to the analogue regime", listed in column (1) of Table 4. This gives us the "percentage change in EU employment resulting from the percentage change of Chinese imports", whose expression is shown below and whose empirical values are reported for each AD-case in the last column of Table 4.

$$\text{EU Employment Multiplier} = \boldsymbol{\rho} * \Delta\,\%\, Imp_{China}\ under\ MES\ regime$$

$$= \boldsymbol{\rho} * \text{Chinese Import Increase}$$

= percentage decrease of in EU jobs/percentage change in tariffs wrt China under MES

Table 4: Employment Elasticities of EU Jobs on Chinese Imports (Benchmark)

[25] Data on employment and EU production are not available at the CN8 product-level, hence we use the EU confidential data.

[26] Of course introducing EU production in the analysis potentially introduces endogeneity. In part, we address this by using the first year lag for EU production.

Case	Employment Elasticity,[27] ρ (1)	Chinese Import Increase due to MES regime (2)	Employment Decrease (3)
AD511 (Persulfates)	-0.346*	18.2%	-6.3%
AD516 (FeSi)	-0.346*	10.3%	-3.6%
AD519 Compressors)	-0.346*	5%	-1.7%
AD522 (Citric Acid)	-0.346*	16%	-5.5%
AD528 (Candles)	-0.346*	4.8%	-1.7%
AD560 (Ceramic Tiles)	-0.346*	5.4%	-1.9%
AD584 (O. Coated Steel)	-0.346*	21.3%	-7.4%
AD585 (MTF)	-0.346*	22.7%	-7.9%
AD598 (Solar Glass)	-0.346*	54%	-19%
AD614 (Tartaric Acid)	-0.346*	7.1%	-2.5%
Source	EU data on the cases	Table 3 col (6)	(col.1) * (col.2)

Note: Column (1) * significance at 10%-level.

4.2 Import-Demand Elasticity from EU data

A downside of using CN8 level data from the publicly available trade statistics is that these product definitions are at a somewhat higher level of aggregation than the actual products under investigation in the 10 anti-dumping cases under scrutiny. Given the existence of confidential data on import volumes and import prices, available from the Commission, we also estimate an alternative import demand elasticity based on EU data. After all, we cannot exclude the possibility that "at the product-level under investigation", the products have a very different elasticity than the one at the more aggregated CN8 level. The EU confidential data that were handed to us for this purpose, involve four observations per case, corresponding with the four years prior to the initiation year of the case. Due to the limited number of years, these data do not allow us to estimate a case-by-case import demand elasticity of Chinese import volumes on Chinese prices. Instead, we pool the data across cases and estimate one overall import-demand elasticity at the product-level involved in the AD-cases. The value of the elasticity obtained this way is reported in the first column of Table 5. The exact specification and regression result is listed in the Appendix in Table A.2.

This alternative elasticity is listed in column (1) of Table 5 and will allow us to arrive at an alternative set of multipliers. In column (2) of Table 5, we list the change in the gross

[27] When we use "import penetration= imports_china/(all imports+EU production)" as a regressor in specification (3) instead of import-levels, we obtain an employment elasticity of -1.15, which is similar to the one reported by Acemoglu et al.(2014) of -1.30 for Chinese imports into the US.

Chinese import prices after the duty. The import multiplier, listed in the last column of Table 5, is now obtained by multiplying the alternative elasticity at product-level from the EU data in column (1) by the gross price changes that can be expected under a regime switch in column (2).

Table 5: Tariffs and Prices (Product-level EU data) of Chinese Importers

Case	**Import demand elasticity EU data** (1)	**Δ p_gross** (2)	**Chinese Import Increase** (3)
AD511 (Persulfates)	-1.38*	-29%	40.12%
AD516 (FeSi)	-1.38*	-8%	11.36%
AD519 (Compressors)	-1.38*	-36%	49.55%
AD522 (Citric Acid)	-1.38*	-21%	29.43%
AD528 (Candles)	-1.38*	7%	9.86%
AD560 (Ceramic Tiles)	-1.38*	-17%	23.88%
AD584 (O. Coated Steel)	-1.38*	-29%	39.43%
AD585 (MTF)	-1.38*	-19%	26.29%
AD598 (Solar Glass)	-1.38*	-27%	36.90%
AD614 (Tartaric Acid)	-1.38*	-10%	14.01%
Source:	EU data	EU data	col.1 * col.2

Note: We use the same values for the employment elasticity, ρ. The regression producing (1) was run on confidential EU data and is reported in the Appendix (A.2.)

In Table 6 we apply the multipliers obtained above and we calculate the effects on EU job losses. The estimates arising from our independent analysis are reported in the last two columns. Using the same employment elasticity as in Table 4, we perform again the calculation from sector imports to sectoral employment.

In column (4) of Table 6, we present the results obtained in our independent analysis under the "CN8 benchmark" scenario with full pass-through, where we use multipliers of Table 4 and 5 reported earlier. Based on these estimates we find job losses, in the EU industry from the 10 AD-cases which amount to between 2.7% to 6.11%, for weighted and unweighted percentage changes, respectively[28].

In column (5) of Table 6, we present the results obtained in our independent analysis under the "product-level" estimation where we use the multipliers of Table 5 as inputs in the analysis. Based on these upper bound estimates we find that job losses in the EU industry from the 10 AD-cases under scrutiny amount to between 8.41% and 9.72%, the unweighted and weighted percentage changes, respectively.

[28] The weighting is based on employment shares of each anti-dumping case in total. We show rounded numbers.

Table 6: Simulated job losses for EU in Chinese MES (in percentages)

Case	Broad Sector	Investigation Period (IP) Employment	Job Loss in % IP (benchmark CN8)	Job Loss in % IP (product-level EU)
(1)	(2)	(3)	(4)	(5)
AD511 (Persulfates)	Chemicals	152	-6.3%	-13.9%
AD516 (FeSi)	Iron & Steel	1,153	-3.6%	-3.9%
AD519 (Compressors)	Mechanical Eng.	193	-1.7%	-17.1%
AD522 (Citric Acid)	Chemicals	511	-5.5%	-10.1%
AD528 (Candles)	Other	4,699	-1.7%	-3.4%
AD560 (Ceramic Tiles)	Ceramics	77,458	-1.9%	-8.26%
AD584 (Coated Steel)	Iron & Steel	6,046	-7.4%	-13.46%
AD585 (MTF)	Iron & Steel	2,366	-7.9%	-9.1%
AD598 (Solar Glass)	Other	857	-19%	-12.7%
AD614 (Tartaric Acid)	Chemicals	179	-2.5%	-4.8%
Unweighted Av.			-6.11%	-9.72%
Weighted Average			-2.7%	-8.41%

When we apply these percentage changes in job loss from the 10 cases and extrapolate that to the entire employment in Trade Defense sectors, which is currently estimated at 231,000 jobs, then we find potential job losses due to Chinese MES between around 6,000 and 14,000 jobs in the benchmark scenario, where we round numbers.

When we do the same for the alternative elasticity estimate, we find possible job losses of between 19,000 and 22,000. Table 7 below provides a summary of our analysis and findings under step 1. Independent of the elasticities that were used, or the weighting scheme that was applied, the results appear to be in the same "order of magnitude".

Table 7: Step 1: Possible Direct Employment Effects in the 10 AD-cases (absolute numbers)

STEP 1: Summary	CN8 Estimates	Product-level Estimates

Unweighted estimates	-14,000	-22,000
Weighted estimates	-6,000	-19,000

It should be noted however, that the job losses listed in Table 7, capture only the employment effect in EU firms that directly compete with the Chinese products and sell a similar product. The negative employment effects that we find for these firms are in fact what we expected. Whenever a Chinese firm exports a similar product to the EU produced one, theories of demand would predict that a substitution effect will take place, away from the EU product and towards the Chinese product whenever this Chinese product becomes cheaper than it was before. This will negatively impact the labour demand in EU firms which will then have a negative effect on employment in the import-competing EU firms.

The employment effects shown in step 1 do not take into account the potential spillover effects that the change in the anti-dumping methodology may have on other more downstream or more upstream producers (see step 4). EU firms producing downstream from the products affected by anti-dumping may use the cheap Chinese imported product as an input. The MES regime makes the Chinese inputs cheaper than they were under the analogue country regime and EU downstream firms may pass some of that cost reduction into their output price, which will decrease. This will result in a positive demand for EU products which in turn result in an increase of labor demand in input-using EU firms. Thus, in a downstream EU industry, the employment effects of cheaper Chinese imports are likely to be positive.

EU firms producing products which are more upstream than the Chinese imported product, are however likely to suffer negative employment effects. The reason is that they face a reduction in the demand for their output. Upstream EU firms producing the same type of inputs as the Chinese will lose business and employment in these upstream EU firms is likely to go down. A more detailed analysis of upstream and downstream effects is left for step 4. Here in step 1, we concentrate only on the direct employment effects of EU firms selling similar products to the imported Chinese ones.

5. STEP 2: Assessing which sectors are likely to face dumping by Chinese firms

The analysis of employment effects for the entire economy, in the next Section, will be conducted at a level of aggregation where we observe import penetration of Chinese and Rest-of-the-World (ROW) firms in the EU market as well the input-output flows between sectors. The World Input-Output Database (WIOD) contains this information and we will introduce it then.

What is needed as well is an assessment of the likelihood that any product in a WIOD sector is subject to anti-dumping measures on Chinese imports. We will consider two scenarios. First, in Scenario 2 we will generalize the detailed analysis conducted for 10 cases in step 1 to the entire economy using the universe of cases (52) where the EU currently imposes AD duties on imports from China. Second, in Scenario 3 we will further consider that the incidence of Chinese dumping might increase in the future, because of Chinese firms changing their behavior when the EU grants it market economy status in anti-dumping investigations.[29]

We will assign probabilities of AD action in different sectors based on observable cases of three different types, namely:

1. Type 1: EU cases against China (in force on August 2015)
2. Type 2: Third country cases against China (in the period 2000-2015)
3. Type 3: EU cases against other countries (in the period 2000-2015)

In Scenario 2 only cases of the first type are used. In Scenario 3, we additionally exploit the information of the second and third type of cases to identify sectors most at risk of potential future cases.

The additional cases considered in the Scenario 3 will help us to identify sectors most at risk for future dumping. We will rely on the academic literature to obtain an estimate of the likely overall magnitude on the potential future increase in dumping.

[29] In microeconomic analysis, the expression 'long-term' refers to the situation where fixed and quasi-fixed factors of production (such as capital stocks), but also firm strategies, production technology etc. are not fixed anymore, but can be adjusted. This corresponds with the meaning of 'long-term' in the context used here where long-term here is used to distinguish a time horizon in which Chinese firms engage increasingly in dumping behaviour as a strategic reaction towards the lower AD tariffs which takes time to unfold and take its full effect. This interpretation of 'long-term' should not be confused with macro-economic analysis, in which fluctuations have eased out and the economy has converged to an equilibrium at its so-called natural rate of unemployment. In a way, our concept of 'long-term' may even be opposed to macro-economic interpretation, as we explicitly exclude macroeconomic adjustment from our analysis be it in a positive or negative direction (cf. section 7.5 where we discuss macroeconomic multipliers).

5.1 Assigning probabilities at the most detailed level

Scenario 2 (short-term)

Incorporating the first type of cases is straightforward. For these products anti-dumping measures are currently in force. From the information on the 10 cases analyzed in step 1, we observe how large Chinese imports are of the products subject to AD measures during the investigation period. For the same period, which differs across the 10 cases, we collect information on the total value of Chinese imports in the 4-digit HS sector that contains the affected products from the UN Comtrade database.[30] We find that Chinese imports of the affected products in each case account, on average, for 22% of total Chinese imports in the affected 4-digit sector. Note that this share is calculated over the investigation period, thus before any AD measures came in force.

From DG Trade's online TDI database[31] and its August 2015 report on AD measures, we retrieved an exhaustive list of all cases where AD measures against China are currently imposed, including undertakings. We also added two cases that were in force at the start of 2015 but for which duties expired in the following months.[32] In total these cover 52cases and we identified all the 4-digit HS sectors involved. When a sector has a single active case it gets assigned a 22% probability, when more than one case is in force, the sector is assigned a 44% probability. The interpretation is that 22% of the output in a 4-digit sector is in product categories where Chinese imports are subject to AD measures.[33]

Sectors that contain products subject to a type 1 case would with certainty have been affected if the EU had decided to grant MES to China and had analyzed these cases differently. Therefore our first analysis only considers the employment effects in these sectors. One can think of these as short-run effects.

Scenario 3 (potential long-term)

When we take a more long-run perspective, type 1 AD cases are not the only ones that are relevant. To take into account that the focus of trade defensive actions evolves over time, we additionally identify "sensitive AD sectors" using type 2 and 3 cases: (type 2) anti-dumping actions from third country jurisdictions (e.g. the United States or Australia) against China, and (type 3) anti-dumping actions from the EU against other countries than China.

The change in the EU's methodology to adjudicate anti-dumping cases against China might change Chinese firms' pricing behavior on the EU market. We draw on the academic literature to assess what the additional incidence of dumping might be when the EU's enacts

[30] Given that most investigation periods span two years, we use the average imports for the two years. When a case covers products in more than one 4-digit sector, we take imports from all 4-digit sectors involved.

[31] http://trade.ec.europa.eu/tdi/

[32] AD duties in case AD528 expired on August 7, 2015 and in case AD 539 on June 16, 2015.

[33] Ideally we would like to use production shares as we are interested in the fraction of the EU workforce working in these sectors, but at this detailed level of analysis import shares is all that we have available.

a less stringent standard. The type 2 and 3 cases are used to determine which sectors are most likely at risk of potential future anti-dumping cases.

In particular, we assign some positive probability of future dumping happening in sectors that contain type 2 cases, which cover actions of the United States against China. It is not implausible that in sectors where Chinese firms are currently dumping, the same type of behavior might spread to the EU market. It might even be the case that dumping is already happening, but the affected EU sector has not yet filed a case or injury has not yet materialized. Cases from other jurisdictions are informative about likely future dumping in the EU because firms tend to enter export markets sequentially, and large (Arkolakis, 2010), nearby (Eaton and Kortum, 2004), and less uncertain markets (Albornoz et al. 2012) will be entered first. The EU might be entered, and be subject to dumping, only at a later time, while more attractive markets, due to size or proximity, are already affected sooner.

In principle we could include AD actions of other countries besides the United States as well, but there is a strong overlap in the industries that different countries target, see for example Blonigen and Prusa (2015). Hence, each additional third country we include will gradually have fewer and fewer impact on the probabilities.

We also incorporate information from type 3 cases, namely those of the EU against other countries than China. These types of actions are also informative given that many products exhibit a natural lifecycle in production (Antràs, 2005). Some of the current imports of other countries to the EU are likely to be replaced by Chinese imports in the future as the Chinese industry matures and productivity increases. Current anti-dumping problems with other countries might move with them.

