Retaliation and Compensation in Trade Policy – Designing a Retaliation Strategy for Europe

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Introduction

Trade frictions in the global economy are rising and, in the past years, Europe has found itself in the position of wanting to introduce tariffs against another country in order to seek compensation or pursue retaliatory purposes. It has done so because another country has exposed European exports to tariffs or discriminatory measures. An example is Europe's reaction to the United States tariffs on exports of steel and aluminium, introduced in 2018 for reasons of national security. Europe found these tariffs to violate agreed trade rules and introduced matching retaliatory tariffs on US exports to Europe.

Another reason why the EU may want to introduce tariffs is that it has been authorized by the World Trade Organisation (WTO) to introduce compensatory measures after winning a dispute at the Geneva trade body. There is currently such a case in front of the EU. In mid-October, the WTO's Appellate Body confirmed that the EU has the right to retaliate against the United States by raising tariffs on up to €3.57 billion of US exports. This award follows previous decisions by the WTO's Dispute Settlement Body in a dispute about subsidies to Boeing: in early 2019, for instance, the WTO's Appellate Body concluded that the US hadn't fully complied with a previous ruling on distortive subsidies to Boeing.

The question is what the EU should do now: should it impose tariffs on US exports – and if so, on what products? In the current case, there is one obvious first step: to negotiate with the US. There has been a parallel case at the WTO about subsidies to Airbus and last autumn the US was awarded the right to retaliate against €6.69 billion of EU exports to the US. It is in the interest of both sides that, first, unlawful subsidies are withdrawn and, second, that retaliatory measures are avoided. However, if that outcome isn't possible, what course of action should be taken then by the EU – and, more broadly, how should the EU think about its retaliatory trade policy?

The motivation of this paper is to ascertain the conditions or types of products that should be used in trade retaliation. Too often retaliatory policy results in harm for the domestic

economy of retaliating countries. We aim to contribute to a framework with which retaliating countries can ensure a 'harm reduction' when selecting goods to place tariffs on, so as to bring minimum damage to their own economies.

We highlight several key considerations to make when selecting goods to place retaliatory tariffs on, which centre around the concept of 'fungibility'. The concept of fungibility of a good can be illustrated with the following question: if a tariff were to be placed on a good that the EU imports as part of a trade retaliation, how easily could the EU replace this import via domestic production or extra-EU imports in such a way that the price or security of supply of the product is not adversely impacted?

We then operationalise this concept of fungibility by examining what share does the US represent of all extra-EU imports of a certain good; what share does the US represent of total EU imports of a certain good; and what number of extra-EU importers exist for a given good. From this framework, we can navigate whether placing a tariff on a particular good would be harmful to the EU's domestic economy. Through this suggested means for trade retaliation, we believe the EU can achieve a degree of political targeting against the US while minimizing harm to domestic firms and consumers by retaliating against goods for which the US has a weaker revealed comparative advantage in, and for which the US is a less dominant supplier.

This paper continues with an investigation of conditions and product types that were involved when retaliation did or did not work in the past, followed by a description of our methodology, a summary of our analysis, and finally a concluding section with the main observations made from this study.

Political Targeting through Trade Retaliation – What worked and what did not?

Economics and politics may not be on the same page in matters of retaliatory trade policy. Economic analysis clearly suggest that the introduction of tariffs will have negative economic consequences both for the country that get exposed to them and the country that impose them. The political analysis, however, may still favour the introduction of retaliatory tariffs. In this section we will present literature that supports our framework for deducing how to introduce retaliatory policy that minimises harm caused to domestic economies by taking into account the 'fungibility' of imports. As outlined above, the fungibility or substitutability of imports indicates how easily they can be replaced by either domestic production or extra-EU import in such a way that the price or security of supply of the import is not adversely impacted.

Several studies have demonstrated that retaliatory trade tariffs have the potential to create significant and negative consequences on the retaliating countries' domestic economy. For

example, using computable general equilibrium models of the welfare and trade effects of several previous trade conflicts between the US and the EU, Breuss (2004) revealed that as a rule, retaliatory tariffs are detrimental to the retaliating country insofar as both the complainant and the respondent will suffer a welfare loss, and that furthermore, retaliatory measures tend to injure an arbitrary selection of importers and exporters, often SMEs, that are generally unrelated to the sector involved in the original dispute. Through this study, we indicate pathways for retaliating countries to navigate trade retaliation in such a way as to reduce this harm caused to their own domestic economy – namely, through consideration of the fungibility of goods they intent to place retaliatory tariffs on.

The importance of the substitutability or fungibility of goods that are covered by retaliatory tariffs is demonstrated by Fetzer and Schwarz (2019) study of EU and Chinese retaliatory responses to US steel tariffs imposed in 2018. Through this study it is established that the retaliation by both countries was politically motivated, involving a high degree of sophistication in design, as tariffs systemically targeted the Republican – in particular, Trumpian – voter base. Using the retaliation lists of the EU and China, hypothetical counterfactual retaliation responses were constructed and compared to the actual retaliation baskets used – quantifying the extent of political targeting against how feasible retaliatory bundles were. An 'optimal' retaliation bundle in this context would have a high degree of political targeting and a low degree of economic harm to one's own country by excluding products for which the US is the dominant supplier. Doing so would mitigate harm to their own country.

Through their analysis, Fetzer and Schwarz determine that the EU achieved a modest degree of political targeting against the US while minimizing harm to domestic firms and consumers by retaliating against goods for which the US had a weaker revealed comparative advantage in, and for which the US was a less dominant supplier. Meanwhile, due to the structure of US exports to China, which is concentrated in agricultural produce and high-tech manufactured goods, there were significant constraints on the Chinese ability to retaliate. While there existed a broad set of feasible hypothetical retaliation bundles – in that they were composed of goods that would be easily substitutable – the vast majority of them would imply weak political targeting. The few bundles that would incorporate a high degree of political targeting would be necessarily composed of goods for which the revealed comparative advantage of the US was high. While the Chinese achieved a high degree of political targeting, this required the imposition of tariffs on agricultural goods for which the US is a dominant supplier, suggesting that the Chinese retaliation was particularly harmful to Chinese consumers.

US retaliatory tariffs on the EU following the 2018 Airbus-Boeing ruling are another example on the importance of fungibility when selecting retaliatory bundles. The WTO authorized the US to impose additional ad valorem duties of up to 100% up to the value of €6.69 billion annually. The USTR indicated that tariff increases would be limited to 10% on large civil aircraft (revised to 15% in March 2020), and 25% on agricultural and other products. Aircraft

accounted for roughly 40% of the €6.69 billion, while whiskeys, liqueurs and wines accounted for another 40% and agricultural products accounted for 20%. The tariffs of 25% that applied to wine, whiskeys and liqueurs were designed to hurt European economies by targeting wine producers, specifically in France and Spain. However, it soon became obvious following the first round of sanctions that there was minimal impact on producers, who had a massive latent excess demand for their wines in Asia-Pacific, Eastern and Central Europe. Meanwhile, US distributors, wholesalers and retailers with inelastic demand absorbed most of the cost increases.

As outlined by Abboud and Johnson (2019), wines are products which are inextricably tied to the place in which they are produced. Not only are European wines difficult to beat in terms of their quality and price point, but wines, along with other specialty foods targeted by US retaliation such as cheeses and olive oil, are 'prestige products' that are upper-market oriented – and as such, the flexibility of its consumers to higher prices are considerable. As the provenance is central to these products, they are considerably less substitutable than average foodstuffs, and so the tariffs imposed by the US has little effect on those that they aimed to harm, being met instead with much domestic backlash. Both the US Speciality Foods Association and Distilled Spirits Council publicly voiced 'deep concerns' at the tariff decisions, which they cited would decrease sales and adversely impact US employment, predicting the loss of approximately 13,000 jobs.

Tariffs on Intermediate Inputs

In addition to our argument that retaliating countries must take into consideration the fungibility of goods they intent to place retaliatory tariffs on, we further present evidence that placing tariffs on intermediate goods used in manufacturing processes will have much more diffuse and detrimental effects on domestic economies than would tariffs placed on consumer goods for private consumption. We argue that imposing tariffs on intermediate or input goods would increase production costs and reduce the competitiveness of EU production.

From several examples we can deduce that generally, tariffs on input goods (used in manufacturing processes) cause more economic harm than tariffs on consumer goods (bought by the average consumer for private consumption). A study conducted by Deutsche Bank (2020) used an analytical framework to observe transmission channels through which tariffs influenced prices and demand, and found that these differ markedly in the case of goods for private consumption and intermediate goods.

On consumer goods their model revealed that the consumer price index initially increases roughly in proportion with the share of imports in an underlying basket of goods, and households shift their consumption to domestic products. This form of import tariff stimulates domestic production in the short term, while in the medium term there is a slight decline in gross domestic product.