Even more general, we also assigned a small, but positive probability to 4-digit sectors that did not experience any type of AD case in the last years, but are in a 2-digit industry where other 4-digit sectors experienced AD cases. We must also take into account that dumping patterns might spread to sectors that are similar in technology or where the same firms are active. Naturally, we only assign a low probability in this case.

In Table 8 we summarize the probabilities we have used for the different cases in the two scenarios, as discussed above.

Table 8: Probabilities any Product will face AD action against China

Probability assigned to 4-digit HS sector	**Scenario 2 (short-run)**	**Scenario 3 (potential)**
44%	Multiple cases of type 1	Multiple cases of type 1
22%	A single case of type 1	A single case of type 1

11%	-	No cases of type 1, but at least a single case of type 2 or type 3
1%	-	No actual cases (of any type), but at least one case in another 4-digit sector within the same 2-digit industry
0%	All other	All other

5.2 Aggregate to the sector level

Sectoral incidence of dumping

The probabilities in Table 8 are assigned at the 4-digit HS level, which comprises approximately 1200 different sectors. They are aggregated up to the WIOD sectors at which level we will study the production and employment impacts. To map the detailed HS codes into WIOD sectors we used some existing concordances[34] and constructed one ourselves, according to the following chain:

- 4-digit HS (at this level of aggregation the EU classification corresponds to the UN's)
- 2 or 4-digit CPC (Central Product Classification ver. 1.0)
- 2-digit ISIC (International Standardized Industry Classification)
- 16 tradable WIOD sectors (out of 35 input sectors)

To aggregate from the 4-digit HS codes to the WIOD sectors we necessarily used import shares as weights because production or employment is not available at such a detailed level. As the objective is to measure the fraction of EU workers who are employed in sectors where Chinese products are subject, or could become subject, to AD duties, we used the shares of EU imports from the entire world rather than Chinese shares to aggregate from the detailed 4-digit categories to the more aggregate WIOD sectors. Only in the final aggregation, from the WIOD sectors to the aggregate for all tradable goods sectors we can use production shares as weights.[35]

In Table 9 we provide an illustration of how we obtained the sectoral probabilities used in the two scenarios, starting from a number of observed AD cases. We show for a number of cases in the WIOD sector 24 "Chemicals," how the assigned probabilities are aggregated using observed shares to the aggregate probabilities a given product in sector 24 is subject to AD measures, either in the short term (Scenario 2) or potentially in the future (Scenario 3).

[34] These are available at http://unstats.un.org/unsd/cr/registry.

[35] For "Agriculture" (Agriculture, Hunting, Forestry and Fishing) we use employment weights in the aggregation analysis. This WIOD sector consists of three sub-sectors in the ISIC, namely "01: Agriculture, hunting and related service activities", "02: Forestry, logging and related service activities," and "05: Fishing, aquaculture and service activities incidental to fishing." Eurostat reports separate employment statistics for each of the three. This breakdown of employment by sub-sectors is not available for other WIOD sectors for which we use import weights.

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Magnitude of the probabilities

Assigning a magnitude to the probability of a 4-digit sector to have a dumping case in the future, even though there are currently no EU measures in force against China, is necessarily subjective. We do have a few objective benchmarks that informed our choices. First, for type 1 cases, the share of Chinese trade in products subject to current AD duties as a fraction of total imports from China in the entire 4-digit sector is a natural percentage to use.

Second, we draw on the literature of the "chilling" effect of anti-dumping statutes (Egger and Nelson, 2011; Vandenbussche and Zanardi, 2010) to obtain an upper bound on the fraction of aggregate trade that is likely to be affected by a change in anti-dumping enforcement. These papers estimate what fraction of a countries' trade is affected indirectly by the mere enactment of an AD statute. While only a small fraction of trade is actually subject to AD measures, especially for new users, importers in other sectors might change their behavior merely because of the threat of AD action.

We can use the point estimate from Vandenbussche and Zanardi (2010) to perform a similar calculation as in their footnote 34 for the average "tough" AD user. They show that a country that newly enacts an AD statute and launches 6 cases per year would see direct and indirect effects on 5.9% of its aggregate trade. As the EU had 9 cases per year over the same time period, the comparable share of trade affected would be 7.2%. Given that the current exercise is not the same as the EU enacting AD legislation for the first time, but merely changing its implementation, this fraction should be considered a large upper-bound on the total fraction of trade that could be affected, even in the long-run.

Table 9: Illustration how the Probabilities/shares are calculated for WIOD sector 24

HS4	EU Cases	US Cases	Share assigned
3905	-	AD 1014 (against China)	11%
3906	-	-	1%
3907	AD468 (against China) + several against other trading partners	-	22%
4002	AD472 (expired case)	-	11%
7104	-	-	0%

HS4	Probabilities		Share in CPC 34
	Scenario 2	Scenario 3	
2503	0	0	0.1%
2707	0	0.01	2.4%
2708	0	0.01	0.02%
28**	0.0198	0.0532	14.6%
29**	0.1157	0.1356	54.1%
…	…	…	…
3905	0	0.11	0.6%
3906	0	0.01	0.8%
3907	0.22	0.22	3.2%
…	…	…	…
3913	0	0.11	0.3%
3914	0	0.01	0.1%
4002	0	0.11	2.5%
7104	0	0	0.1%

CPC4	Probabilities		Share in WIOD 24
	Scenario 2	Scenario 3	
34	0.0725	0.0996	53.1%
35	0.0151	0.0303	46.9%

WIOD	Probabilities		Share in all tradable goods sector
	Scenario 2	Scenario 3	
24	0.0455	0.0670	8.5%

Note: WIOD sector 24 is "Chemicals". In the top two panels, we do not list all the HS 4-digit sectors that fall in this industry, only a few rows to illustrate the calculations.

Third, Vandenbussche and Viegelahn (2011) have shown that EU anti-dumping policy in recent years has increasingly targeted the developing world, with China taking a very prominent position as the main target country. In particular, they find that the share of products imported by the EU from China and falling under EU anti-dumping protection has roughly tripled in 2004-2009, reaching a level of more than 2% at the end of the period. As a country with a large overlap in its product-mix compared with that of the EU, China is more likely to be targeted under EU anti-dumping policy than other developing countries.

In Table 10 we illustrate the sectoral implications of the detailed probabilities we assigned in Table 9. The WIOD contains 35 sectors, but only 16 of them are tradable goods where AD measures are possible, the rest being service sectors. As the two scenarios use different probabilities at the 4-digit level, they generate different aggregate probabilities. In the short-run Scenario 2 that only uses existing EU cases against China, many aggregate sectors have no AD actions at all. In Scenario 3, where US cases against China and EU cases against other countries also receive some weight, all 16 tradable goods sectors show a positive probability, but they range from 0.9% in the mining sector to a more than 10-fold higher probability of 10.2% in non-metallic minerals.

Table 10: Likelihood a Product in the Sector has AD measures imposed against China

SIC Code	Industry (WIOD)	Employment share	Probability of AD action against China	
			Scenario 2 (short-run)	Scenario 3 (potential)
01-05	Agriculture	21.3%	0%	0.2%
10-14	Mining	1.9%	0%	0.9%
15-16	Food products	11.3%	0.6%	3.6%
17-18	Textiles	4.2%	0%	1.4%
19	Leather & footwear	1.1%	0%	5.8%
20	Wood products	2.4%	6.3%	8.0%
21-22	Paper products	3.4%	1.3%	5.2%
23	Oil products	0.5%	0%	6.9%
24	Chemicals	4.8%	4.5%	6.7%
25	Rubber & plastics	3.6%	2.1%	8.5%
26	Non-metallic minerals	2.9%	7.3%	10.2%
27-28	Basic & fabricated metals	10.9%	4.7%	8.3%
29	Machinery	7.4%	3.3%	7.2%
30-33	Electrical & optical equip.	6.6%	1.0%	3.7%
34-35	Transport equipment	9.5%	2.8%	4.0%
36-37	Manufacturing NEC	8.2%	0%	5.7%

Note: The 10 cases analyzed in step 1 all fall in industries 24, 26, 27-28, or 29. The probabilities are weighted using total EU imports from the 4-digit HS sectors to the WIOD sectors.

5.3 Probability of dumping versus probability of AD measures

It is important to realize that the statistics shown in Table 10 are a reflection of the current AD regime that the EU is enforcing. We have calculated the probabilities for the actual current cases against China (Scenario 2) or for the potential rise in future dumping cases (Scenario 3). These numbers are intended to capture the likelihood a product is subject to Chinese dumping under the current methodology.

In the analysis in step 3 we will make a counterfactual comparison calculating how many jobs would be lost if ***these cases*** were assessed under the new methodology versus the old methodology. As shown in step 1, the new methodology might not change the outcome, might result in lower AD duties (the case in 7 of the 10 cases), but it might also lead to a decision of "no dumping taking place." Under the old methodology, these sectors would be considered dumped, but not anymore under the new methodology. Therefore the probabilities in Table 10 are accurate for the old methodology, but might overestimate the results for some of the sectors under the MES methodology.

The effect of the new methodology leading to some decisions where the investigation will not find evidence of dumping anymore is already incorporated in the counterfactual tariff change that we will use. We will study the employment effects under the situation that the new methodology leads to a reduction of around 30 percentage-points in AD duties, but this is a combination of some cases seeing the AD duty lowered, while other cases seeing the AD duty abolished entirely. This distinction does not matter for the calculations in step 3 as the effects enter linearly, but it naturally implies that under the new methodology fewer sectors will be deemed to be victim of Chinese dumping, even under unchanged pricing behavior in the face of the new methodology.

In Table 11 we show the aggregate incidence of dumping taking place, in the first row. These statistics correspond to the incidence of AD measures being in place under the old methodology. We show two sets of numbers. First, we use production shares as weights, which is the relevant way of aggregating when we calculate aggregate employment effects. Second, we use Chinese import shares as weights, which is the relevant calculation to assess how accurate the probabilities in Scenario 2 are or how expansive the Scenario 3 really is.[36] At the bottom, we adjust these numbers to reflect that the analysis in step 1 suggested that in 30% of the sectors no AD measures would be imposed anymore under the new methodology.[37]

At the bottom we see that under Scenario 2, representing the current state, 2.5% of Chinese trade is affected by EU AD measures. This statistic is relatively close to the 2%

[36] In these calculations we did not use the statistics from Table 11 as the detailed measures were obtained by aggregating using the EU's import shares from the entire world—as a stand-in for production shares. We recalculated all those numbers as well using EU import shares from China.

[37] Naturally, this adjustment depends crucially on the decision to weigh or not. If we used a weighted average there would be hardly any adjustment as AD measures are still imposed in Ceramic Tiles which is by far the largest of the 10 cases considered. As the 30 percentage points counterfactual reduction in AD duties is also obtained as an unweighted average, we also used the 3/10 ratio here.

number Vandenbussche and Zanardi (2010) calculated for 2009. As AD action is more likely in sectors where Chinese imports are large, it is not surprising that EU production in the same sectors accounts for a smaller fraction, 1.6%, of the total (of the entire tradable goods sector).

The corresponding statistics for Scenario 3, which includes a possible future expansion of EU AD actions to new products, show that this scenario represents a situation where 5.7% of Chinese trade would be subject to EU AD action under the old methodology. This is more than double from Scenario 2, the current state of affairs, and a tripling compared to 2009, which itself was already a strong increase over the 2004-2009 period. It suggests that Scenario 3 is a very expansive scenario where EU AD enforcement would spread to many more sectors than has been historically be the case. Employment effects estimated in this case are likely to be upper bound estimates.

Table 11: Aggregate Incidence of dumping or AD measures

(weighted averages of the probabilities)	**Probability of AD action against China**	
	Scenario 2 (short-run)	**Scenario 3 (potential)**
(a) Under the old methodology		
EU production with AD action against China	1.6%	4.3%
EU imports from China subject to AD measures	2.5%	5.7%
(b) Under the new methodology (MES)		
EU production with AD action against China	1.1%	3.0%
EU imports from China subject to AD measures	1.7%	3.9%

Note: The aggregate share indicated at the bottom, over all WIOD sectors, is obtained using output weights in the final stage of the aggregation.

6. STEP 3: Direct employment effect on the entire tradable goods sector

In the third step, we calculate an expected employment reduction in the EU if China were granted MES in AD investigations. The change in adjudication methodology would lead to lower AD duties than are imposed in the current regime. We use the estimates from step 1 as a starting point to construct a sector-specific employment semi-elasticity. Naturally not every product will be subject to this changing AD regime. Therefore we will multiply the expected employment effects with the probability that a product in a given sector is subject to AD action, i.e. the statistics calculated in step 2.

We first need to generalize the expected employment effects from the 10 cases to the entire tradable goods sector. We need to make two adjustments, first, for the fact that the different cases entail a different change in AD duties, and second, that sectors are structurally different and even the same change in AD duty is likely to have different effects.

We accomplish the first adjustment by not working with the percentage employment reduction directly, but by constructing an employment semi-elasticity, i.e. the percentage change in employment by the EU industry for each percentage point change in AD duty on Chinese products. For each of the 10 cases in step 1, we take the predicted change in employment due to the different status of China, the statistics in column (4) of Table 6, and we divide them by the percentage point AD duty changes in column (4) of Table 3. The ratio we work with is thus:

$$\text{Employment semi-elasticity} = \frac{\%\Delta(\text{L})}{\%\text{point }\Delta(\text{AD-duty})}$$

For the benchmark estimates from step 1, this elasticity averages 0.23 over the 10 cases, with a median of 0.20 and a range of [0.02 – 0.34] once we drop the top and bottom outliers and limit attention to the 8 cases in the middle. For the estimates obtained using the product-level estimates, the mean is higher at 0.35, with a median of 0.35 and a range of [0.27 – 0.36], again omitting the two extreme values.

When we use the average of these elasticities for all sectors to simulate a counterfactual change in AD duties for an "average" sector, it is natural to also perform this counterfactual calculation using the same average reduction in AD duties in each sector, which was 30 percentage points in the 10 cases of step 1.[38]

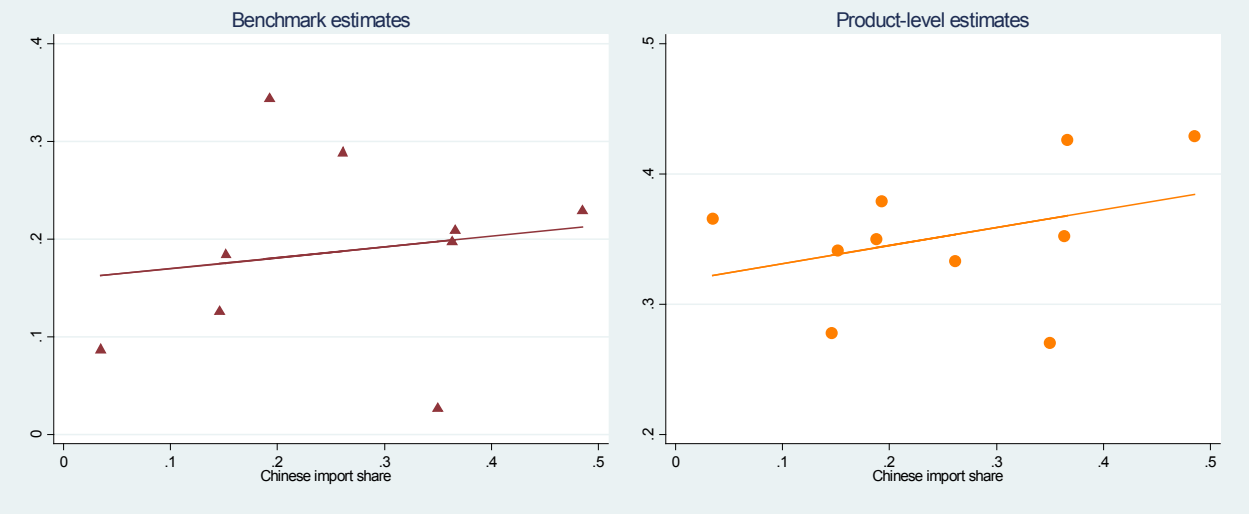
When using this average elasticity on the 16 WIOD sectors, we will not use the simple average directly as sectoral heterogeneity will affect the relevant employment elasticity in a

[38] Naturally, when using the average elasticity of 0.31 and applying a 30 percentage points lower tariff we obtain an employment reduction of 9.3%, very close to the result in Scenario 1. It is not exactly the same as taking the product of two averages is different from taking the average of a product.

predictable way. In step 1 those sectoral differences, in particular in terms of import penetration, could be taken into account explicitly, but the lack of detailed information at the aggregate level requires a reduced form approach. We adjust the employment elasticity using two observable sector characteristics that have predictable effects on the expected employment effect.

First, a reduction in AD duty in a sector with a higher Chinese import penetration should have a larger effect as the same proportional adjustment of Chinese firms will have a larger quantity effect on the domestic industry in absolute terms. We plot in Figure 1 the elasticities of the ten cases (on the vertical axis) against Chinese import penetration (on the horizontal axis) for the two sets of elasticities: the step 1 benchmark estimates (left) and the second set of estimates obtained at the more detailed product level (right). The regression lines confirm the predicted positive relationship: sectors with higher Chinese import penetration see larger employment effects per percentage point reduction in AD duties. The adjustment is not very large though.

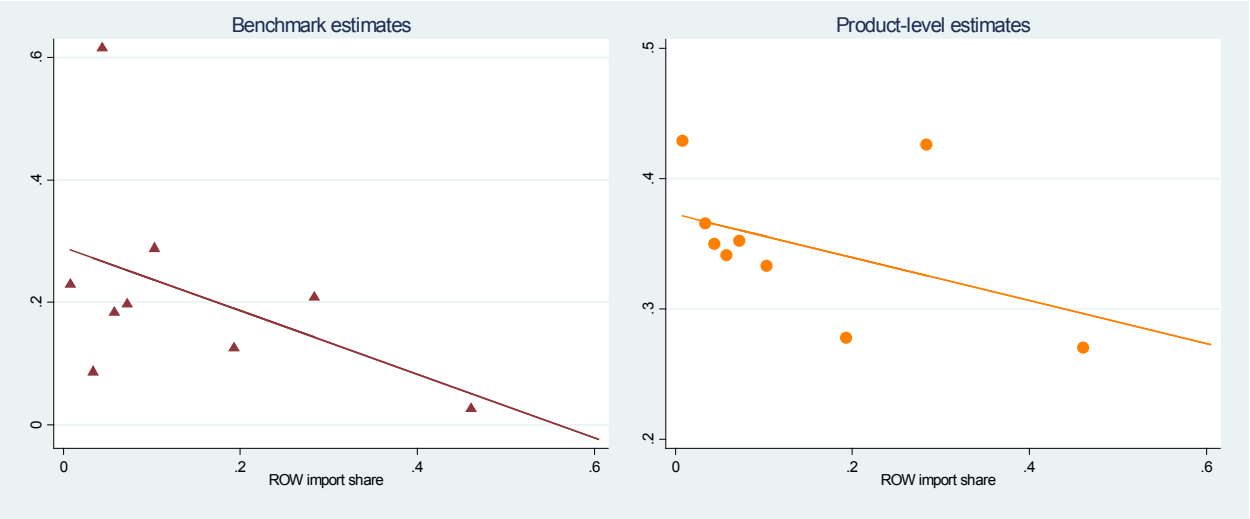
Figure 1: Estimated employment elasticity by Chinese import shares



We perform the same exercise using import penetration from the Rest-of-the-World (ROW). Here we expect a negative relationship as a higher import penetration of other countries will, ceteris paribus, let the burden of market share adjustment fall to a greater extent on foreign firms, and thus less on the domestic EU industry.[39] This is indeed what surfaces from the results in Figure 2. For both sets of estimates, the relationship between EU employment effects and ROW import penetration is strongly negative.

[39] The analysis in Scott and Jiang (2015) assumes all Chinese market share gains are at the expense of local EU producers.

Figure 2: Estimated employment elasticity by "Rest of the World" import shares



Both adjustments are intuitive, but they are naturally not independent. Sectors with higher Chinese import penetration are likely to also be sectors with lower ROW import penetration and the two effects from Figures 1 and 2 will to some extent offset. In order to calculate sector-specific semi-elasticities that incorporate both adjustments, we run a multivariate regression, and report the results in Table 12.

Table 12: Regression Results to fit an Adjusted, Predicted Employment Elasticity

Dependent variable: $\frac{\%\Delta(L)}{\%\text{point }\Delta(AD\text{-}duty)}$	**Benchmark estimates**	**Product-level estimates**
Constant	0.262**	0.325***
	(0.129)	(0.035)
China IP	0.123	0.207*
	(0.441)	(0.119)
ROW IP	-0.546	-0.213*
	(0.420)	(0.114)
Adj-R2	0.29	0.29
Observations	9	9
Cases excluded	FeSi	FeSi

Note: In both regressions we exclude case AD516 (FeSi) as the production of the domestic industry only accounts for 20% of demand. Including it would lead to highly extreme and implausible point estimates on the import penetration variables. As the objective is only to obtain a sensible sectoral adjustment to the average elasticity, not to establish a stable relationship, we excluded this outlier.

Given that Chinese and ROW import penetration is observable for each of the WIOD sectors, we can use the regression results from Table 12 to calculate a full set of adjusted, sector-specific elasticities. As the import penetrations at this more aggregate level tend to be a lot lower than in the 10 cases we analyzed, the predicted semi-elasticities are somewhat

closer to the intercepts in Table 12 which is the applicable semi-elasticity in a sector with no imports whatsoever.

The last two columns of Table 13 report the sector-specific semi-elasticities in the two cases, starting from the two different sets of estimates from step 1. An adjustment was made for the mining elasticity when using the benchmark estimates as the predicted elasticity was negative—due to the excessively large import penetration. We replaced the estimate with one half of the lowest elasticity across the other sectors.

Table 13: Predicted Employment Elasticities for all WIOD sectors

SIC Code	Industry (WIOD)	Import penetration		Predicted employment semi-elasticity	
		China	ROW	Benchmark estimates	Product-level estimates
01-05	Agriculture	0.5%	9.9%	0.21	0.30
10-14	Mining	0.2%	64.5%	0.08	0.19
15-16	Food products	0.6%	8.1%	0.22	0.31
17-18	Textiles	17.1%	23.7%	0.15	0.31
19	Leather & footwear	15.6%	20.8%	0.17	0.31
20	Wood products	1.6%	5.3%	0.23	0.32
21-22	Paper products	0.3%	5.3%	0.23	0.31
23	Oil products	0.2%	16.8%	0.17	0.29
24	Chemicals	2.3%	21.1%	0.15	0.29
25	Rubber & plastics	4.4%	7.3%	0.23	0.32
26	Non-metallic minerals	1.9%	4.2%	0.24	0.32
27-28	Basic-fabricated metals	1.8%	9.4%	0.21	0.31
29	Machinery	4.2%	10.7%	0.21	0.31
30-33	Electrical & optical eq.	16.4%	16.5%	0.19	0.32
34-35	Transport equipment	1.8%	13.0%	0.19	0.30
36-37	Manufacturing NEC	3.3%	12.2%	0.20	0.31

With two sets of employment semi-elasticities from Table 13, and two sets of probabilities that each sector is affected under two alternative scenarios from Table 10, we can calculate 4 different expected output or employment effects for each sector.[40] The employment change is calculated as follows:

$$\Delta Employment = \underbrace{\Delta Duty}_{-30\%} * \underbrace{Probability}_{\text{Table}} * \underbrace{semi\text{-}elasticity}_{\text{Error! Reference source not found.}}$$

In Table 14 we report the results using the benchmark estimates in the two scenarios at the sectoral level. Sectors with large effects have a higher than average elasticity, such as "food products" (15), a particularly high probability of being affected, such as "basic and fabricated metals" (27-28), or both, such as "non-metallic minerals" (26).

Table 14: Aggregate Potential Employment Effects by Sector of granting MES to China

SIC Code	Industry (WIOD)	Predicted employment effects using the benchmark estimates	
		Scenario 2 (short-run)	Scenario 3 (potential)
01-05	Agriculture	0%	-0.012%
10-14	Mining	0%	-0.013%
15-16	Food products	-0.037%	-0.235%
17-18	Textiles	0%	-0.065%
19	Leather & footwear	-0.001%	-0.269%
20	Wood products	-0.443%	-0.561%
21-22	Paper products	-0.089%	-0.362%
23	Oil products	0%	-0.353%
24	Chemicals	-0.205%	-0.301%
25	Rubber & plastics	-0.143%	-0.582%
26	Non-metallic minerals	-0.532%	-0.742%
27-28	Basic & fabricated metals	-0.301%	-0.529%
29	Machinery	-0.208%	-0.448%
30-33	Electrical & optical eq.	-0.055%	-0.216%
34-35	Transport equipment	-0.163%	-0.230%
36-37	Manufacturing NEC	0%	-0.341%

[40] We assume a constant output to employment ratio in the short run, which implies that employment and output effects will be equal in percentage terms.

In Table 15 we show the aggregate effects over the entire tradable goods sector in all 4 possible cases. These aggregate effects were obtained from aggregating detailed changes at country-sector-level. The aggregate employment over all countries and tradable goods sectors was 43 million workers in the EU28 in 2014 (Structural Business Statistics of Eurostat).[41]

Table 15: Aggregate Direct Potential Employment Effects over the entire Tradable Goods Sector

(a) In percentage terms

	Scenario 2 (short-run)	**Scenario 3 (potential)**
Benchmark (CN8) estimates	-0.116%	-0.274%
Product-level estimates	-0.171%	-0.409%

(b) In number of jobs

	Scenario 2	**Scenario 3**
Benchmark (CN8) estimates	-49,700	-117,800
Product-level estimates	-73,600	-175,600

Note: is based on detailed employment statistics that imply aggregate employment in the tradable goods sector of 43 mio workers in the EU28 (2014)

[41] http://ec.europa.eu/eurostat/web/structural-business-statistics

7. STEP 4: Adding indirect effects

7.1 The signs and magnitudes of expected indirect effects

From the analysis in the first three steps we obtained the employment effects in the sectors directly related with current anti-dumping action. We now incorporate indirect employment effects as the adjustment of directly affected sectors as a result of the change in methodology has spillover effects on upstream and downstream sectors.

Lower AD duties in a sector will lead to the following indirect effects in other sectors:

- Effects on upstream sectors
  - Substitution: Demand falls as downstream EU production is replaced by Chinese imports which use fewer EU inputs in their production (negative)
  - Demand: Demand rises as lower prices downstream boost output and more inputs are needed by domestic and foreign producers (positive)
- Effects on downstream sectors
  - Substitution: Lower input prices for the downstream sector might induce firms to substitute away from labor and towards intermediates (negative)
  - Demand: Lower input prices will filter into lower output prices downstream, expand the market and raise sales, and thus raising labor demand (positive)

We expect the substitution effect to dominate in the upstream sectors for an overall negative effect and the demand effect to dominate in the downstream sectors for an overall positive effect. We now discuss why this will be the case, but to facilitate the discussion and keep the terminology straight, we will sometimes use the following fictional example to make upstream-downstream unambiguous:

Figure 3: Fictional example of input flows in industry affected by AD

In this example, the tire sector is directly affected by AD action against China and in step 3 we already calculated the magnitude of the negative employment effects for the tire sector when AD duties are lowered if the EU grants MES to China. We will now estimate employment effects in the rubber and automobile industry even when these are not directly affected by AD actions. In reality, each sector will experience both direct and indirect effects

(especially in Scenario 3) because each sector will be upstream for some and downstream for other sectors. We discuss the quantitative implementation in the sub-sections below, but first illustrate the nature and relative importance of the four different effects that we listed above.

In particular, we are interested in quantifying the indirect employment effects stemming from a change in AD duties in the tire sector both on the upstream sectors that provide inputs to tires, such as the rubber sector, and on the downstream sectors that use tires as inputs in their own products, such as the automobile sector.

Upstream

The upstream rubber producers will be affected negatively as Chinese producers take market share away from EU based tire manufacturers. As all firms source disproportionately local, this change in market share will hurt the EU rubber industry and benefit the Chinese rubber industry. The magnitude of this effect is determined by the difference in sourcing of the different tire sectors, which we can observe in the WIOD tables. The fact that many Chinese exports are produced under the processing trade regime which relies heavily on imported intermediaries is likely to cushion the blow somewhat as the EU rubber industry will increase exports to the Chinese tire industry.

An opposite, positive, employment effect will simultaneously affect the rubber industry as lower tire prices in the EU market raise demand and output for all market participants. The increase in production will help all input suppliers including the domestic, upstream rubber industry. We expect this effect to be muted, though, as the price decline will be weaker for EU tire producers than for Chinese producers. The exact effect will depend on the elasticity of the demand for tires and the nature of competition. The more differentiated the goods directly affected by AD action are, the weaker the positive upstream demand effect is likely to be.

In all, we expect the first substitution effect to dominate upstream. The loss in market share of the domestic tire industry will be the dominant force. EU producers will lose more sales to Chinese firms than they gain from lower prices.[42] For Chinese producers, the substitution and demand effect work in the same direction, but their expansion in production is unlikely to help the upstream EU input industry enough. As we will show in the next section, most EU sectors where Chinese products are affected by AD duties are relatively upstream and the EU industry is only a marginal input provider to the Chinese industry.

Downstream

The substitution mechanism that affects the downstream industry is entirely different from upstream, but again contributes negatively to the indirect employment prospects. As prices decline in the EU tire industry, other industries that use tires as inputs, such as the automobile industry, might substitute between purchased intermediates and direct employment. Rather

[42] In the direct analysis we already calculated that EU firms lost market share in directly affected sectors, which means that for them the loss of market share to Chinese producers outweighed the increase in sales due to price reductions.

than make some parts in-house by combining raw materials with their own workers, downstream firms might instead purchase finished parts from the upstream sector and reduce their own employment.[43] This is a corollary from the positive demand effect that we discussed in the upstream sector. Greater output and greater employment of tires, will be partially offset by lower employment and less in-house production of tires by automobile companies downstream.