Meanwhile, if tariffs are raised on foreign intermediate goods instead, production costs rise at first in line with the share of imports used, causing domestic producers to increase their prices. Domestic products therefore become more expensive for households and enterprises abroad, thus there is a decline both at home and abroad for domestically produced goods. Owing to import tariffs, fewer intermediate goods are imported and domestic goods are used instead, but this does not offset the decline in demand. While consumers prices are not directly affected by import tariffs on intermediate goods, there is an increase in producer prices reflected over the medium term. This increased cost of domestic suppliers will make for lower productivity per unit of output and can lead to the response of many firms reshoring production. As such, tariffs disrupting global value chains can cause shocks to specific intermediate-producing sectors that can have significant aggregate consequences that are considerably less favourable than the real economic effects of tariffs on finished goods.

Eichengreen (2020) makes use of the 'natural experiment' of the exogenous supply chain disruption caused by the Great East Japanese Earthquake of 2011 and the subsequent tsunami. The prefecture directly impacted by the earthquake accounted for 4.7% of aggregate Japanese output and was home to suppliers of parts and components to, inter alia, the motor vehicle and electronic industries. The propagation of the shock over input-output linkages can account for a 1.2 percentage point decline in Japanese gross output in the year following the quake – which is more than four times the magnitude of the direct effect of the disaster itself on the Japanese economy. This would suggest that the indirect effects of tariff-induced supply chain disruptions can be significantly larger than the direct effects, and would support our argument that the impacts of tariffs placed on intermediate or input goods used in manufacturing process are diffuse and detrimental, compared to tariffs placed on finished consumer goods.

Our argument if further supported with the example of the effects of tariffs on intermediate goods investigated by Francois and Baughman (2003) on President Bush's March 2002 imposed tariffs on certain steel products which lasted for three years. In their findings, it is clear that these tariffs played a leading role in pushing prices up, causing shortages of imported product and putting US manufacturers of steel-containing products at a disadvantage relative to foreign competitors. As a result, customers of steel consumers moved sourcing offshore as US steel-containing products became less reliable and more expensive. Francois and Baughman estimate that 200,000 Americans lost their jobs to higher steel prices in 2002.

Ahern (2002) discusses the European retaliation of €3.57 billion of US exports approved by WTO arbitrators following the FSC/ETI case. Ahern notes that there was a marked skew on the EU's retaliation list away from component parts or intermediate goods that would disrupt EU production, instead focusing on finished consumer goods. The precious stones and jewellery sector was the most heavily targeted, accounting for 36% of the total trade

targeted, while being less than 3% of total US exports to the EU. Meanwhile, sectors excluded from the retaliation list accounted for close to 40% of US exports to the EU. Exports from the two largest US export sectors (machinery and electronic machinery) were targeted minimally, with tariffs covering less than €1 billion of the €44 billion in exports from these sectors. Many of the products in these minimally-targeted sectors (machinery, optical equipment, vehicles, electronic machinery, aircraft, organic chemicals, pharmaceuticals, accounting for 70% of US exports to the EU), are components in products that EU companies export back to the US, or components in products that EU subsidiaries of US companies use in their production process. These minimally-targeted sectors are characterised by massive amounts of cross-investment and intra-industry trade that integrates markets tightly. Ahern's study would suggest that in previous retaliation practices, the EU has anticipated the negative impacts that tariffs would have on intermediate and input goods that is argued in this study.

There have been relatively few cases in the history of the GATT/WTO where retaliatory measures have actually come into force, and as such, little has been recorded on the consequences of such measures for imposing countries. From the examples examined here, we can summarise that in cases where retaliatory tariffs have covered goods that are not easily substitutable, and/or intermediate inputs, their effects have generally been significantly unfavourable for the retaliating country. As such, it is advisable that in the design of their retaliatory policy, countries take into consideration both the fungibility of goods covered and whether they wish to incorporate intermediate or component goods.

It follows from the analysis above that it is critical for the EU to, in the first instance, avoid tariffs on imports that cannot be substituted without effects on higher prices and lower supply. Moreover, the EU should avoid imposing tariffs on intermediate or input goods – where the effect of a tariff would be to increase production costs and reduce the competitiveness of EU production. This is especially important when retaliatory actions are bilateral, when they only target one country. Increasing costs of production for EU producers may have the effect of making other foreign producers more competitive on the EU market.

How to Measure Fungibility

In this section of the paper, we will describe the methodology and analysis of this study on retaliatory trade policy. As a first step, we have analysed the fungibility of EU imports from the US with the view of understanding what products the EU should avoid exposing to new tariffs. We define levels of fungibility, analysing which US product imports represent more or less than 20 percent of extra-EU imports.

Fungibility Analysis

The first step of this study is to determine product categories where US imports form a significant part of extra-EU imports. We have identified six levels of fungibility to be applied across the product codes in the list of products provided by the European Commission. If the import of a product from the US were is impeded by the imposition of 20% tariffs, a fungible product would be easily substituted via domestic production or extra-EU importers excluding the US. And this substitution would not negatively impact the cost or security of supply of these goods relative to when they were previously being sourced from the US.

In order to operationalize these levels of fungibility, we followed the European Commission's list, analysing which US product imports represent more or less than 20 percent of extra-EU imports. If US import was less than 20 percent of extra-EU imports, the product was assigned to level 3. If US import was higher than 20 percent of extra-EU imports – signalling trade dependence – the product was assigned to level 4.

The second step was to determine which US product imports represent a significant share of all EU imports – including intra-EU imports. This analysis adds a new dimension to the determination of fungibility: if a US product import also represents a significant share of all EU imports, it is likely that the substitutability US imports is smaller (and vice versa).

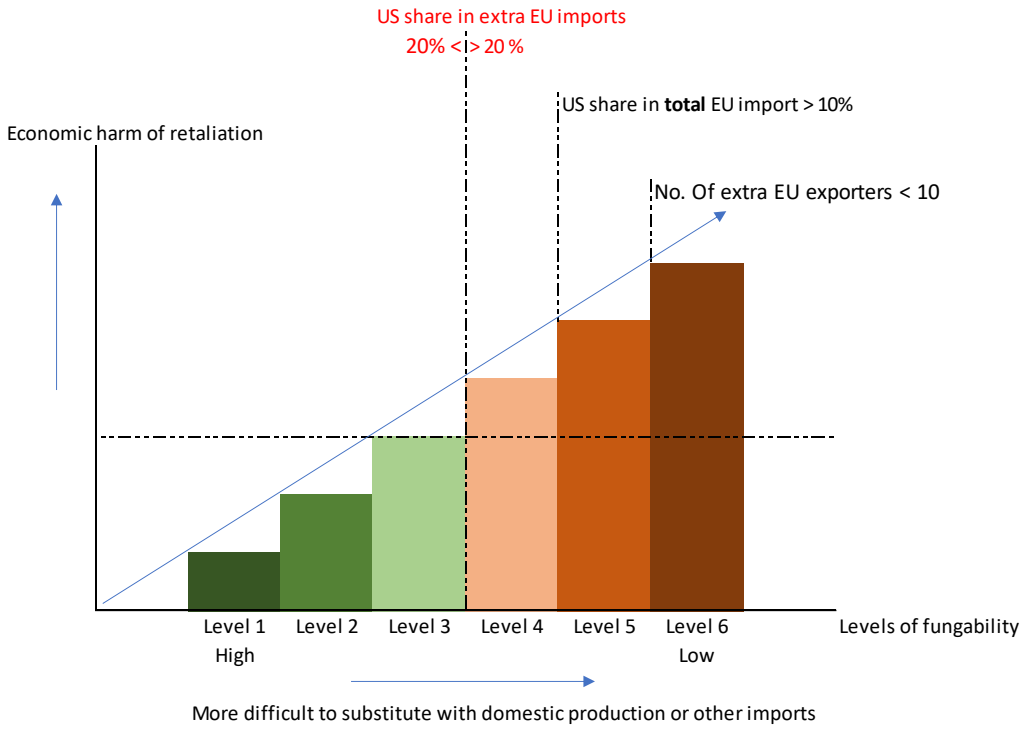
Consequently, for all the products that were assigned to level 3, we analysed if some of these products had US imports representing less than 10 percent of all EU imports. If that is the case, the product was assigned to level 2. If it was not the case, the product stays in level 3. We did a similar exercise for all products that was assigned to level 4. If a product in level 4 has US imports representing more than 10 percent of all EU imports, then it is moved to level 5 – suggesting greater economic consequences. If a product in level 4 does not have US imports in excess of 10 percent of all EU imports, it stays in level 4.

The third step, finally, is to consider which products have a high number of suppliers. The greater the number of suppliers, the easier it will be to substitute for US imports. We follow the same progressive methodology and now start form level 2 and 5. If a product in level 2 has a larger number of export suppliers, it is moved to level 1. If it has fewer export suppliers, it stays in level 2. Conversely, if a product in level 5 has few export suppliers, it is

assigned to level 6. On the other hand, if a product at level 5 has many export suppliers, it stays in level 5.