But also in the downstream automobile industry, there is an opposite, offsetting effect from the demand side. As inputs (tires) become cheaper, it lowers the marginal cost of the downstream industry (automobiles) which will eventually translate in lower prices, higher quantities sold and greater employment.

Whether the negative substitution effect or the positive demand effect dominates depends on the elasticity of substitution in production downstream and the elasticity of demand. Especially in the short run, there is often very little scope to substitute between inputs. Much of the literature assumes a Leontief technology, see for example Van Biesebroeck (2003). We therefore expect the positive demand effect to dominate.

As the indirect employment effects are expected to be negative upstream, but positive downstream, the net impact of MES for China will hinge on the average "downstreamness" of Chinese inputs. To quantify the exact indirect effects we need information on the source of inputs for different industries and the demand elasticities of upstream and downstream sectors. We will use the World Input-Output Database and make demand elasticity assumptions to evaluate which effects dominate, but first we provide some direct information on the nature of the sectors particularly prone to AD dumping action against China.

7.2 How upstream or downstream are sectors subject to EU AD duties against China?

In our simple example in Figure 3 each sector, rubber, tires, and automobiles, can unambiguously be ranked as upstream or downstream. Of course, in the broader economy, industries are subject to both upstream and downstream effects, e.g. AD dumping action in the rubber or automobile sectors would have opposite effects on the tire industry. Moreover, the rubber industry will also use trucks in its logistics chain and to some extent the automobile industry will even be upstream from the rubber industry.

To assess whether sectors particularly prone to EU AD action against Chinese imports are mostly upstream or downstream, we calculate a summary measure over the entire tradable goods industry. For each sector we calculate two quantities, which we express as a share of total sector output merely for convenience:

A. The amount of inputs purchased by industry *i* from all other industries (the complement of value added in gross output)

[43] This is a hypothetical example, as the car industry is unlikely to produce its own tires.

B. The amount of output of the same industry *i* used as input by all other industries (and not as final demand)

We then compare the ratio A/B for the average EU sector, using production weights of each sector (as shown in Table 10), with the weighted average of the same ratio where we additionally use the probability a product is affected by Chinese dumping (as calculated in step 2 and shown in the last columns of Table 10) in the weights.

Table 16: Average Upstream-ness or Downstream-ness of Sectors with AD duties against China

		Average for EU sectors weighted by probability of Chinese dumping	
	Average over all EU tradable sectors	**Scenario 2**	**Scenario 3**
(a) Excluding trade from the calculation			
A: Inputs purchased from other sectors / total output	71.3%	75.6%	71.8%
B: Output used in other sectors / total output	61.2%	69.9%	65.6%
A / B ratio (higher = more downstream)	1.30	1.20	1.21
(b) Alternative measure: Using total output in the calculations, i.e. including trade			
A / B ratio (higher = more downstream)	1.25	1.09	1.17

Note: In panel (a) we exclude EU exports of output and EU imports of inputs when we calculate the quantities A and B. In the calculations in panel (b) we include all production (exported or consumed domestically) and inputs (imported or sourced domestically).

Lower numbers for the A/B ratio, such as in Scenario 2 (column 2) and 3 (column 3), compared to the average for all the EU tradable sectors (column 1) indicate that an industry is more important as a provider of intermediates to other sectors (its role as an upstream sector) rather than as a purchaser of inputs (its role as a downstream sector). The results indicate clearly that the average EU sector hit by AD duties against Chinese imports is a lot more upstream than the average tradable EU sector. While for the average EU sector A exceeds B by 30% (the 1.30 value in Table 16), the difference for sectors with AD duties against China is only 20% (the 1.20 value in Table 16). When we include EU exports of output and EU imports of inputs in these calculations, in panel (b), the difference is similar. The A/B ratio is a lot smaller for sectors with AD duties against China (1.09) than for the average sector (1.25).

These results directly indicate that sectors where the EU currently imposes AD duties on China tend to have fewer upstream sectors than the average EU manufacturing sector. At the same time, sectors where the EU currently imposes AD duties on China tend to have more

downstream sectors than the average EU manufacturing sector. Recall also that the lowering of the AD duties under the market economy methodology is expected to negatively affect upstream sectors, but positively affect downstream sectors, As a result, the indirect effect of changing towards MES for China—which exports products into the EU that tend to be rather upstream—will be on balance less negative than a similar change in status for a different country with a production structure that is more like the EU.

7.3 Magnitude of upstream effects

As discussed above, we expect the sum of the substitution and demand effect on upstream sectors to be negative. In Appendix B we outline in detail the methodology based on the WIOD table that we used to assess the quantitative importance of these effects. The key ingredients in the analysis are (1) a comparison of sourcing patterns between EU and Chinese sectors, which we can observe directly in the WIOD, and (2) the increased demand for inputs produced in the EU due to higher imports of Chinese products downstream, which requires an assumption on the demand elasticity.

The final results are obtained by a matrix multiplication of three elements. First is a row vector Row_1 that measures the input use of upstream sector *i*. Second is a matrix A that controls for the share of sector *i* output that is exported and thus unaffected. Third is a column vector, which is the same for each upstream sector *i*, and which contains the downstream change in demand. Multiplying these three elements produces the aggregate indirect upstream effect for sector *i* due to changed MES treatment of China in the entire EU tradable goods sector:

$$\text{Indirect upstream effect on sector } i = Row_i * A * Column$$

In Table 17 we separately report the negative effects from the EU industry (the first 16 terms in the sum, as obtained by taking only the first 16 elements of Row_i), RoW imports (then next 16 terms), and the positive effects from increased input deliveries to Chinese sectors increasing their production as their exports to the EU expand. All three columns contain the net effect of Chinese products gaining market share at the expense of EU and RoW products, as well as the demand expansion downstream due to lower prices.

The results clearly indicate that the negative effects dominate in each sector in the EU. The greater intensity of EU input use by EU firms compared to Chinese firms is by far the most important element. In some sectors, such as Leather & footwear or Machinery, the increased sales by Chinese firms also lead to higher sales of EU inputs, but it is never enough to compensate for the lower input use by EU clients.

Table 17: Potential Upstream Indirect Employment Effects by Sector of granting MES to China

(for Scenario 3, benchmark CN8 employment elasticities, and assuming σ=1.38)

SIC Code	Industry (WIOD)	Effect from EU clients	Effect from RoW clients	Effect from CH clients	Total
1-5	Agriculture	-0.00090	-0.00000	0.00001	-0.00090
10-14	Mining	-0.00184	-0.00001	0.00002	-0.00183
15-16	Food products	-0.00032	-0.00000	0.00000	-0.00032
17-18	Textiles	-0.00025	-0.00000	0.00001	-0.00025
19	Leather & footwear	-0.00035	-0.00001	0.00003	-0.00032
20	Wood products	-0.00167	-0.00001	0.00001	-0.00167
21-22	Paper products	-0.00085	-0.00001	0.00002	-0.00084
23	Oil products	-0.00063	-0.00001	0,00000	-0.00064
24	Chemicals	-0.00084	-0.00002	0.00004	-0.00082
25	Rubber & plastics	-0.00128	-0.00001	0.00003	-0.00126
26	Non-metallic minerals	-0.00110	-0.00000	0.00001	-0.00109
27-28	Basic & fabricated metals	-0.00205	-0.00002	0.00003	-0.00204
29	Machinery	-0.00069	-0.00001	0.00011	-0.00059
30-33	Electrical & optical eq.	-0.00051	-0.00001	0.00006	-0.00046
34-35	Transport equipment	-0.00045	-0.00001	0.00003	-0.00043
36-37	Manufacturing NEC	-0.00070	-0.00001	0.00001	-0.00070

In Table 17 we reported the detailed results for one particular case, i.e. the hypothetical Scenario 3 and using benchmark (CN8) semi-elasticity estimates. [44] In Table 18 we show the aggregate effects in all four possible cases.

Table 18: Potential Upstream Indirect Employment Effects for both Scenarios and both set of Estimates

(a) In percentage terms

	Scenario 2 (short-run)	Scenario 3 (potential)

[44] Note that there are also negative upstream effects on the non-tradables sector, which aggregates all service sectors, construction, and utilities. We did not add those effects in Table 18 as the total effect at -0.00016 is as low as in the least affected tradable goods sector.

Benchmark (CN8) estimates	-0.036%	-0.086%
Product-level estimates	-0.052%	-0.127%

(b) In number of jobs

	Scenario 2	**Scenario 3**
Benchmark (CN8) estimates	-15,300	-36,900
Product-level estimates	-22,600	-54,600

Finally, it should be noted that these calculations adjust for the fraction of output from each sector not destined to the EU market, through the multiplication with the A matrix. If, alternatively, we would assume that inputs sourced from Europe are disproportionately used in products destined to be exported back to Europe the indirect effects would be somewhat more positive. This seems especially plausible in the case of China, where the export processing sector uses a lot more imported inputs than firms producing for the domestic market (Koopman, Wang, and Wei, 2012). As a result, the findings above might overestimate the negative indirect upstream effect as the output expansion by Chinese firms might not reduce the use of inputs sourced from upstream EU industries as much as is assumed here. Given the small magnitude of the effects in the second last column of Table 17, any such change would be minor.

7.4 Magnitude of downstream effects

The calculations to estimate the downstream effects also exploit the information in the WIOD, but capture fundamentally different effects. One important element we have no information on, and which is likely to be unimportant in practice, is the input-substitution downstream between employment and purchased inputs. We follow the maintained hypothesis underlying the construction of the input-output matrices and assume a Leontief technology. It implies that the input shares in the production process are fixed and determined by technology. There is no substitution between employment and purchased intermediates. In the short-run this is surely the only reasonable assumption, but even in the long run it is difficult for most industries to change their production technology radically.

What is left to calculate is how important the upstream market expansion is for employment in downstream sectors. The details of these calculations are again delegated to Appendix B. Using the information in the WIOD, we calculate a row vector (Row) that measures the change in prices for all products sold in the EU market in directly affected sectors, both domestically produced and imported. For each sector *i* we calculate a column vector ($Column_i$) that measures where its inputs come from, again for both EU-produced and imported inputs.

Matrix multiplying the Row and $Column_i$ vectors gives the average input price reduction for EU sector *i*:

$$-\Delta\overline{p_i^{IN}} = \text{Row} * \text{Column}_i.$$

If downstream industries passed input price changes perfectly on to consumers, the upstream price changes triggered by lowered AD duties would show up directly into the final goods price downstream. Alternatively, the downstream industry might keep a fraction of the price decrease as profits and only reduce prices partially, i.e. $\Delta p_i^{OUT} = y * \Delta\overline{p_i^{IN}}$ with y<1. To err on the side of caution, we assumed a pass-through rate of one half (y = 0.5). Using the same local approximation to output change used before, the downstream impact on sector *i* is:

$$\sigma * 0.5 * \Delta\overline{p_i^{IN}}$$

In order to gauge the importance of the different assumptions we need to make, we calculated the downstream industry effects under several scenarios. Given the relatively low share of imported inputs, changing the pass-through rate *y* had only a relatively small impact on the total effect and we fixed it to one half throughout in the calculations we show.

Table 19: Potential Downstream Indirect Employment Effects by Sector of granting MES to China

(for Scenario 3 and using a pass-through rate of 0.5 downstream)

SIC Code	Industry (WIOD)	No price-matching upstream	Partial price-matching upstream ($\Delta p^{EU/RW} = 0.1 * \Delta p^{CH}$)
01-05	Agriculture	0.00005	0.00041
10-14	Mining	0.00002	0.00010
15-16	Food products	0.00007	0.00081
17-18	Textiles	0.00007	0.00020
19	Leather & footwear	0.00002	0.00008
20	Wood products	0.00003	0.00024
21-22	Paper products	0.00004	0.00049
23	Oil products	0.00006	0.00070
24	Chemicals	0.00021	0.00129
25	Rubber & plastics	0.00012	0.00058
26	Non-metallic minerals	0.00005	0.00036
27-28	Basic & fabricated metals	0.00035	0.00275
29	Machinery	0.00035	0.00176
30-33	Electrical & optical eq.	0.00078	0.00174
34-35	Transport equipment	0.00043	0.00233
36-37	Manufacturing NEC	0.00008	0.00049

However, the assumption on price matching in the directly affected sectors was more important and in Table 19 we show results using two alternative scenarios. A first, conservative assumption is no price matching at all in directly affected sectors (x=0). It leads to rather small effects. A second assumption of x=0.1 is more optimistic, but still only assumes that EU or RoW firms match only one tenth of the price decline of Chinese imports. Even with this very small price matching behavior, the effects in the last column of 18 are on average more than 5 times larger. This reflects the fact that EU-sourced inputs are an order of magnitude more important than inputs imported from China.

The detailed results for the long-run, potential probabilities (Scenario 3) are in T9 for two price-matching scenarios. In Table20 we report aggregate indirect effects downstream in all

four possible cases.[45] When we calculate aggregate effects and add the indirect effects to the previously obtained direct effects and the upstream effects, we use the average of the results obtained under either assumption, as reported in the last column of Table 20.

Table 20: Potential Downstream Indirect Employment Effects for both Assumptions on Price Matching

(a) In percentage terms

	Scenario 2 (short-run)	Scenario 3 (potential)
No price-matching	0.009%	0.019%
Partial price-matching	0.052%	0.115%
Average downstream effect	0.030%	0.066%

(b) In number of jobs

	Scenario 2	Scenario 3
No price-matching	3,700	8,600
Partial price-matching	22,500	48,200
Average downstream effect	13,100	28,400

7.5 Other effects: macroeconomic multipliers

Indirect effects

The negative upstream effects imply that a reduction in AD duties in one sector lowers the input demand for suppliers to that sector and has additional negative effects on EU employment (upstream). The positive downstream effects imply that a reduction in AD duties in one sector, will lower the input cost of that sector's clients which will (partially) make its way into prices, boosting demand and raising EU employment (downstream).

Either of these effects could dominate and the net effect can therefore be positive or negative. The upstream effects depend on the magnitude of the direct employment effect and hence on the set of estimates used. The downstream effects only depend on the price adjustments in the directly affected sector, which depend only on the competitive responses, but not on the estimates for the direct effects. We find that by using the benchmark (CN8) estimates, which were smaller in absolute magnitude, the positive downstream effects dominate, but the negative upstream effects dominate when using the product-level estimates.

[45] As for the upstream effects, we ignore the impact of lower tradable goods on the non-tradeables sector. Given the low share of goods inputs, the positive effect is again as low as for the least affected sectors in Table 19.

The "type I" multiplier effects in Scott and Jiang (2015) correspond to our upstream effects. The pricing effects that boost EU employment downstream might be included in those calculations as well or they might be omitted. What Scott and Jiang (2015) call "type II" multiplier effects , or respending effects, are quite different in nature and we discuss them next.