The result of this analysis is that a product is exposed to greater fungibility risks – meaning that US imports cannot easily be substituted without economic damages on the EU – the more it moves from level 4 to level 6, or from light red to dark red. Similarly, a product is less exposed to fungibility risks when it moves between level 3 and level 1. A brief overview of these levels is depicted as follows:

Figure 1: Levels of Fungibility



Level 1 includes products of which the US share of extra EU imports is <20%; the US share of total EU imports is <10%; and additionally, the total number of extra EU importers is >10. Given these characteristics, Level 1 products are considered highly fungible relative to products in other levels. This means that if they were no longer imported from the US due to an increase in tariffs, they would be easily substituted via domestic production or extra EU importers in such a way that the overall price and security of supply of these goods would not be negatively impacted. In the context of this study which investigates the potential impact of retaliatory trade policy, the trade costs of applying a 20% tariff to products located in Level 1 would not be considered high in comparison to other levels.

Level 2 includes products of which the US share of extra EU imports is <20%; the US share of total EU imports is <10%; however, unlike products in Level 1, the total number of extra EU importers is not >10. Given these characteristics, Level 2 products would be considered

fungible, though less-so than products in Level 1 as there are less extra EU importers that could serve as potential substitutes to the US. If the products from Level 2 were no longer imported from the US due to increased tariffs, they would be easily substituted via domestic production or extra EU importers in such a way that the overall price and security of supply of these goods would not be negatively impacted. The trade costs of applying a 20% tariff to products located in Level 2 should not be high relative to other levels, though higher than the costs that would be expected to arise from increased tariffs on products from Level 1.

Level 3 includes products of which the US share of extra EU imports is <20%; however, unlike products in Levels 1 and 2, the US share of total EU imports is not <10%, and furthermore, the total number of extra EU importers is not >10. Given these characteristics, Level 3 products would be considered more fungible than products located in higher levels, while less fungible than products in Levels 1 and 2. This means that if products from Level 3 were no longer imported from the US as a result of increased tariffs, we could expect them to be somewhat easily substituted via domestic production or extra EU importers in such a way that the overall price and security of supply of these goods would not be negatively impacted, though such an outcome remains a possibility. The trade costs of applying a 20% tariff to products located in Level 3 should not be high relative to higher levels but would be higher than the costs that would be expected to arise from increased tariffs on products from Levels 1 and 2.

Level 4 includes products of which the US share of extra EU imports is >20%. Given these characteristics, Level 4 products, while more-fungible than products from Levels 5 and 6, would not be considered highly fungible as the EU currently imports a significant proportion of these products from the US. This means that if the EU no longer imported products included in Level 4 from the US due to increased tariffs, we would expect it to be considerably difficult for these products to be substituted via domestic production or extra EU importers, or that doing so would entail a negative impact on the overall price and security of supply of these goods. The trade costs of applying a 20% tariff to products located in Level 4 are considerable but would be lower than the costs that would be expected to arise from increased tariffs on products from Levels 5 and 6.

Level 5 includes products of which the US share of extra EU imports is >20%, and the US share of total EU imports is >10%. Given these characteristics, Level 5 products, while more-fungible than products from Level 6, would not be considered highly fungible as the EU currently imports a significant proportion of these products from the US. This means that if the EU no longer imported products included in Level 5 from the US due to increased tariffs, we would expect it to be difficult for the EU to substitute these products via domestic production or extra EU importers, and that doing so would be likely to negatively impact the overall price and security of supply of these goods. In the context of this study, the trade costs of applying a 20% tariff to products located in Level 5 are considerable.

Level 6 includes products of which the US share of extra EU imports is >20%; the US share of total EU imports is >10%; and the number of extra EU importers is <10. Given these characteristics, Level 6 products are the least fungible out of all levels as the EU currently imports a significant proportion of these products from the US and in addition to this, has less than 10 sources of import for these products outside of the EU. This means that if the EU no longer imported Level 6 products from the US as a result of increased tariffs, we would expect it to be very difficult for the EU to substitute these products via domestic production or extra EU importers, and that doing so would be highly likely to negatively impact the overall price and security of supply of these goods. In the context of this study, the trade costs of applying a 20% tariff to products located in Level 6 are extremely high.

Applying Partial Equilibrium Modelling to Levels of Fungibility

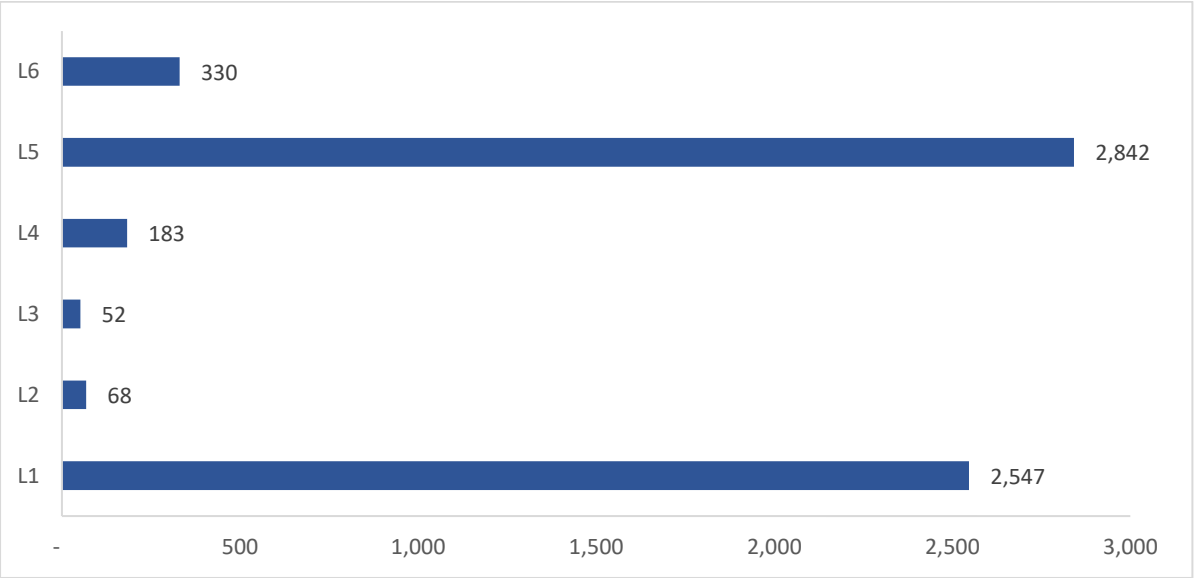
Now that we have made clear what fungibility means, we used partial equilibrium (PE) modelling to investigate the implications of retaliatory trade measures – in this case, the potential effects of a scenario wherein EU tariffs on US imports were increased from their current rate to 20%. For this study we used a list of products that they European Commission suggested as the basis for tariff retaliation against the US, therefore the modelling is done on a real list of products considered by the EU. For more information on the data and methodology of the PE analysis see Annex I.

Table 1: Composition of Fungibility Levels

Level	Number of product codes	Percentage of product codes	Trade reduction (million €)	% of total trade reduction
L1	114	59%	2.547	42%
L2	35	18%	68	1%
L3	3	2%	52	1%
L4	12	6%	183	3%
L5	20	10%	2.842	47%
L6	10	5%	330	5%

In our analysis, we categorise all products from the EU list and using a PE analysis identify the value of trade that would be lost as a result of a 20% tariff on selected goods across all levels, ranking EU-member states in accordance with who would be most affected in terms of the absolute value of imports. In addition, we rank Member States in accordance to the proportion the resulting reduction in trade represents over a country's total imports from the US on these goods – determining how significant that trade reduction would be for individual states.

Figure 2: Reduction in Trade across Levels of Fungibility (million EUR)



In the previous section describing the Levels of Fungibility that have been operationalised for this project, it was evident that products located in Level 1 are highly fungible – so, while they represent a large bulk of the products used in this study, the burden or cost of the distribution effects caused by a 20% tariff on products in this Level are not likely to be negative, due to their fungibility – i.e., these products are not largely imported from the US by the EU, and would be relatively easy to substitute via domestic production or extra EU imports.

As was previously discussed, products located in Level 2 would be considered fungible in the context of this study. Paired with the fact that they do not represent large bulk of the product codes, or a large % of trade reduction across all levels, we can deduct that the burden or cost of the distribution effects caused by a 20% tariff on products in this Level are not likely to be negative.

Products located in Level 3 would be considered somewhat fungible in the context of this study. Paired with the fact that they represent the smallest share of the product codes, and the smallest % of trade reduction across all levels, we can deduct that the burden or cost of the distribution effects caused by a 20% tariff on products in this Level are not likely to be negative, though significantly less negative than for products in higher levels.

Regarding level 4, the lower fungibility of the products in this level is not necessarily a cause for concern when taking into account the fact that they make up a small amount of the product codes used in this study and a small % of trade reduction across all levels. If Level 4 constituted a larger bulk of products, it may be considered a more problematic level in this study. However, given what we know about the number of products in Level 4, the burden or cost of the distribution effects caused by a 20% tariff on products in this Level would not be expected to be largely negative.

When it comes to level 5, 18 of the product codes used in this study from the *CNs* dataset are located in this level, making up **10% of total product codes but 47% of total trade reduction** across all levels. Taking into consideration the low fungibility of products in Level 5, combined with the fact that this level represents a large bulk of the products used for this study and constitutes a large percentage of trade lost, Level 5 is considered the most problematic across levels in the context of the burden or cost of the distribution effects caused by a 20% tariff on products in this Level.

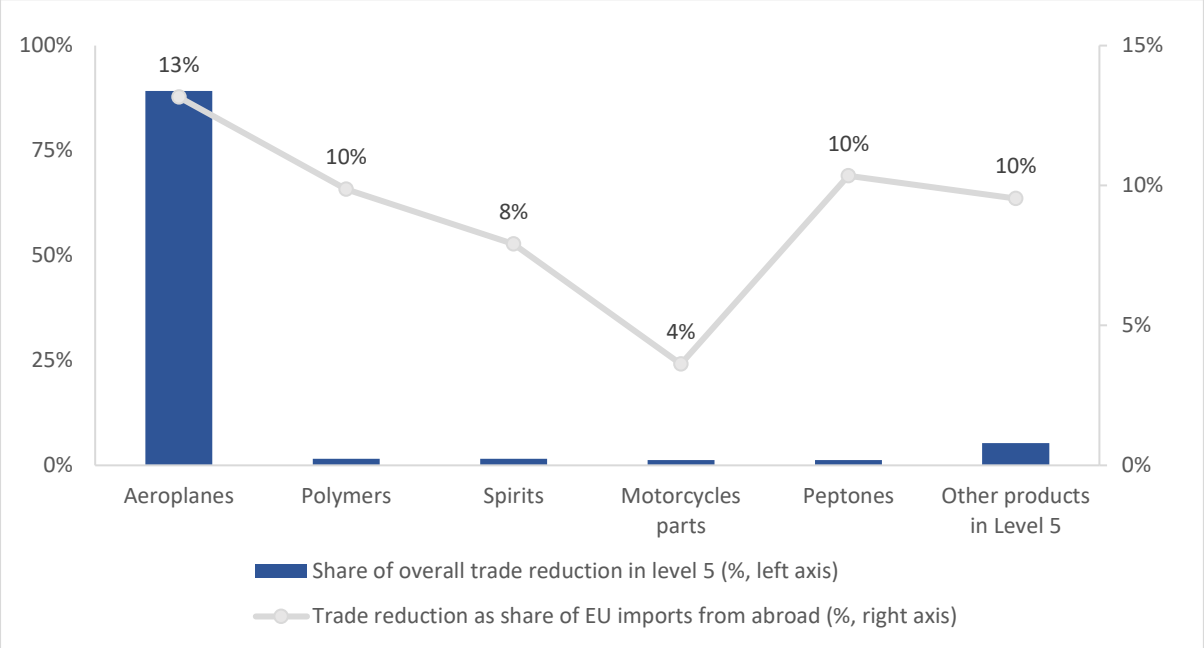
Finally, Level 6 is considered a problematic level due to the extremely low fungibility of products, though less-so than Level 5, as it does not constitute as large of a share of the products in this study, nor as large of a % of trade that would be lost due to increased tariffs. The burden or cost of the distribution effects caused by a 20% tariff on products in this level would be considered high.

Overall, the analysis shows that that there is an “overshooting” taking place when it comes to level 5, whereas the losses related to Level 4 and 6 are closer to what represents more optimised political targeting. Accordingly, we now proceed with a detailed analysis of Level 5, which as we have established proves to be the most notable and problematic of the levels observed in this study.

Level 5: A Closer Look

Products in Level 5 are not considered highly fungible in the context of this study. We would expect it to be difficult for the EU to substitute these products via domestic production or extra EU imports, and that doing so would be likely to negatively impact the overall price and security of supply of these goods. In the context of this study, the trade costs of applying a 20% tariff to products located in Level 5 are considerable.

Figure 3: Share in affected EU-US imports (in total affected EU-US imports)



From Figure 3 we observe the % in trade reduction represented by several products and the % of trade reduction these products represent over EU imports from abroad. For example, while the product 'Aeroplanes' represents 89% of trade reduction, the product represents 13% of trade reduction over EU imports from abroad. With the exception of aeroplanes, which represent the central sector of dispute involved in recent EU-US trade retaliation, from Figure 2 we can observe that intermediate/input goods used in manufacturing processes (polymers, spirits, motorcycle parts and peptones - all represent a significant share of the trade reduction over EU imports from abroad.

The large presence of aeroplanes and intermediate/input goods used in manufacturing processes accounting for the trade loss in Level 5 explaining why Level 5 is the most problematic across levels in the context of the burden or cost of the distribution effects caused by a 20% tariff on products in this Level. Many of the types of products that make up the most significant shares of trade loss in Level 5 can be considered the less fungible product types as laid out in the previous analysis of this study.

Figure 4: Trade reduction per EU member state (Euros, million)[1]

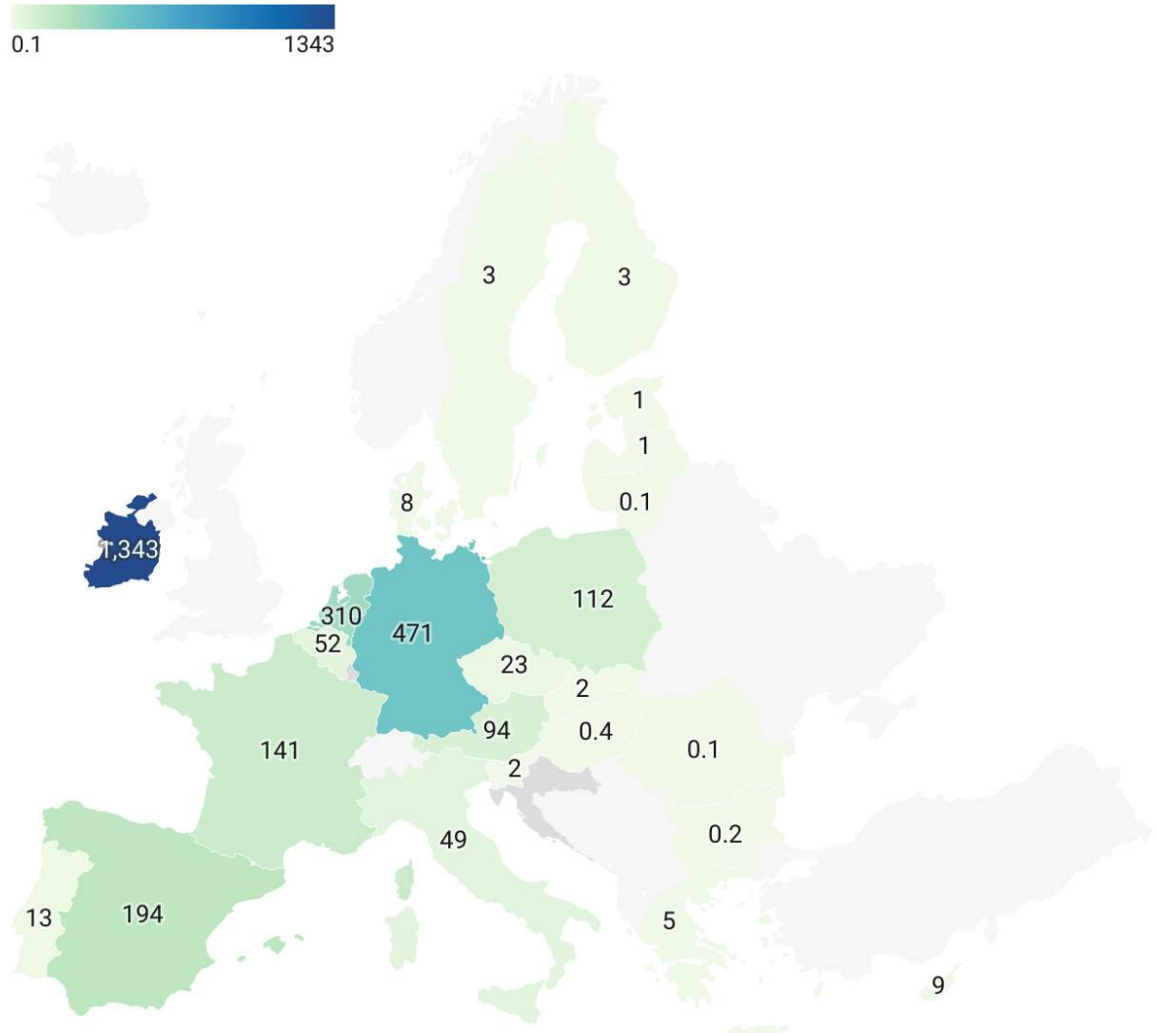


Figure 4 outlines the trade reduction in absolute terms per EU member state and shows where most of the trade reduction is likely to take place. Ireland stands out among member states with a trade reduction of 1,343 million Euros. A large part of this trade reduction in Ireland is likely to stem from Ireland's aircraft leasing sector, a high value-added market niche that is likely to be impacted by tariffs on Level 5 products on aeroplanes. Countries such as Ireland, Germany (471 million Euros) and the Netherlands (310 million Euros) represent the most impacted among member states in terms of trade reduction.