Macroeconomic multipliers

A final aspect to consider is to what extent the job losses calculated above will have general equilibrium effects in the rest of the economy. Especially in the context of optimal fiscal policy during recessions, there is a fierce debate in the economic literature as to the magnitude of the appropriate economic multiplier on government expenditures. Ilzetzki, Mendoza and Végh (2013) provide an up-to-date overview to the recent debate in the literature. They also illustrate that the exact magnitude of the (fiscal) multiplier is highly sensitive to countries' particular situation, e.g. indebtedness, exchange rate regime, level of development and openness.

Ilzetzki et al. (2013) cite two extreme views from the policy debate, which ranges from Robert Barro's assertion that the peacetime fiscal multiplier is basically zero, to Christina Romer who used a multiplier as high as 1.6 when evaluating the likely effect of President's Obama stimulus package. One can even find more extreme estimates in the sprawling academic literature. A multiplier below 1 implies that money taken from the public (as taxes or borrowed) reduces GDP more than the subsequently addition to GDP when that money is spent by the government. The distortionary effects of the policy leave GDP lower that would be accomplished without the policy. A multiplier above 1 would suggest that the government can create additional aggregate demand by taxing or borrowing money and spending the proceeds.

One recent entry in this debate is Sims and Wolff (2013) who show that if the central bank follows a Taylor rule the output multiplier is relatively constant over the business cycle and about 0.9. They also show, however, that the multiplier is higher when the nominal interest rate is pegged, which is for example the case at the zero lower bound. They find a range of 0.7 to 1.8, which includes 1, but does not rule out additional effects to an initial shock.

Gechert, Hughes Hallett, Rannenberg (2015) conduct a meta-analysis and find a range of estimates. The most relevant is the multiplier associated with general public spending which is around 0.75 when economic circumstances are average or above average. It is estimated higher, at approximately 1.4 during recessions. The average of 0.97 across the three regimes suggests that a value of unity would not be a bad guide to formulate policy that will be in force irrespective of the business cycle.

The magnitude of the multiplier is an ongoing debate in macroeconomics with no consensus in the literature. Moreover, it has generally (or 'been') to applied to government spending and the existing evidence is unlikely to generalize directly to changes in private economic activity. It matters in our context as we need to consider to what extent displaced workers are likely to quickly find new jobs or to what extent the reduction in employment

will lower aggregate demand in the economy and lead to further job losses as displaced workers reduce their consumption. If the first case dominates, the job losses calculated before are overestimated. If the second effect dominates, the results are underestimates.

We have little to add to this debate as it goes beyond trade policy. As both effects work in opposite direction, they will cancel out to some extent. We feel the appropriate course of action is to not adjust our calculations to reflect these concerns. As these effects are macroeconomic in nature, they will affect all displaced workers similarly and they can simply be adjusted by applying a multiplier on the final estimates. We see no reason to use a multiplier different from unity, but if one is convinced that a macroeconomic multiplier above one is more appropriate—implying that for every job lost due to a change in the AD policy there will be some additional job destruction due to general equilibrium effects—one can straightforwardly multiply all the estimated effects by this multiplier. We feel such calculations are ad-hoc and, most importantly, are considerations that are entirely independent from the trade and market equilibrium effects we have concentrated on.

8. Aggregate Effects in Three Scenarios

Finally, we summarize the aggregate effects that we obtained under different modelling assumptions in a comparative table. In the three sub-sections we show the results for the three different Scenarios. In each case we use two sets of results, once using the benchmark estimates from step 1, which estimates the elasticities at the CN8 level, and once using the product-level estimates which estimate the elasticities using the more detailed product data from the cases, but which allows for less heterogeneity in the model.

8.1 Scenario 1: Simple Extrapolation from the 10 cases

In this scenario we simply extrapolate directly the results from the 10 AD cases to a broader group of sectors. We applied the estimated average percentage response to the 231,000 total employment in "TDI sensitive" sectors. We thus obtain an estimated aggregate employment effect on these particular sectors. Note that these estimates are limited to a subset of the economy and that indirect effects are not yet taken into account.

Table 21: Summary of Potential Employment Effects in Scenario 1

(only direct effects)	**Benchmark (CN8) estimates**		**Product-level estimates**	
	In percentage	In jobs	In percentage	In jobs
Unweighted	-6.0%	-14,000	-9.7%	-22,000
Weighted	-2.7%	-6,000	-8.5%	-19,000

Note: Percentage employment reduction applied to 231,000 employees in "TDI sensitive" sectors.

8.2 Scenario 2: Short-run effect based on cases against China currently in force

In Scenario 2 that we develop below, we now consider all the ongoing EU TDI cases against China (52 cases in total). Based on the products involved in all these cases, we construct "best estimates" of the likelihood that any particular product from China is subject to AD duties. Thus scenario 2 matches the current state of affairs in terms of existing product coverage of dumped imports from China. This allows us to construct an estimate of the counterfactual employment effects in the MES regime, if the current range of cases and products were to remain unchanged, but if the assigned duties would now be determined when giving China MES.

- In 2009, 2% of Chinese imports into the EU was subject to AD measures
- In this scenario, 2.5% of Chinese imports into the EU will be subject to AD duties (under the old methodology)
- In this scenario, 1.6% of domestic EU production is in sectors where Chinese imports are subject to AD duties.

Estimated aggregate effects on employment are:

Table 22: Summary of Potential Employment Effects in Scenario 2

	Benchmark (CN8) estimates		**Product-level estimates**	
	In percentage	In jobs	In percentage	In jobs
Direct effect	-0.116%	-49,700	-0.171%	-73,600
Indirect effects upstream	-0.036%	-15,300	-0.052%	-22,600
Indirect effects downstream	+0.030%	+13,100	+0.031%	+13,100
Total effect	-0.121%	-51,900	-0.193%	-83,100

Note: is based on detailed employment statistics that imply aggregate employment in the tradable goods sector of 43 mio workers in the EU28 (2014).

8.3 Scenario 3: Potential long-run scenario including hypothetical future cases

This scenario differs from Scenario 2 as it uses different probabilities in step 2 on the likelihood that any particular product is affected by Chinese dumping. The probabilities used now reflect a possible future expansion of dumping by Chinese firms, even though in some of these cases the new (MES) adjudication methodology will not lead to the imposition of AD duties anymore.

Two points of reference to assess the scope of this scenario are as follows:

- In 2009, 2% of Chinese imports into the EU was subject to AD measures
- In this scenario, 5.7% of Chinese imports into the EU will be subject to AD measures under the old methodology
- In this scenario, 3.4% of domestic EU production is in sectors where Chinese imports are subject to AD duties

Estimated aggregate effects on employment are:

Table 23: Summary of Potential Employment Effects in Scenario 3

	Benchmark (CN8) estimates		**Product-level estimates**	
	In percentage	In jobs	In percentage	In jobs
Direct effect	-0.274%	-117,800	-0.409%	-175,600
Indirect effects upstream	-0.086%	-36,900	-0.127%	-54,600
Indirect effects downstream	+0.066%	+28,400	+0.066%	+28,400
Total effect	-0.294%	-126,300	-0.469%	-201,800

Note: The percentage employment reduction is applied to detailed employment statistics that imply aggregate employment in the tradable goods sector of 43 mio workers in the EU28 (2014).

9. Member State – Sector Job Effects of MES for China

9.1. Methodology for Member State-Sector Elasticities

In this section we perform a breakdown of aggregate EU job losses from MES for China in TDI cases, by EU member state (MS) and by sector. Throughout the section we describe job effects that would result from a reduction in tariffs of around -30%, which is the tariff decrease that can be expected when moving from current duty calculation towards counterfactual duties in the case of MES for China.

Below we explain the methodology we performed to obtain sectoral elasticities. The next section holds all the employment results obtained with these elasticities.

As described earlier, we calculate sectoral elasticities using the regression coefficients obtained by fitting an equation on the results from the case-level analysis – which was inherently an EU-level analysis.

Extending the step 1 results of individual cases to all sectors at the EU-level, we could use a sectoral elasticity for the EU as a whole and use the following equation to impute the relevant elasticity for sector s:

$$\text{elasticity}_s = \beta_0 - \beta_{CH}.\overline{IP^{EU}_{CH,s}} + \beta_{RW}.\overline{IP^{EU}_{RW,s}}$$

Now, for the calculation of the member state-sector import elasticities below, we adjusted the equation as follows:

$$\text{elasticity}_{cs} = \beta_0 - \beta_{CH}.\overline{IP^{EU}_{CH,s}} - \beta_{CH}.\left[IP^{c}_{CH,s} - \overline{IP^{EU}_{CH,s}}\right]$$

$$+\beta_{RW}.\overline{IP^{EU}_{RW,s}} + \beta_{RW}.\frac{1}{2}\left[\left(IP^{c}_{RW,s} + IP^{c}_{REU,s}\right) - \left(\overline{IP^{EU}_{RW,s} + IP^{EU}_{REU,s}}\right)\right]$$

The three coefficients β_0, β_{CH} and β_{RW} are estimated based on the 10 cases analyzed in before and the results from the regressions are reported there. We obtained 2 sets of coefficients, one using the CN8 estimates and one using the product-level estimates, and we will work with two sets of elasticities throughout. We use the coefficient estimates obtained at the EU-level to construct an elasticity that varies by member state by exploiting the member state-specific variation in import penetration ratios.

$IP^{c}_{CH,s}$, $IP^{c}_{RW,s}$ and $IP^{c}_{REU,s}$ are the member state-specific import penetration ratios from the three respective destinations: China, Rest-of-the-World, and Rest-of-the-EU. At the EU-level, the last ratio is by construction non-existent, but at the member state-level it does drive a wedge between the size of the domestic industry and the imports from outside the EU.

$\overline{\mathrm{IP}^{\mathrm{EU}}_{\mathrm{CH,s}}}$ and $\overline{\mathrm{IP}^{\mathrm{EU}}_{\mathrm{RW,s}}}$ are the sectoral import penetration ratios for the EU as a whole, from China and the Rest-of-the-World respectively. These are the only variables one would need to use when working at the EU-level. The final variable entering the equation is $\overline{\mathrm{IP}^{\mathrm{EU}}_{\mathrm{RW,s}} + \mathrm{IP}^{\mathrm{EU}}_{\mathrm{REU,s}}}$ which is the employment weighted average of the sum of the national import penetration ratios from RW and REU. All the import penetration ratios vary at the sector level, with sectors defined at the level of WIOD.

To understand the logic of the equation for the member state-sector elasticities, one only needs to realize that the (employment) weighted average of both terms in square brackets are zero when averaged over all EU member states. As a result, the average member state-sector elasticities (over countries) will equal the sectoral elasticity. However, the elasticities vary across countries to the extent that the terms in the square brackets are positive or negative. I.e. they differ to the extent that countries differ from the EU-wide import penetration.

For the import penetration from China this is straightforward. The EU-average IP simply drops out and we could use the member state-specific IP directly. However, the adjustment is important for the adjustment to the Rest-of-the-World IP. At the EU level, domestic sales with imports from China and RW aggregate to the entire market. At the member state-level, imports from the rest of the EU are yet an alternative way to satisfy demand, but also an alternative channel where increased imports from China does not hurt the domestic sector, but instead lowers imports. By using the member state-specific deviation in square brackets we are able to use the β_{RW} coefficient that we necessarily had to estimate at the EU-level to make the adjustment. Given that the import penetration ratios are much larger and vary much more when adding REU to RW, we only use one half of the variation in the adjustment.

In the remainder of section 9, we describe the results in terms of job effects arising from the member state-sector elasticities explained above. We first discuss the benchmark (CN8) estimates of a breakdown of employment effects of MES in TDI cases against China, by EU member state and sector. Afterwards, we also discuss the product-level estimates by member state and sector.

9.2. Job Effects by Member State and Sector

Below we discuss results on job effects of MES for China, for individual EU countries and individual sectors. We consider short-run (scenario 2) and long-run (scenario 3) effects which we define as follows.

In the **short-run scenario 2**, we take into account all the Chinese products currently subject to TDI (52 cases) (November 2015) and based on these products, we determine the probability that each sector will be subject to TDI in the nearby future. Thus, scenario 2 makes projections from the existing 52 AD cases to derive the volume of affected trade for the respective HS4 sector level and adds the effects up to individual sectors first and to the total economy in a final step.

In the **long-run scenario 3**, we consider the possibility that the MES regime may have additional long-run effects also affecting *new* products, not subject to current EU TDIs thus far. As dumped imports from China are likely to expand into different product categories that have not been subject to EU dumping investigations before, scenario 3 effects incorporates what is products that are likely to be affected in the future. For this purpose, we use US AD cases against China and EU AD cases against other countries than China to inform us on the sectoral distribution of these potential new cases and products. In Scenario 3, we thus additionally consider the possibility that in the future, AD enforcement could spread to more products (a hypothetical long-run scenario which can be regarded as the worst case scenario).

We develop short-run and long-run job effects under two alternative sets of product definitions which differ from each other in terms of aggregation: i) we consider publicly available 8-digit product codes (CN8) from Eurostat (COMEXT data), which we refer to as our "**Benchmark CN8 estimates**" and ii) we consider more detailed **Product-level** definitions made available to us by the EU commission and resulted from confidential data where products are typically more narrowly defined than in the publicly available data.

In our discussion below, we each time first discuss the short-run (scenario 2) and subsequently the long-run (scenario 3) job effects. In each of the Tables we give separate results for the "direct effects", and "indirect effects" and "total effects". We further split the "indirect effects" into "indirect upstream" and "indirect downstream" job effects. As anticipated, "direct employment effects" and "indirect upstream" employment effects are negative, while "indirect downstream" employment effects are positive. Together, they result in total negative job losses of MES for China. This holds for every individual EU member state, and for every EU sector and for every scenario. Overall, "direct effects" on employment tends to be the largest component in the total.

In general, job effects are more negative under the long-run scenario than in the short-run which is plausible. Also, job effects tend to be more negative when using Product-level estimates rather than CN8 estimates.

We start by discussing Benchmark estimates (CN8) where we first show a breakdown of job losses by individual EU member state and afterwards a breakdown of job losses by individual EU sectors.[46]

9.3. Benchmark Estimates (CN8)

Member State Level Job Effects

The total aggregate EU employment loss based on CN8 **short-run** estimates lies around -52 000 jobs. When we break this number down by individual EU member state, like we do in Table 23 below, it can be noted that especially Germany would suffer job losses, followed by Italy, France and Poland. It can also be noted from Table 24 that while all countries would suffer losses, the impact is clearly differential across countries. Larger countries tend to carry larger losses, although a member state like Italy seems disproportionately affected since countries of similar population size like UK and Spain appear to suffer much less job losses. Results however also suggest that sectoral composition of TDI cases may disproportionally affect some countries but that by no means job losses are limited to one or a few individual countries. With the exception of Germany, one observation that arises is that the higher per capita GDP of a MS, the bigger the indirect (and positive) downstream job effects and the lower the overall job loss.

The total aggregate EU employment loss based on CN8 **long-run** estimates lies around -126 000 jobs. Also, in the long-run, especially Germany and Italy would be negatively affected, followed by France and Poland. The impact on other EU countries is smaller.

[46] Small divergences in numbers with the Final Report can occur due to rounding issues.

Table 24: Short-run (Scenario 2) Job Effects by *Member state* using CN8 estimates

	Direct Effects	Indirect upstream Effects	Indirect downstream Effects	**Total effect**
Austria	-928	-331	270	-989
Belgium	-588	-240	215	-612
Bulgaria	-629	-239	161	-708
Cyprus	-36	-15	9	-41
Czech Republic	-2,082	-632	587	-2,126
Germany	-12,864	-3,158	3,415	-12,607
Denmark	-358	-137	119	-375
Spain	-3,474	-957	799	-3,632
Estonia	-129	-56	33	-152
Finland	-591	-165	128	-628
France	-4,903	-1,403	1,246	-5,060
United Kingdom	-3,752	-1,220	1,088	-3,884
Greece	-427	-224	125	-526
Hungary	-909	-362	348	-923
Ireland	-258	-87	74	-272
Italy	-7,312	-1,878	1,549	-7,640
Lithuania	-202	-95	48	-248
Luxemburg	-12	-7	5	-14
Latvia	-189	-67	31	-226
Malta	-17	-8	7	-18
Netherlands	-736	-326	261	-801
Poland	-4,446	-1,739	1,148	-5,036
Portugal	-948	-313	215	-1,047
Romania	-2,053	-1,063	678	-2,438
Slovakia	-675	-252	234	-693
Slovenia	-247	-113	92	-268
Sweden	-905	-253	219	-938
Total	-49,668	-15,339	13,104	-51,903

Table 25:Long-run (Scenario 3) Job Effects by *Member state* using CN8 estimates

	Direct Effects	Indirect upstream Effects	Indirect downstream Effects	**Total effect**
Austria	-2,065	-763	582	-2,246
Belgium	-1,266	-540	460	-1,346
Bulgaria	-1,758	-639	372	-2,025
Cyprus	-90	-38	21	-108
Czech Republic	-4,442	-1,374	1,236	-4,579
Germany	-28,368	-6,882	7,262	-27,988
Denmark	-809	-324	261	-872
Spain	-8,488	-2,384	1,738	-9,134
Estonia	-283	-130	74	-339
Finland	-1,362	-392	283	-1,471
France	-11,824	-3,328	2,704	-12,448
United Kingdom	-9,482	-2,861	2,352	-9,991
Greece	-1,196	-681	295	-1,582
Hungary	-2,303	-862	775	-2,390
Ireland	-607	-237	174	-670
Italy	-17,779	-4,313	3,324	-18,768
Lithuania	-563	-255	114	-704
Luxemburg	-25	-17	11	-31
Latvia	-366	-169	72	-464
Malta	-54	-20	16	-57
Netherlands	-2,144	-782	568	-2,357
Poland	-11,125	-4,609	2,538	-13,197
Portugal	-2,439	-784	471	-2,752
Romania	-5,072	-3,158	1,550	-6,680
Slovakia	-1,465	-565	497	-1,533
Slovenia	-575	-264	198	-642
Sweden	-1,844	-561	460	-1,944
Total	-117,791	-36,933	28,407	-126,317

Sector Level Job Effects

Below we discuss job losses of MES for China for each individual EU sector based on CN8 estimates.

Based on Table 26, we conclude that in the short-run, most job losses would be suffered by the "Basic and fabricated metals" sector, followed by "non-metallic minerals", "wood products" , "Transport equipment" and "Chemicals". Incidentally, these sectors are typically the ones in which most Antidumping activity takes place and therefore do not come as a surprise as sectors where most of the employment action is going on.

Based on Table 27, we conclude that in the long-run, most job losses would occur in sectors such as "Basic **Metals**", "non-metallic **Minerals**" which is similar to the short-run, but now also sectors like "**Machinery**", "**Rubber and Plastics**" and even "Agriculture" would suffer net job losses in the long-run scenario.[47]

The occurrence of "Agriculture" warrants a deeper look at this sector whose full-length description is "Agriculture, Hunting, Forestry and Fishing". Most TDI action is coming from the sub-sector "Fishing & Aquaculture", with anti-dumping cases in this sector on products such as farmed salmon, trout and shrimp but with relatively little EU employment in the "Fishing & Aquaculture" sub-sector. The other sub-categories in this sector involving products of Agriculture, Hunting and Forestry occur far less in TDIs.

[47] Sector 36 is shown in Table 27 to suffer higher job losses than some of those mentioned in this paragraph. However, since the sector is a diverse residual aggregate rather than a clearly defined sector we chose not to highlight it.

Table 26: Short-Run (Scenario 2) Job Effects by *Sector* using CN8 Estimates

	Sector	Direct Effects	Indirect upstream Effects	Indirect downstream Effects	**Total effect**
1-5	Agriculture	0	-2,170	806	-1,364
10-14	Mining	0	-391	21	-370
15-16	Food products	-1,803	-310	658	-1,455
17-18	Textiles	0	-113	60	-53
19	Leather & footwear	-3	-16	4	-16
20	Wood products	-4,475	-914	92	-5,297
21-22	Paper products	-1,306	-376	136	-1,546
23	Oil products	0	-34	14	-20
24	Chemicals	-4,235	-773	825	-4,183
25	Rubber & plastics	-2,234	-757	252	-2,739
26	Non-metallic minerals	-6,695	-846	150	-7,391
27-28	Basic & fabricated metals	-14,114	-5,027	3,853	-15,288
29	Machinery	-6,610	-896	1,589	-5,917
30-33	Electrical & optical equip.	-1,555	-525	1,215	-865
34-35	Transport equipment	-6,637	-1,138	2,953	-4,822
36	Manufacturing NEC	0	-1,052	475	-577
Total		-49,668	-15,339	13,104	-51,903

Notes: (1) For "Agriculture" (Agriculture, Hunting, Forestry and Fishing) we use employment weights in the aggregation analysis. This WIOD sector consists of three sub-sectors in the ISIC, namely "01: Agriculture, hunting and related service activities", "02: Forestry, logging and related service activities," and "05: Fishing, aquaculture and service activities incidental to fishing." Eurostat reports separate employment statistics for each of the three. This breakdown of employment by sub-sectors is not available for other WIOD sectors for which we use import weights.

Table 27: Long-Run (Scenario 3) Job Effects by *Sector* using CN8 Estimates

	Sector	Direct Effects	Indirect upstream Effects	Indirect downstream Effects	**Total effect**
1-5	Agriculture	-1,089	-8,214	2,106	-7,197
10-14	Mining	-107	-1,493	47	-1,553
15-16	Food products	-11,357	-1,544	2,140	-10,762
17-18	Textiles	-1,177	-461	243	-1,395
19	Leather & footwear	-1,282	-154	22	-1,413
20	Wood products	-5,671	-1,686	137	-7,220
21-22	Paper products	-5,282	-1,234	389	-6,127
23	Oil products	-686	-125	73	-737
24	Chemicals	-6,242	-1,696	1,561	-6,377
25	Rubber & plastics	-9,087	-1,975	549	-10,512
26	Non-metallic minerals	-9,349	-1,375	259	-10,465
27-28	Basic & fabricated metals	-24,776	-9,589	7,279	-27,085
29	Machinery	-14,225	-1,882	3,376	-12,731
30-33	Electrical & optical equip.	-6,112	-1,317	3,591	-3,838
34-35	Transport equipment	-9,367	-1,737	5,636	-5,468
36	Manufacturing NEC	-11,983	-2,452	999	-13,436
Total		-117,791	-36,933	28,407	-126,317

9.4. Product-Level Estimates

In this section we discuss job effects based on confidential product-level data which is more disaggregate than CN8 level data. We start by discussing member state-level job effects and afterwards sector-level job effects.

Member State Level Job Effects

The short-run job loss for the EU as a whole when using product-level estimates amounts to around – 83 000 jobs lost. A breakdown by individual EU member state predicts the same as before e.g. countries like Germany and Italy would suffer most in terms of job losses of MES for China, followed by France and Poland. Losses are smaller for other individual EU countries. This holds both in the short-run, shown in Table 28 below as well as in the long-run, shown in Table 29 below. But overall, long-run job losses would be larger, as expected.

Table 28: Short-run (Scenario 2) Job Effects by *Member state* using Product-level Estimates

	Direct Effects	Indirect upstream Effects	Indirect downstream Effects	**Total effect**
Austria	-1,552	-485	270	-1,768
Belgium	-1,273	-357	216	-1,415
Bulgaria	-939	-348	161	-1,126
Cyprus	-52	-21	9	-65
Czech Republic	-3,254	-933	588	-3,599
Germany	-18,622	-4,712	3,418	-19,916
Denmark	-708	-202	119	-792
Spain	-4,728	-1,407	800	-5,335
Estonia	-217	-80	33	-264
Finland	-817	-241	128	-930
France	-7,111	-2,077	1,247	-7,940
United Kingdom	-6,034	-1,807	1,089	-6,752
Greece	-604	-321	125	-800
Hungary	-1,684	-535	348	-1,871
Ireland	-424	-130	74	-479
Italy	-9,701	-2,762	1,550	-10,912
Lithuania	-328	-135	48	-415
Luxemburg	-29	-11	5	-35
Latvia	-275	-96	31	-339
Malta	-35	-12	7	-40
Netherlands	-1,385	-480	261	-1,604
Poland	-6,597	-2,518	1,150	-7,965
Portugal	-1,363	-454	215	-1,602
Romania	-2,900	-1,523	678	-3,745
Slovakia	-1,207	-371	234	-1,344
Slovenia	-483	-166	92	-557
Sweden	-1,322	-371	219	-1,474
Total	-73,644	-22,556	13,115	-83,084

Table 29: Long-run (Scenario 3) Job Effects by *Member state* using Product-level Estimates

	Direct Effects	Indirect upstream Effects	Indirect downstream Effects	**Total effect**
Austria	-3,491	-1,124	582	-4,033
Belgium	-2,797	-806	460	-3,143
Bulgaria	-2,641	-947	372	-3,215
Cyprus	-138	-56	21	-173
Czech Rep.	-7,074	-2,045	1,236	-7,883
Germany	-41,663	-10,291	7,262	-44,692
Denmark	-1,642	-481	261	-1,862
Spain	-11,529	-3,509	1,738	-13,299
Estonia	-508	-191	74	-625
Finland	-1,901	-577	283	-2,195
France	-17,033	-4,925	2,704	-19,254
United Kingdom	-15,226	-4,272	2,352	-17,146
Greece	-1,682	-981	295	-2,368
Hungary	-4,184	-1,279	775	-4,689
Ireland	-1,037	-350	174	-1,214
Italy	-23,459	-6,389	3,324	-26,523
Lithuania	-908	-369	114	-1,163
Luxemburg	-67	-25	11	-81
Latvia	-577	-245	72	-751
Malta	-109	-30	16	-123
Netherlands	-3,913	-1,155	568	-4,500
Poland	-16,481	-6,769	2,538	-20,712
Portugal	-3,574	-1,155	471	-4,258
Romania	-7,375	-4,578	1,550	-10,403
Slovakia	-2,701	-841	497	-3,044
Slovenia	-1,081	-390	198	-1,273
Sweden	-2,806	-829	460	-3,175
Total	-175,597	-54,608	28,407	-201,797

Sector Level Job Effects

When we consider job effects obtained with product-level estimates at sector-level, the same conclusions arise as the ones obtained with CN8 estimates. From Table 30 below it can be noted that sectors that would endure most employment losses in the short-run would be

"Basic and fabricated **Metals**", "non-metallic **Minerals**", "**Transport** Equipment" and "**Machinery**" and to a lesser extent also "**Wood** products" and "**Chemicals**".

From Table 31, where we show long-run results, also "**Rubber and Plastics**" and "**Agriculture**" are sectors that would additionally lose jobs from MES for China.

Table 30: Short-run (Scenario 2) Job Effects by *Sector* using Product-level Estimates

	Sector	Direct Effects	Indirect upstream Effects	Indirect downstream Effects	**Total effect**
1-5	Agriculture	0	-3,013	806	-2,207
10-14	Mining	0	-551	21	-530
15-16	Food products	-2,552	-465	658	-2,358
17-18	Textiles	0	-171	60	-111
19	Leather & footwear	-5	-24	4	-26
20	Wood products	-6,039	-1,251	92	-7,198
21-22	Paper products	-1,758	-538	136	-2,160
23	Oil products	0	-55	14	-41
24	Chemicals	-8,051	-1,298	827	-8,522
25	Rubber & plastics	-3,128	-1,144	253	-4,018
26	Non-metallic minerals	-8,871	-1,167	150	-9,887
27-28	Basic & fabricated metals	-20,458	-7,401	3,853	-24,007
29	Machinery	-9,841	-1,348	1,589	-9,599
30-33	Electrical & optical equip.	-2,616	-826	1,215	-2,227
34-35	Transport equipment	-10,324	-1,770	2,957	-9,137
36	Manufacturing NEC	0	-1,534	478	-1,055
Total		-73,644	-22,556	13,115	-83,084

Table 31: long-run (Scenario 3) Job Effects by *Sector* using Product-level Estimates

	Sector	Direct Effects	Indirect upstream Effects	Indirect downstream Effects	**Total effect**
1-5	Agriculture	-1,591	-11,566	2,106	-11,051
10-14	Mining	-402	-2,360	47	-2,716

15-16	Food products	-16,073	-2,246	2,140	-16,179
17-18	Textiles	-2,375	-768	243	-2,900
19	Leather & footwear	-1,934	-274	22	-2,186
20	Wood products	-7,653	-2,381	137	-9,898
21-22	Paper products	-7,111	-1,739	389	-8,460
23	Oil products	-1,163	-205	73	-1,295
24	Chemicals	-11,866	-2,751	1,561	-13,056
25	Rubber & plastics	-12,725	-2,953	549	-15,129
26	Non-metallic minerals	-12,387	-1,920	259	-14,048
27-28	Basic & fabricated metals	-35,912	-14,179	7,279	-42,811
29	Machinery	-21,178	-2,842	3,376	-20,644
30-33	Electrical & optical equip.	-10,282	-2,118	3,591	-8,809
34-35	Transport equipment	-14,570	-2,692	5,636	-11,626
36	Manufacturing NEC	-18,374	-3,616	999	-20,991
Total		-175,597	-54,608	28,407	-201,797

9.5. Summary of Country-Sector Effects

In this section 9 we pursue a breakdown of counterfactual EU employment effects at individual EU member state level as well as at sector-level, if MES for China were granted in European TDI cases on Chinese imports.

We consider results for two sets of product-definitions and under both a short-run and long-run scenario. Here we mainly summarize the upper-bound results at individual member state-level and at sector-level, respectively.