[1] Note that the trade reduction for Malta is 5 million Euros.

Figure 5: Trade reduction as share of imports from abroad per EU member state (%)[2]

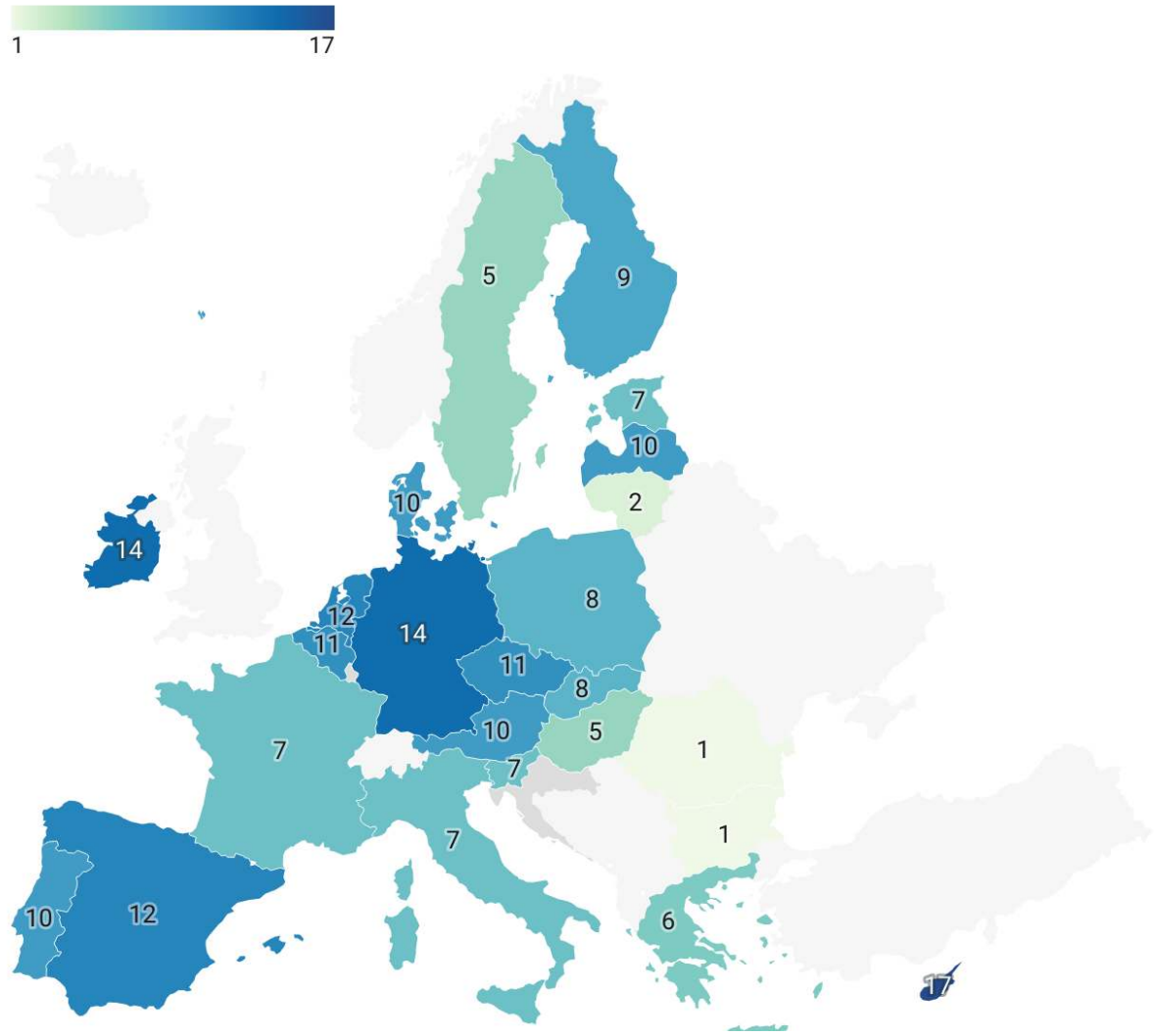


Figure 5 shows trade reduction as the share of imports from abroad of EU member states. Again, Ireland and Germany stand out, both at 14%, which is likely to be partly caused by trade reduction in aeroplanes. Overall, the figure reveals a more even impact across member states than Figure 3, albeit with still significant differences between member states. However, this reveals that the US is a significant importer to most EU member states, who would all be significantly impacted in the case of a 20% tariff on US goods, particularly goods originating from Level 5. Products in this level are generally not considered to be fungible in comparison to products from other levels.

The following section will summarise the concluding remarks arising from this analysis of Level 5, and from the study as a whole.

[2] Note that the trade reduction over EU imports from abroad for Malta is 6%.

Concluding Remarks

Retaliatory trade tariffs have the potential to create significant and negative consequences on the retaliating country's domestic economy – and tariffs on intermediate/input goods can cause more economic harm than tariffs on consumer goods. In the case of the EU, these negative consequences can be unevenly distributed among member states, which means that certain member states alone will have to take the bulk of the burden caused by EU retaliatory trade policy itself.

European policymakers have to take these harmful consequences, and they way in which this harm is distributed across EU member states, into account when deciding what to target with retaliatory trade policy measures. In fact, there is a need to optimise the political targeting by European policymakers in order to minimise harm for the EU and specific EU member states. EU policy makers need to take into account the fungibility of certain products in retaliatory policy lists, such as the ones that are classified as intermediate goods, and where including them can have particular harm for the EU as a whole and in particular in specific member states. In addition to aeroplanes, our analysis showed that intermediate/input goods used in manufacturing processes such as polymers, spirits, motorcycle parts and peptones accounted for the highest shares of trade reduction resulting from retaliatory tariffs.

In our in-depth analysis of the impact of tariffs on less fungible products (Level 5), we find that Ireland stands to be impacted most by a tariff in terms of trade reduction in absolute terms. This is likely to stem from Ireland's aircraft leasing sector that would be impacted by tariffs on aeroplanes. Other countries that stand out are Germany and the Netherlands. In terms of trade reduction as a share of imports from abroad, Ireland and Germany stand out, both at 14%. Overall, the measure of trade reduction as a share of imports from abroad reveals a more even impact across EU member states. This shows that the US is a significant trade partner to most EU member states. All EU member states would be significantly impacted in the case of a 20% tariff on US goods – particularly on goods originating from Level 5.

The welfare effect of placing a tariff on goods such as these would be sure to have a knock-on effect that would be difficult to measure due to the complex nature of the value chains in which they are involved and would most certainly have more diffuse and negative impacts than would placing tariffs on finished consumer goods. The indirect effect of tariff-induced interruptions to supply chains can be significantly larger than the direct effects. EU-members that stand out as having consistently high shares in affected EU-US imports across these intermediate goods include Estonia, Bulgaria, Hungary and Poland.

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Annex

Annex I: Data used and Methodology

The data used in our analysis

This research uses data contained within three datasets that were created specifically for the purposes of this study. These data sets are characterised as follows:

- ***CNs:*** This dataset is composed of a list of CN (commodity number) codes. Each code represents a specific type of good that is traded, based on the list of products that the European Commission suggested as the basis for tariff retaliation against the US. This dataset includes all of the CN codes that were included in the PE analysis at six-digit levels. From this EU list we have 154 codes. This means that 110 codes – from the original EU list of codes – were not included in the PE analysis. This is because these codes were not included in the PE software and/or because there was no trade in 2019.

- ***Levels:*** This dataset contains all of the CN codes present in the '*CNs*' dataset, however, we have additionally categorised these codes into separate levels on the basis of certain criteria pertaining to their fungibility as per the methodology of this paper, which will be explained in further detail below. The CN codes, representing goods that are imported into the EU, are classified in levels from 1 to 6 according to their fungibility.

- ***Other Class:*** This dataset is equal to the '*Levels*' dataset, while also including additional classifications that aid us in understanding the goods used in the analysis, such as whether we can classify products as 'primary' or 'processed' goods.

The variables used in Partial Equilibrium modelling

Our analysis and results include three main variables which are characterised as follows:

- ***tradetotal***: this variable is valued in thousands of $USD, and is equal to the value of trade that would be lost as a result of the EU increasing tariffs on US imports, as per the design of our PE model. This variable is also equal to the sum of trade creation and trade diversion. Because our PE model was designed to investigate an increase in tariffs above their current level, this variable is negative – as an increase in tariffs would be expected to result in a decline in the value of trade.