For the **short-run**, the *upper bound* total EU job loss lies around -83 000 jobs[48] that would be lost when moving to MES for China.

When breaking this number down by member state, the biggest job losses would occur for Germany and Italy.

For the **long-run**, the *upper boun*d total EU job loss lies around – 202 000 jobs losses from moving to MES for China, again featuring Germany and Italy as suffering most of the losses in absolute levels.

Other EU countries suffer smaller losses and the impact is clearly differential across countries. Larger countries tend to carry larger losses, although a member state like Italy seems disproportionately affected since countries of similar population size like UK and Spain appear to suffer much less job losses. Also, the higher the member state's level of per capita GDP, the smaller the job losses appear to be (with the exception of Germany).

In terms of sectoral breakdown, **short-run** job losses are strongest in "Basic & fabricated **Metals**", in "non-metallic **Minerals**" and in "**Machinery**".

The chemical sector, which has seen many antidumping cases in the past, perhaps surprisingly seems relatively less affected by MES for China than other sectors.

In the **long-run**, additional job losses can also be expected to be high in "**Rubber & Plastics**" and "**Food Products**".

[48] Differences with numbers in final report are due to rounding issues.

10. Measures to Maintain Effectiveness of Anti-Dumping

10.1. Types of Measures

In this Section 10, we discuss measures to maintain the effectiveness of Anti-dumping. Thus, we compare job effects reported in Section 8 earlier to what they would be in the event of applying measures aimed at maintaining the effectiveness in anti-dumping cases against China .

In the Table 32 below we report for the 10 cases given to us by the EU Commission both actual duties imposed in these cases (col 1) as well as hypothetical duties under the MES regime without additional measures (col 2). The last two columns report duties under the counterfactual scenario that prices in China are not used for the calculation of the EU antidumping duty against China but instead a technique of "benchmark cost from a third country plus a reasonable profit margin" is used to determine normal values and hence dumping margins and duties. This practice enters into force whenever the EU decides that the normal value of imports cannot be based on domestic prices and costs in the exporting country because they are distorted. Column 3 shows duty levels in this counterfactual scenario where the lesser-duty rule (LDR) is applied, while column 4 goes one step further and reports counterfactual duty levels with the LDR removed. In the counterfactual scenario, the application of the LDR makes a difference and usually implies that duty rates are lower, as we can see from column (3).

In the analysis in section 8, we have compared the effects on jobs of moving in Table 32 from column 1 duties to column 2 duties e.g. by comparing the original duty rates based on analogue country prices that apply in EU cases against China with duty rates that would apply in case of MES. This resulted in an average duty decrease of around -30% which can be seen from bottom Table 33.

Currently in this section 10, we investigate to what extent the benchmark country technique and the LDR could alter duty rates in EU antidumping cases against China. We consider i) the calculation of normal value and dumping margin on the basis of the benchmark costs instead of exporters prices or costs and under the continued application of the "LDR" (column 3 Table 32); ii) the benchmark cost technique but without the "LDR" (Column 4 Table 32). This results in two "counterfactual Measures" which we describe below.

Table 32: Original and Counterfactual Duty Rates Towards China

	Duty Original	Duty MES	Duty with Benchmark cost + UI profit)	Duty: benchmark cost + UI profit
	LDR	LDR	LDR	No LDR
	(1)	**(2)**	**(3)**	**(4)**
Persulfates	72.00%	21.80%	72.00%	76.10%
Fe Si	26.00%	15.60%	26.00%	29.00%
Compressors	76.50%	13.20%	76.50%	76.50%
Citric Acid	36.00%	6.60%	36.00%	58.00%
Candles	12.10%	4.00%	12.10%	27.10%
Ceramic Tiles	31.00%	8.00%	18.50%	18.50%
OCS	40.20%	0.00%	40.20%	51.90%
MTF	43.00%	16.10%	16.90%	16.90%
Solar Glass	37.00%	0.00%	37.00%	71.70%
Tartaric Acid	11.30%	0.00%	11.30%	37.50%

(1) This is **the original** duty for China without MES
(2) This is the duty for China **with MES** but without additional measures
(3) This is duty for China MES with adjusted costs and prices and **with the LDR** still in place
(4) This is duty for China MES with adjusted costs and prices but with the **LDR removed**

Measures 1: Whenever the EU decides that costs and prices in a trade partner are distorted, it calculates normal value and dumping margin on the basis of "benchmark costs plus a reasonable profit margin". In this calculation the Union Industry (UI)'s profit margin is added to the costs of production incurred in the benchmark country for the product under consideration. The EU is one of the few countries that applies the LDR in antidumping (AD) cases. This involves that the antidumping duty is set at the smallest of the dumping margin or injury margin. It will equal the injury margin whenever this is lower than the dumping margin. As a result, duties in col (3) are lower than those in col (4).

Measures 2: We also consider the case where costs and prices in a trade partner are distorted and a "benchmark technique" is applied but where the EU would additionally remove the LDR. In this scenario (**No LDR**), the antidumping duty is set at the level of the dumping margin and is typically higher than in the presence of LDR (col 4 Table 32).

In Table 33 below, we now compare the duty levels under status quo with the duties in the various counterfactual Measures scenarios. We start by comparing the original AD duty to

the MES scenario (col 1 and col 2 of Table 32), which would result in an average drop of the AD tariff of -29.99%, shown at the bottom of Table 33. Next, we compare the original duties to the **Measures 1** scenario with the duty under "benchmark cost +UI profit" and applying the LDR rule (comparing col 1 and col 3 of Table 32). In that case, we find the average duty drops by about -3.86% compared to the status quo.

And finally, we compare the original duties with the counterfactual scenario of "benchmark cost + UI profit" but without applying the LDR rule (comparing col 1 to col 4 in Table 32). Under **Measures 2**, the average counterfactual duty would be 7.81% higher than under original duties which can be seen from the last column of Table 33. The correct interpretation is that average tariffs would be 7.81% higher under Measures 2 compared to status quo, as reported in Column (3) of Table 33. As we will see below, this will result in the prediction that EU jobs are additionally saved on top of those that are already protected by current TDI.

Table 33: Factors to Maintain Effectiveness of Duties against China

Case Name	Duty MES - Duty Original	Measures 1	Measures 2
Persulfates	-50.2%	0.0%	4.1%
FeSI	-10.4%	0.0%	3.0%
Compressors	-63.4%	0.0%	0.0%
Citric Acid	-29.4%	0.0%	22.0%
Candles	-8.1%	0.0%	15.0%
Ceramic tiles	-23.0%	-12.5%	-12.5%
OCS	-40.2%	0.0%	11.7%
MTF	-26.9%	-26.1%	-26.10%
Solar glass	-37.0%	0.0%	34.7%
Tartaric acid	-11.3%	0.0%	26.2%
Tariff Change	**-29.99%**	**-3.86%**	**7.81%**

(a) We compare the original duties with MES duties
(b) We compare original duties with Measures 1 duties
(c) We compare the original duties with Measures 2 duties

10.2. Job Effects With Different Types of Measures

The short-run job effects with MES without benchmark technique were listed in Table 22 in section 8.2. while those for the long-run job effects were listed in Table 23 in section 8.3. Below we re-draft these tables under each of the Measures scenarios when applying the benchmark technique with and without applying LDR. Based on the average duty changes in scenarios Measures 1 and Measures 2 compared to the status quo, we now calculate the job

effects under the short-run scenario (Scenario 2) as well as job effects under the long-run scenario (Scenario 3).

In the **short-run scenario 2**, we take into account all the Chinese products currently subject to TDI (52 cases) (November 2015) and based on these products, we determine the probability that each sector will be subject to TDI in the nearby future. Thus, scenario 2 makes projections from the existing 52 AD cases to derive the volume of affected trade for the respective HS4 sector level and adds the effects up to individual sectors first and to the total economy in a final step.

In the **long-run scenario 3**, we consider the possibility that the MES regime may have additional long-run effects also affecting *new* products, not subject to current EU TDIs thus far. As dumped imports from China are likely to expand into different product categories that have not been subject to EU dumping investigations before, scenario 3 effects incorporates what is products that are likely to be affected in the future. For this purpose, we use US AD cases against China and EU AD cases against other countries than China to inform us on the sectoral distribution of these potential new cases and products. In Scenario 3, we thus additionally consider the possibility that in the future, AD enforcement could spread to more products (a hypothetical long-run scenario which can be regarded as the worst case scenario).

We develop short-run and long-run job effects under two sets of product definitions which differ from each other in terms of aggregation i) we consider publicly available 8-digit product codes (CN8) from Eurostat (COMEXT data), which we refer to as our "**benchmark CN8 estimates**"; ii) we consider more detailed **product-level** definitions made available to us by the EU Commission and resulting from confidential data where products are typically more narrowly defined than in the publicly available data.

We would like to point out that the direct effects of measures for a particular sector and member state are exactly *proportional* to the change in AD, in case one would like to evaluate measures that maintain the effectiveness of AD. Indirect employment effects are almost proportional.[49]

10.3. Measures Type 1:

Short-run (Scenario 2)

In Table 34 below, we re-do the Table 22 of Section 8.2. in which job effects are listed (direct, indirect up-and downstream effects and total job effects). But instead, we now use an average tariff reduction that applies in case of Measures 1 e.g. an average reduction of **-3.86%.** By comparing the original Table 22 under MES with Table 34 under Measures 1 scenario, we see that job effects are much smaller in Measures 1 than under MES. Where the upper-bound

[49] As the employment elasticities and input-output weights differ by sector and countries have different sector-weights, the indirect effects are not exactly proportional with tariffs, not at the country-sector level (but close to it).

total effect in the original report by moving to MES was -83 100 jobs lost, the short-run job loss in scenario 2 under Measures 1 compared to the status quo of the original duties is -10 300 jobs as shown below.

Table 34: Re-doing Table 22 of Section 8.2. (for Measures 1): Summary of Employment Effects in Scenario 2

	Benchmark (CN8) estimates		**Product-level estimates**	
	In percentage	In jobs	In percentage	In jobs
Direct effect	-0.015%	-6,400	-0.022%	-9,500
Indirect effects upstream	-0.005%	-2,000	-0.007%	-2,900
Indirect effects downstream	+0.005%	+2,100	+0.005%	+2,100
Total effect	-0.015%	-6,300	-0.024%	-10,300

Long-run (Scenario 3)

In Table 35 below, we re-do Table 23 for the long-run job effects but now with an average tariff reduction of **-3.86%**. By comparing the original Table 23 to Table 35, we clearly see that job effects are much smaller under Measures 1 in Table 35. Where the total effect in Table 23 of section 8.3. was -201 800 jobs lost as a result of moving from status quo to MES, the long-run job losses under Measures 1 compared to status quo amount to -25 100 jobs lost, which can be seen below.

Table 35: Re-doing Table 23 of Section 8.3. (for Measures 1): Summary of Employment Effects in Scenario 3

	Benchmark (CN8) estimates		**Product-level estimates**	
	In percentage	In jobs	In percentage	In jobs
Direct effect	-0.035%	-15,200	-0.053%	-22,600
Indirect effects upstream	-0.011%	-4,700	-0.016%	-7,000
Indirect effects downstream	+0.011%	+4,600	+0.011%	+4,600
Total effect	-0.036%	-15,300	-0.058%	-25,100

10.4. Measures Type 2:

Short-run (Scenario 2)

The Measures 2 scenario results in more jobs being saved than under the status quo of the original duty. These jobs saved under Measures 2 were not protected under the current TDI legislation and therefore lost, but would be saved in case of removing the LDR. The fact that average tariffs would be 7.81% higher under Measures 2 compared to status quo, as reported in Column (3) of Table 33, results in EU jobs that are saved in addition to the jobs that are already protected by current TDI.

In Table 36 below, we now re-do Table 22 of Section 8.2. but with an average tariff increase compared to status quo of **7.81%.** In the original Table 23, moving from status quo to the MES resulted in -83 000 jobs lost. When now comparing the status quo with the Measures 2 in Table 36, we see that the removal of LDR saves an additional 20 200 EU jobs compared to the jobs protected in the original duty scenario.

Table 36: Re-doing Table 22 of Section 8.2. (for Measures 2): Summary of Employment Effects in Scenario 2

	Benchmark (CN8) estimates		**Product-level estimates**	
	In percentage	In jobs	In percentage	In jobs
Direct effect	0.030%	+12,900	+0.045%	+19,200
Indirect effects upstream	0.009%	+4,000	+0.014%	+5,900
Indirect effects downstream	-0.011%	-4,800	-0.011%	-4,800
Total effect	0.028%	+12,100	+0.047%	+20,200

Long-run (Scenario 3)

In Table 37, we re-do Table 23 for the long-run job effects but now with an average tariff increase of **7.81%** compared to status quo, this results in different estimates than in the

original Table 23 where we compared MES to status quo. By now comparing the status quo with Measures 2 duties, where we remove the LDR, we clearly see below that job effects are positive. The removal of the LDR in combination with measures taken under the Measures 1 scenario (Measures 2) saves an extra 49 500 jobs that would otherwise be lost in the face of Chinese import competition under status quo TDI duties which can be seen below.

Table 37: Re-doing Table 23 of Section 8.3. (for Measures 2): Summary of Employment Effects in Scenario 3

	Benchmark (CN8) estimates		**Product-level estimates**	
	In percentage	In jobs	In percentage	In jobs
Direct effect	+0.071%	+30,700	+0.106%	+45,700
Indirect effects upstream	+0.022%	+9,600	+0.033%	+14,200
Indirect effects downstream	-0.024%	-10,400	-0.024%	-10,400
Total effect	+0.069%	+29,800	+0.115%	+49,500

When interpreting the "Measures type 2" results, the reader should keep in mind that our methodology is tailored to only study the sectors directly and indirectly affected, not the economy as a whole. The resulting job increases may therefore not be misinterpreted as a reduction of unemployment at the macro-level that can be achieved by increasing import tariffs.

10.5. Summary of Measures to Maintain Effectiveness of Anti-Dumping

In this section 10, we presented a set of alternative job effects of granting MES to China in TDI cases. Where the main report in Section 8 calculates job effects based on costs and prices of Chinese firms, in this section 10 we supplemented this by calculating EU job effects in the event that costs and prices in China would be considered as distorted and cannot be used for the calculation of dumping margins and duties. But instead a technique of "benchmark country cost plus union industry profit margin" would be used for dumping margins. We evaluated job effects under this counterfactual both with and without application of the LDR. As before, we considered results in the short-run and long-run.

Applying this technique while still maintaining the LDR, would result in an average tariff that is -3.86% lower than in the status quo and results in EU job losses compared to status quo of around -10 300 jobs in the **short-run** and around - 25 100 jobs in the **long-run.**

Removing the LDR in addition to applying benchmark country costs plus UI profit margin**,** would result in an average tariff increase of +7.81% compared to status quo tariffs in current TDIs and would result in additional EU jobs being saved compared to those under original duties of around +20 200 in the **short-run** and around +49 500 in the **long-run**. These are the EU jobs that can additionally be safeguarded in comparison with the status quo.