- ***tradetotalpos:*** this variable is equal to the variable *tradetotal* multiplied by -1. As previously discussed, *tradetotal* is negative, thus to facilitate the calculation of other

variables it is necessary to convert it into a positive value, which is represented by this variable.

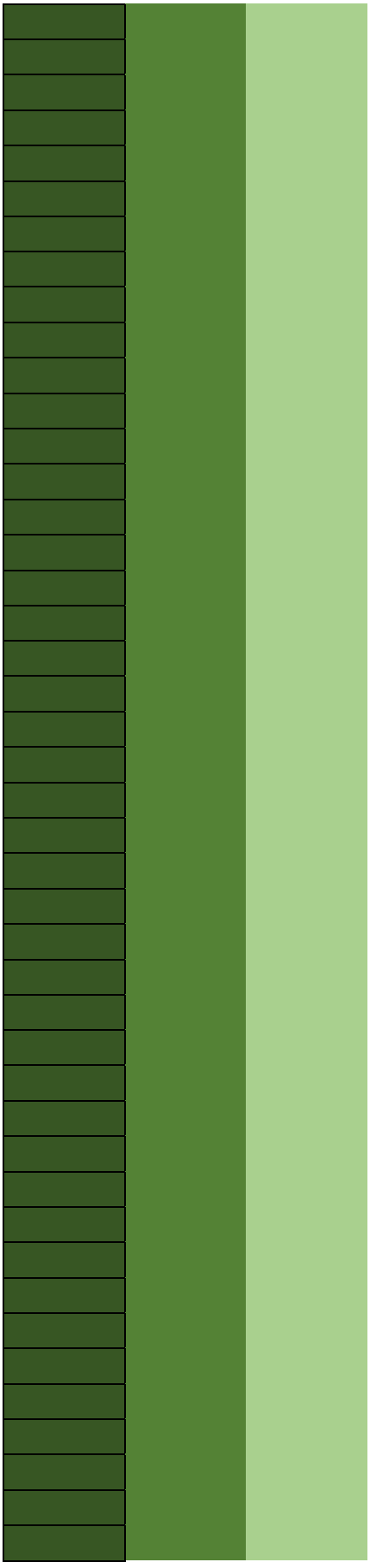
- ***import_total***: this variable is valued in thousands of $USD, and is equal to the value of EU imports from the US for each product code (CN code). For example, for the product 30471, Austria imports a total of $68.7 thousand USD from the US.

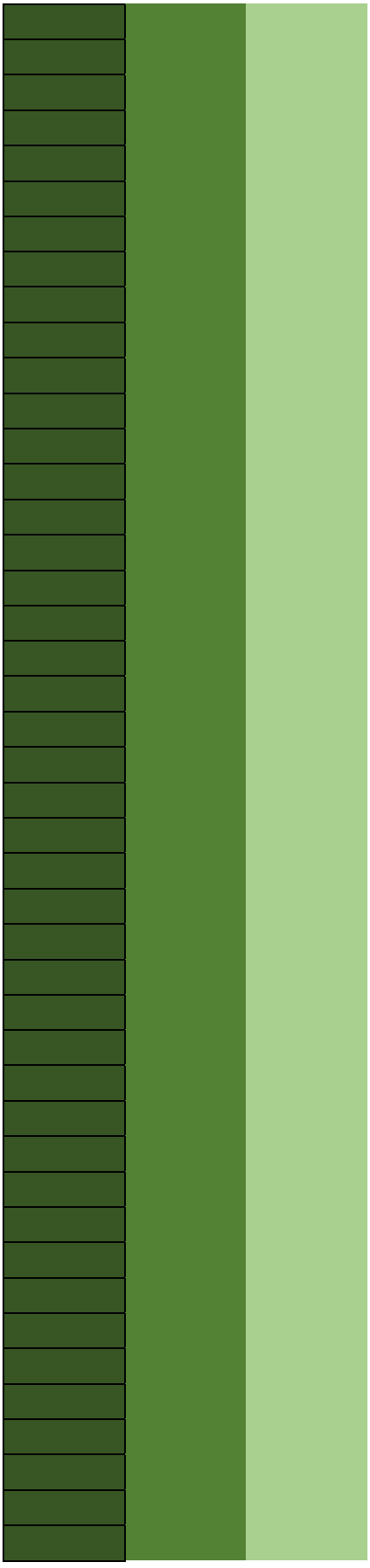
By combining the variables *tradetotalpos* and *import_total*, we can calculate the reduction in trade that results from the 20% tariff applied to each of the product codes used from the dataset *CNs*, over the total amount of imports for a given country in the EU. Using the example of Austria given above, this will be equal to (19.442/68.7) *100, or (*tradetotalpos/import_total)* *100.

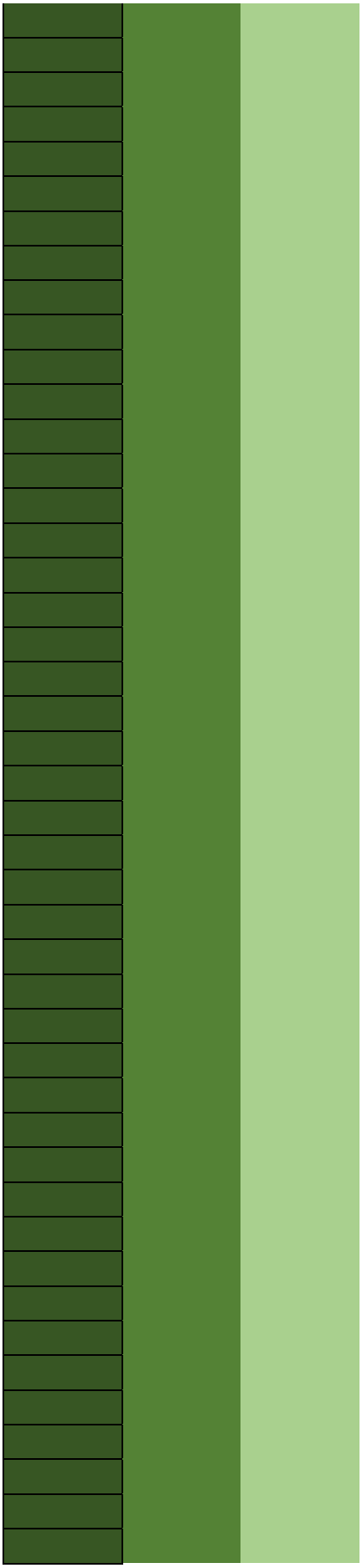
It should be noted that for certain products and countries, the reduction in trade as a result of the tariff would be sufficient to eliminate all US imports on that particular product code. In such cases, *tradetotalpos* would be equal to *import_total*. This occurs for a minority of product codes for which US imports are already low (not larger than 100,000 EUR).

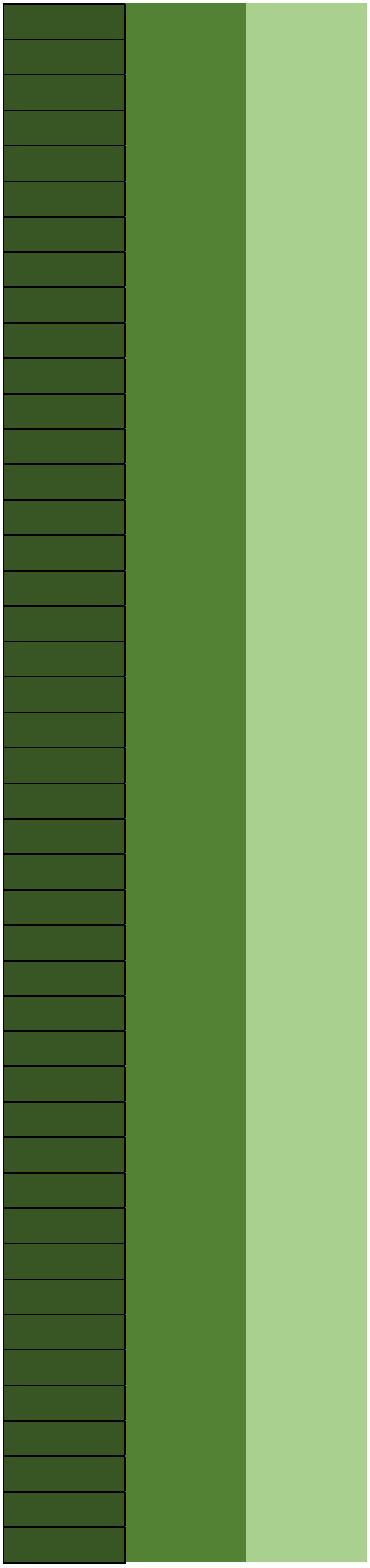
Annex II (digital): Products in Level 1 (products that fulfill criteria for level 3, 2 and 1)

Reporter	Product	L1	L2	L3	L4	L5	L6	Year
EU27_2020	3011100							2019
EU27_2020	3011900							2019
EU27_2020	3035410							2019
EU27_2020	3048100							2019
EU27_2020	3048910							2019
EU27_2020	3048990							2019
EU27_2020	3049999							2019
EU27_2020	3054100							2019
EU27_2020	3074399							2019
EU27_2020	3075200							2019
EU27_2020	4061050							2019
EU27_2020	5119910							2019
EU27_2020	5119939							2019
EU27_2020	5119985							2019
EU27_2020	7095910							2019
EU27_2020	7095990							2019
EU27_2020	7122000							2019
EU27_2020	7129005							2019
EU27_2020	7129030							2019
EU27_2020	7129050							2019
EU27_2020	7129090							2019
EU27_2020	8029085							2019
EU27_2020	8041000							2019
EU27_2020	8045000							2019
EU27_2020	8054000							2019
EU27_2020	8061010							2019
EU27_2020	8062030							2019
EU27_2020	8104050							2019
EU27_2020	8119085							2019
EU27_2020	8119095							2019
EU27_2020	8134095							2019
EU27_2020	9011100							2019
EU27_2020	9023000							2019
EU27_2020	9051000							2019
EU27_2020	9052000							2019
EU27_2020	10019900							2019
EU27_2020	11042917							2019
EU27_2020	12060091							2019
EU27_2020	12060099							2019
EU27_2020	12122100							2019
EU27_2020	12122900							2019

EU27_2020	13012000		2019
EU27_2020	13019000		2019
EU27_2020	13021970		2019
EU27_2020	13023290		2019
EU27_2020	13023900		2019
EU27_2020	15042090		2019
EU27_2020	15079090		2019
EU27_2020	15121191		2019
EU27_2020	15155019		2019
EU27_2020	15155099		2019
EU27_2020	15159011		2019
EU27_2020	15159029		2019
EU27_2020	15159051		2019
EU27_2020	15159059		2019
EU27_2020	15159091		2019
EU27_2020	15159099		2019
EU27_2020	15162010		2019
EU27_2020	15162091		2019
EU27_2020	15162096		2019
EU27_2020	15162098		2019
EU27_2020	15180091		2019
EU27_2020	15180095		2019
EU27_2020	15180099		2019
EU27_2020	15211000		2019
EU27_2020	15219099		2019
EU27_2020	16052190		2019
EU27_2020	17019910		2019
EU27_2020	17019990		2019
EU27_2020	17031000		2019
EU27_2020	18061015		2019
EU27_2020	18061020		2019
EU27_2020	18061030		2019
EU27_2020	18061090		2019
EU27_2020	18062010		2019
EU27_2020	18062030		2019
EU27_2020	18062050		2019
EU27_2020	18062095		2019
EU27_2020	18063100		2019
EU27_2020	18063210		2019
EU27_2020	18063290		2019
EU27_2020	18069011		2019
EU27_2020	18069019		2019
EU27_2020	20081191		2019
EU27_2020	20081196		2019

EU27_2020	20081198		2019
EU27_2020	20081919		2019
EU27_2020	20081995		2019
EU27_2020	20081999		2019
EU27_2020	20083059		2019
EU27_2020	20083090		2019
EU27_2020	20089999		2019
EU27_2020	20091199		2019
EU27_2020	20092100		2019
EU27_2020	20092999		2019
EU27_2020	21011100		2019
EU27_2020	21021090		2019
EU27_2020	21022011		2019
EU27_2020	21022019		2019
EU27_2020	21022090		2019
EU27_2020	21031000		2019
EU27_2020	21032000		2019
EU27_2020	21039010		2019
EU27_2020	21039090		2019
EU27_2020	21041000		2019
EU27_2020	21069059		2019
EU27_2020	22041093		2019
EU27_2020	22041096		2019
EU27_2020	22041098		2019
EU27_2020	22042108		2019
EU27_2020	22042109		2019
EU27_2020	22042193		2019
EU27_2020	22042195		2019
EU27_2020	22042197		2019
EU27_2020	22071000		2019
EU27_2020	22082029		2019
EU27_2020	22082089		2019
EU27_2020	22084011		2019
EU27_2020	22084031		2019
EU27_2020	22084039		2019
EU27_2020	22086011		2019
EU27_2020	22086019		2019
EU27_2020	22089091		2019
EU27_2020	22090091		2019
EU27_2020	24011035		2019
EU27_2020	24011070		2019
EU27_2020	24011085		2019
EU27_2020	24012035		2019
EU27_2020	24012070		2019

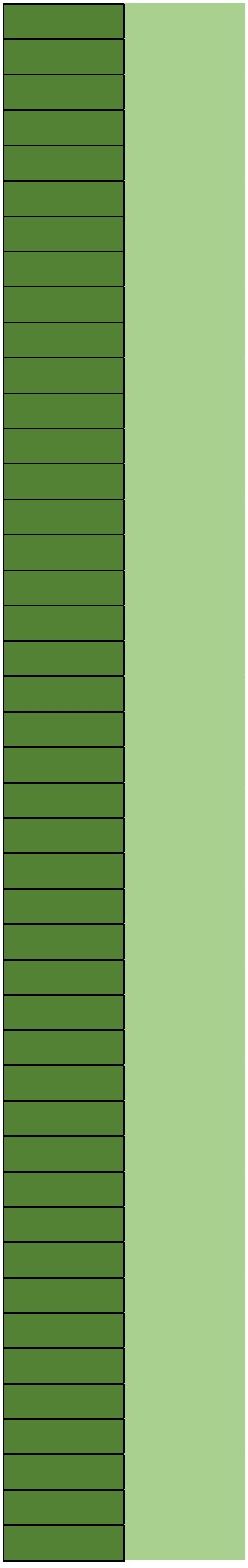
EU27_2020	24012085		2019
EU27_2020	24012095		2019
EU27_2020	24013000		2019
EU27_2020	27011290		2019
EU27_2020	27011900		2019
EU27_2020	29335995		2019
EU27_2020	29339980		2019
EU27_2020	29349990		2019
EU27_2020	29359090		2019
EU27_2020	30051000		2019
EU27_2020	30059031		2019
EU27_2020	30059050		2019
EU27_2020	32041700		2019
EU27_2020	33011210		2019
EU27_2020	33011310		2019
EU27_2020	33011920		2019
EU27_2020	33012590		2019
EU27_2020	33012911		2019
EU27_2020	33012941		2019
EU27_2020	33019030		2019
EU27_2020	33019090		2019
EU27_2020	35030010		2019
EU27_2020	35030080		2019
EU27_2020	35040010		2019
EU27_2020	35051010		2019
EU27_2020	35051090		2019
EU27_2020	35052010		2019
EU27_2020	35052090		2019
EU27_2020	38151200		2019
EU27_2020	39011010		2019
EU27_2020	39011090		2019
EU27_2020	39013000		2019
EU27_2020	39041000		2019
EU27_2020	39073000		2019
EU27_2020	39074000		2019
EU27_2020	39076100		2019
EU27_2020	39076900		2019
EU27_2020	39201024		2019
EU27_2020	39201025		2019
EU27_2020	39201081		2019
EU27_2020	39206219		2019
EU27_2020	39206290		2019
EU27_2020	39219041		2019
EU27_2020	39219043		2019
EU27_2020	39219060		2019

EU27_2020	39219090		2019
EU27_2020	42021110		2019
EU27_2020	42021190		2019
EU27_2020	42021211		2019
EU27_2020	42021219		2019
EU27_2020	42021250		2019
EU27_2020	42021291		2019
EU27_2020	42021299		2019
EU27_2020	42021910		2019
EU27_2020	42021990		2019
EU27_2020	42022100		2019
EU27_2020	42022210		2019
EU27_2020	42022290		2019
EU27_2020	42022900		2019
EU27_2020	42023100		2019
EU27_2020	42023210		2019
EU27_2020	42023290		2019
EU27_2020	42023900		2019
EU27_2020	42029110		2019
EU27_2020	42029180		2019
EU27_2020	42029211		2019
EU27_2020	42029215		2019
EU27_2020	42029219		2019
EU27_2020	42029291		2019
EU27_2020	42029298		2019
EU27_2020	42029900		2019
EU27_2020	52029900		2019
EU27_2020	84099100		2019
EU27_2020	84099900		2019
EU27_2020	84295210		2019
EU27_2020	84295290		2019
EU27_2020	87011000		2019
EU27_2020	87012010		2019
EU27_2020	87012090		2019
EU27_2020	87019110		2019
EU27_2020	87019390		2019
EU27_2020	87019410		2019
EU27_2020	87059080		2019
EU27_2020	87141010		2019
EU27_2020	87141030		2019
EU27_2020	87141050		2019
EU27_2020	87141090		2019
EU27_2020	87149110		2019
EU27_2020	87149130		2019