Appendix A: Background tables for step 1

Table A. 1: Import-Demand Elasticities from CN8 Data (Step 1A)

Case AD	(511) $dlnImp_{china}$	(516) $dlnImp_{china}$	(519) $dlnImp_{china}$	(522) $dlnImp_{china}$	(528) $dlnImp_{china}$	(560) $dlnImp_{china}$	(584) $dlnImp_{china}$	(585) $dlnImp_{china}$	(598) $dlnImp_{china}$	(614) $dlnImp_{china}$
$dlnPrice_{chin}$	-0.616**	-1.30**	-0.175**	-0.76**	-0.68***	-0.32***	-0.75***	-1.18***	-2.03***	-0.71***
	(0.278)	(0.55)	(0.07)	(0.344)	(0.08)	(0.06)	(0.202)	(0.162)	(0.300)	(0.240)
Control	Price of Row	Price of Row	Price of Row	Price of Row	Price of Row	Price of Row	Price of Row	Price of Row	Price of Row	Price of Row
Year Dum	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	201	115	451	202	627	1028	281	326	66	163
R^2	0.154	0.288	0.113	0.029	0.364	0.138	0.270	0.207	0.504	0.163

Note: Standard errors in brackets. We insert of prices from the RoW as a control as well as time dummies. Prices are unit values obtained from 8-digit product-level data from COMEXT, EUROSTAT. These are short-run elasticities estimated on the bilateral import volumes at CN8 level from China into the individual member states of the EU between 2000 and 2014. We did not instrument for price and cannot exclude endogeneity effects which may bias elasticities downward resulting in lower bound effects in scenario 1. Estimates are reported in first differences on trimmed data to account for potential measurement error but are typically lower than in levels. */**/*** are respectively 1%, 5% and 10% significance levels.

Table A. 2: Import-Demand Elasticity from EU data (Step 1A)

Dependent Variable	$Ln(Imp)_{China}$
$Ln(P)_{China}$	-1.38*
	(0.821)
$Ln(P)_{Row}$	0.477
	(0.681)
constant	16.07***
	(3.73)
Year dummies	Yes
Observations	36
R^2	0.99

Source: EU confidential data on EU employment, imports and production
Note: Standard errors in brackets. Variables are all in logs. The insignificance of the coefficient on imports of the RoW is probably specific to the 10 AD-cases under scrutiny given the large role of Chinese imports in most of these cases which much higher than for other products in the same sector. Product-fixed effects which account for the cross-section variation were also included when estimating and estimates thus represent the within variation.

Table A. 3: Employment Elasticity (Step 1B)

Dependent Variable	$Ln(Emp)_{EU}$	$Ln(Emp)_{EU}$
	(1)	(2)
$Ln(imports)_{China}$	-0.346*	-0.399*
	(0.197)	(0.221)
$Ln(imports)_{Row}$	0.0325	0.047
	(0.117)	(0.12)
$Ln(prod)_{EU}$	0.72***	0.75***
	(0.157)	(0.166)
Constant	1.60***	1.8**
	(0.800)	(0.932)
Year dummies	No	Yes
Observations	40	40
R^2	0.67	0.68

Source: EU confidential data on EU employment, imports and production.
Note: variables are all in logs. Standard errors in brackets. In (1), lagging EU production with one year to address potential endogeneity, results in qualitatively similar results but that would mean losing many observations. The insignificance of the coefficient on imports of the RoW is probably specific to the 10 AD-cases under scrutiny given the large role of Chinese imports in most of these cases. In our calculations, we use the employment elasticity reported in (1) which is the more prudent estimate.

Appendix B: Methodology for step 4

B.1 Calculation of the upstream effects

Before we show the matrix calculations that generated the results, we first introduce and define different elements that enter these calculations:

- The WIOD matrix has a generic element

$$[q_{ij}]$$

which captures the output of sector *i* that is consumed by sector *j* as input. We collapsed the matrix[50] to have only 51 columns: 48 (3x16) columns capture the output of sector *i* that is consumed by the 16 tradable sectors from the three regions of interest EU, ROW, and China and the last 3 columns are the final demands of the three regions which include input use by non-tradable sectors not directly subject to AD actions. The first 16 elements capture input use by the 16 tradable EU sectors and we sometimes make this clear by a subscript, e.g. $\{q_{i11}^{EU}, \dots, q_{i16}^{EU}\}$. The next 16 elements capture similar input use of sector *i* (in practice we will only look at the first 16 EU sectors) by ROW $\{q_{i17}^{ROW}, \dots, q_{i32}^{ROW}\}$ and China $\{q_{i32}^{CH}, \dots, q_{i48}^{CH}\}$.

- Total output of sector *i* can be obtained either from the demand side, the summation of where its output goes, or from the production side, the summation of its own input use, value added, and adjustments. Here we use the first approach and define

$$Q_i = \sum_{j=1}^{51(=3*16+3)} q_{ij}$$

summing over the 48 sectors (16 in each region) that use *i*'s inputs as well as 3 final demand sectors (one for each region).

- $-x_1$ equals the estimated reduction in production in EU sector 1 due to the introduced MES of China. It incorporates (i) the likelihood the sector is affected and (ii) the

[50] The original WIOD matrix is gigantic. It covers 35 production sectors for 40 countries plus a rest-of-the-world residual country. There are 3 additional columns for final consumption by households, non-profit organizations, and government, and 2 columns for gross fixed capital formation and change in inventory for a total of (35+5) x (40+1) or 1640 columns. In addition to the 35x41 rows that distinguish where each sector obtains its inputs from, there are 6 additional rows for taxes-subsidies, cif/fob adjustments, direct purchases abroad and foreign purchases in the local area, value added and transport costs for a total of 1441 rows or an entire matrix of a 1441x1640 dimensionality or approximately 2.36 million elements. See Dietzenbacher, Los, Stehrer, Timmer and de Vries (2013) for details about its construction and content.

relevant employment elasticity for the sector which incorporates both the negative substitution effect and the positive demand-boosting effect.[51]

- $-\tilde{x}_1$ equals the corresponding effect on the imports of ROW sector 1 into the EU. How this compares to the effect on EU firms depends on the type of competition and market clearing we assume. One option is to use the same effect as on EU terms, which is not implausible as the percentage effect is expressed as an elasticity. This would be the appropriate assumption if competition was monopolistically competitive with horizontally differentiated varieties. Alternatively, we could make a proportionality assumption, multiplying the estimated effect in EU sector 1 with the relative import penetration (IP_1^{ROW}/IP_1^{DOM}) of ROW producers, where IP_1^{DOM} is defined as $1 - IP_1^{ROW} - IP_1^{CH}$. In that case we would use $\tilde{x}_1 = x_1 \frac{ip_1^{ROW}}{ip_1^{DOM}}$. We performed the calculations both ways, but given the extremely small effect on RoW firms, this assumption turns out to be quantitatively entirely unimportant. To err on the save side and not underestimate any possible negative effect, we use the first assumption in the final calculations and use $\tilde{x}_1 = x_1$.
- As the prices of Chinese imports fall, the market for their products expands and this effect is denoted by r_1. Assuming a constant local effect, the total output increase for each sector is proportional to the price decline $-\Delta\bar{p}$ and the likelihood a sector has AD duties imposed ($\Pr_i$). Using a Constant Elasticity Demand assumption as a local approximation, the market expansion can be calculated as

$$r_1 = -\Delta\bar{p} * \sigma * \Pr_1.$$

  Note that the revenue increases by less, using $(\sigma - 1)$ in the above formula, due to the price decline. However, we are interested in the output change as this is assumed to be proportional to the employment change. We use a demand elasticity of 1.38 in the calculations, in line with the assumption used in step 1.[52]
- The total effect on Chinese imports combines the market stealing effect from EU and RoW competitors in addition to the market expansion. In order to combine the previous effects which are in percentage terms, we rescale the x_1 and $\tilde{x}_1$ percentage effects to be appropriate multipliers for the absolute level of Chinese imports: $x_1^R = x_1 \frac{ip_1^{DOM}}{ip_1^{CH}}$ and similarly for $\tilde{x}_1$.

The upstream indirect effects on sector 1 (the first EU tradable goods sector) are found by multiplying a row-vector of its input use expressed in output shares with a column vector of similar dimensions (18) that captures the changed demand in 48 client sectors. The substitution effects will lower the demand from EU and ROW sectors, but boost demand from Chinese sectors. The pure demand effect will boost demand in all 48 sectors, but most

[51] In the absence of output elasticities by employment, we use the standard assumption of a constant proportion between output and employment.

[52] As before, a reduction in the tariff by 30% would lead to a price decline of 0.30/1.30 or 23%.

strongly from Chinese sectors as price declines in the EU market will be strongest on inputs from China which directly benefit from lower AD duties, while other sectors only see a price decline to the extent they respond to the lower prices of their Chinese competitors.

Using the previously defined elements we can define the row vector for sector 1 as:

$$\text{Row}_1\text{:} \quad \left[\frac{q_{1,1}^{EU}}{Q_1} \quad \frac{q_{1,2}^{EU}}{Q_1} \quad \dots \quad \frac{q_{1,17}^{ROW}}{Q_1} \; \frac{q_{1,18}^{ROW}}{Q_1} \dots \quad \frac{q_{1,33}^{CH}}{Q_1} \; \frac{q_{1,34}^{CH}}{Q_1} \dots\right].$$

A similar row vector exists for all 16 EU tradable goods sectors and one for the non-tradables sector.

We need to adjust these shares, because the elements in this Row vector capture the amount of good 1 produced in the EU that is used as an input by all 48 tradable good sectors around the world. However, not all of that output is destined for the EU market. EU production that is exported will not be affected by the lower downstream EU demand resulting from lower Chinese prices on the EU market. Similarly, Chinese production that is locally consumed will also not be affected. Therefore, we have to multiply Row 1 with a diagonal matrix, denoted by A, that measures the fraction of the output of each sector that is destined for the EU market, either as input in any of the EU sectors or as final demand:

$$A = \begin{bmatrix} a_{1,1} & \dots & 0 \\ \vdots & \ddots & 0 \\ 0 & 0 & a_{48,48} \end{bmatrix}, \text{ with } a_{ii} = \frac{1}{Q_i}\left(\sum_{j=1}^{16} q_{\text{i,j}}^{EU} + q_{\text{i,S}}^{EU} + q_{\text{i,FD}}^{EU}\right).$$

The term in brackets sums all EU bound output of sector *i* for use in tradable sectors, services, or consumed as final demand and is calculated similarly for all sectors *i,* whether they are located in the EU or abroad. It only tracks where a sector's output goes.

The relevant column vector, which is the same for each row vector, measures the change in size in each sector's output and thus the different input demands:

$$\text{Column:} \quad [-x_1 \quad -x_2 \quad \cdots -\tilde{x}_1 \; -\tilde{x}_2 \cdots \quad (r_1 + x_1^R + \tilde{x}_1^R)\,(r_2 + x_2^R + \tilde{x}_2^R) \; \cdots]'$$

Note that the row straightforwardly measures both the output of sector 1 going into other EU sectors as well as output consumed by the different RoW and Chinese sectors. To obtain the absolute change in the size of the extra-EU sectors, rows 17-32 and 33-48 in the column vector, we need some additional calculations.

Matrix multiplying the row vector with matrix A to strip out exports and then with the column vector produces the aggregate indirect upstream effect for sector 1 due to changed MES treatment of China in the entire EU tradable goods sector:

$$\text{Indirect upstream effect on sector 1} = \text{Row}_1 * \text{A} * \text{Column}$$

B.2 Calculation of the downstream effects

Most elements we need to calculate the market expansion effect downstream have already been defined in the previous section. A few more are listed here:

- We again need the total output for a sector. We could calculate this summing over all rows, the 48 rows a sector gets its inputs from, plus 1 rows for the value added plus adjustments produced within the sector, $Y_j = \sum_{i=1}^{49(=3*16+1)} q_{ij}$, but by construction this is the same as the row-total Q_j calculated before.
- The price reduction of Chinese producers on the EU market will be given by $-0.23 * \Pr_i$ assuming perfect pass-through of tariff changes into prices, as required by AD laws (0.23 = 0.30/1.30).
- For EU and ROW producers, the effect depends on the price adjustment which will vary according to the type of market competition that is assumed. In the extreme scenario of Bertrand price competition they would match Chinese price reductions one-for-one. In the other extreme of monopolistic competition and a small market penetration of Chinese imports (so that their impact on the sectoral price index is negligible) prices of EU or ROW producers would not change at all. The truth is somewhere in the middle and we denote the price decline by $-0.23x * \Pr_i$. We will perform some sensitivity check on the appropriate value of *x*. In particular, in the most conservative scenario we set *x*=0 in which case the downstream industries only benefit from price changes on imports imported from China. In the second scenario, we put *x*=0.1. It means that the maximum price adjustment for EU producers to a 23% price reduction on Chinese imports we consider is 2.2%. Using a larger value for *x* would make the indirect downstream effects more positive.
- The export share of a EU sector *i* is denoted by sh_i^X

Using all these elements we can again define a row and column vector that need to be multiplied to find the total effect. Now, the column vector for sector 1 captures input use by EU sector 1 from each of the 48 potential input sectors, either domestic inputs (the first 16 elements) or imported inputs. The vector contains the input shares and the sum would be one minus the value added share in output:

$$\text{Column}_1: \quad \left[\frac{q_{1,1}^{EU}}{Y_1} \quad \frac{q_{2,1}^{EU}}{Y_2} \quad \dots \quad \frac{q_{17,1}^{ROW}}{Y_{17}} \quad \frac{q_{18,1}^{ROW}}{Y_{18}} \quad \dots \quad sh_1^X \frac{q_{33,1}^{CH}}{Y_{33}} \quad sh_1^X \frac{q_{34,1}^{CH}}{Y_{34}} \quad \dots\right]'$$

In contrast with the calculations of the upstream effect, we do not need to focus only on output destined for the EU market. If cheaper inputs allows EU sector 1 to raise its exports, that is still a positive indirect downstream effect that we want to incorporate in the total. As such, we do not need a multiplication with a matrix, like A before, that downscales the column vector. We do, however, need to adjust the price decline of imported inputs from China for the export share of the sector (sh_1^X), because AD duties on inputs are rebated if the final output is exported. As a result, export sales will not benefit directly from lower AD duties on Chinese inputs, only by the potential price reductions of domestic of RoW

producers to the extent they match the Chinese price declines, which is indicated by the *x* factor.

The corresponding row vector, which is now the same for each of the 16 EU-sector columns, is

$$\text{Row:} \quad -0.30/1.30 * [x * \text{Pr}_1 \quad x * \text{Pr}_2 \quad \cdots x * \text{Pr}_1 \quad x * \text{Pr}_2 \quad \cdots \text{Pr}_1 \; \text{Pr}_2 \; \cdots]$$

It measures the price decline in each sector, as discussed above, which is scaled by the likelihood a product in each sector is subject to dumping by Chinese firms (Pr_i).

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