EU27_2020	87149190							2019
EU27_2020	87149210							2019
EU27_2020	87149290							2019
EU27_2020	87149420							2019
EU27_2020	87149490							2019
EU27_2020	87149610							2019
EU27_2020	87149630							2019
EU27_2020	87149690							2019
EU27_2020	95042000							2019
EU27_2020	95043090							2019
EU27_2020	95045000							2019
EU27_2020	95049010							2019
EU27_2020	95049080							2019
EU27_2020	95069110							2019
EU27_2020	95069190							2019

Annex 2: Products in Level 2 (products that full criteria for level 3 and 2 but not 1)

Reporter	Product	L1	L2	L3	L4	L5	L6	Year
EU27_2020	3027900							2019
EU27_2020	3028530							2019
EU27_2020	3031300							2019
EU27_2020	3034220							2019
EU27_2020	3036310							2019
EU27_2020	3036619							2019
EU27_2020	3038190							2019
EU27_2020	3043300							2019
EU27_2020	3047110							2019
EU27_2020	3047190							2019
EU27_2020	3047411							2019
EU27_2020	3048921							2019
EU27_2020	3048929							2019
EU27_2020	3049921							2019
EU27_2020	3053211							2019
EU27_2020	3053219							2019
EU27_2020	3061210							2019
EU27_2020	3061290							2019
EU27_2020	3061500							2019
EU27_2020	3061691							2019
EU27_2020	3061699							2019
EU27_2020	3072210							2019
EU27_2020	3074220							2019
EU27_2020	3074331							2019
EU27_2020	3074335							2019

EU27_2020	3074338		2019
EU27_2020	3074392		2019
EU27_2020	4069021		2019
EU27_2020	4069086		2019
EU27_2020	5119931		2019
EU27_2020	7095950		2019
EU27_2020	7142090		2019
EU27_2020	8022200		2019
EU27_2020	8062010		2019
EU27_2020	8119019		2019
EU27_2020	8119050		2019
EU27_2020	8119070		2019
EU27_2020	8119075		2019
EU27_2020	8119080		2019
EU27_2020	8134010		2019
EU27_2020	8134030		2019
EU27_2020	11042908		2019
EU27_2020	13023210		2019
EU27_2020	15042010		2019
EU27_2020	15121199		2019
EU27_2020	15159040		2019
EU27_2020	15159060		2019
EU27_2020	15219010		2019
EU27_2020	15219091		2019
EU27_2020	16052110		2019
EU27_2020	18062080		2019
EU27_2020	20091111		2019
EU27_2020	20091119		2019
EU27_2020	20091191		2019
EU27_2020	20092919		2019
EU27_2020	21039030		2019
EU27_2020	22041094		2019
EU27_2020	22042106		2019
EU27_2020	22042107		2019
EU27_2020	22042295		2019
EU27_2020	22042296		2019
EU27_2020	22042297		2019
EU27_2020	22042298		2019
EU27_2020	22042993		2019
EU27_2020	22042995		2019
EU27_2020	22082040		2019
EU27_2020	22084051		2019
EU27_2020	22084099		2019
EU27_2020	22086091		2019

EU27_2020	22086099							2019
EU27_2020	23032010							2019
EU27_2020	24011060							2019
EU27_2020	24012060							2019
EU27_2020	24031100							2019
EU27_2020	29349960							2019
EU27_2020	33019021							2019
EU27_2020	35011090							2019
EU27_2020	35021190							2019
EU27_2020	35052050							2019
EU27_2020	38248500							2019
EU27_2020	38248800							2019
EU27_2020	39201023							2019
EU27_2020	52029100							2019
EU27_2020	87019190							2019
EU27_2020	87019490							2019

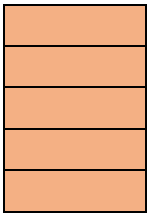
Annex 4: Products in Level 3 (products that full criteria for level 3 but not level 2 and 1)

Reporter	Product	L1	L2	L3	L4	L5	L6	Year
EU27_2020	3072290							2019
EU27_2020	12024200							2019
EU27_2020	22042198							2019
EU27_2020	22042997							2019
EU27_2020	24011095							2019
EU27_2020	33012931							2019
EU27_2020	52010090							2019

Annex 4: Products in Level 4 (products that full criteria for level 4 but not level 5 and 6)

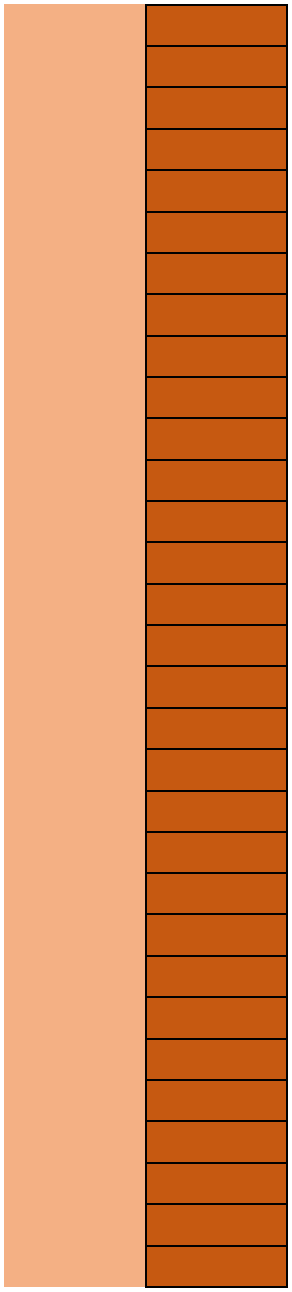
Reporter	Product	L1	L2	L3	L4	L5	L6
EU27_2020	7129019						
EU27_2020	15159039						
EU27_2020	20081913						
EU27_2020	20081993						
EU27_2020	22042294						
EU27_2020	22051010						
EU27_2020	22090099						
EU27_2020	30059010						
EU27_2020	30059099						
EU27_2020	33012979						
EU27_2020	35021110						
EU27_2020	35029020						
EU27_2020	35051050						

EU27_2020	38237000							
EU27_2020	39012090							
EU27_2020	39019030							
EU27_2020	84295199							
EU27_2020	87019310							



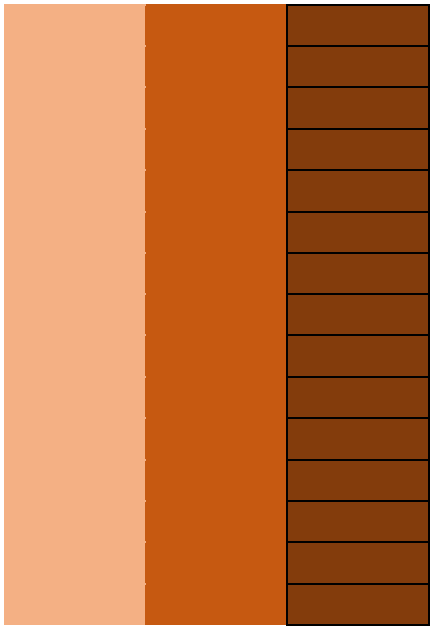
Annex 5: Products in Level 5 (products that full criteria for level 4 and 5, but not level 6)

Reporter	Product	L1	L2	L3	L4	L5	L6	Year
EU27_2020	7132000							2019
EU27_2020	7134000							2019
EU27_2020	7142010							2019
EU27_2020	8062090							2019
EU27_2020	8132000							2019
EU27_2020	11042989							2019
EU27_2020	20089991							2019
EU27_2020	22042194							2019
EU27_2020	22042998							2019
EU27_2020	22072000							2019
EU27_2020	22084091							2019
EU27_2020	22089099							2019
EU27_2020	33012510							2019
EU27_2020	33012971							2019
EU27_2020	33012991							2019
EU27_2020	33019010							2019
EU27_2020	35029070							2019
EU27_2020	35029090							2019
EU27_2020	35040090							2019
EU27_2020	39014000							2019
EU27_2020	39019080							2019
EU27_2020	52030000							2019
EU27_2020	87019210							2019
EU27_2020	87019290							2019
EU27_2020	87141020							2019
EU27_2020	87141040							2019
EU27_2020	88021100							2019
EU27_2020	88024000							2019
EU27_2020	95043010							2019
EU27_2020	95043020							2019
EU27_2020	95044000							2019



Annex 6: Products in Level 6 (products that full criteria for level 4, 5 and 6)

Reporter	Product	L1	L2	L3	L4	L5	L6	Year

EU27_2020	3034110		2019
EU27_2020	3036390		2019
EU27_2020	3038115		2019
EU27_2020	3047500		2019
EU27_2020	3048960		2019
EU27_2020	3052000		2019
EU27_2020	3063210		2019
EU27_2020	3074333		2019
EU27_2020	8025200		2019
EU27_2020	12024100		2019
EU27_2020	22042994		2019
EU27_2020	22042996		2019
EU27_2020	84295110		2019
EU27_2020	84295191		2019
EU27_2020	88021200		2019