

TTIP and intra-European trade: boon or bane?

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Abstract

The European Union is the world's largest and deepest free trade zone. Amongst its members, it has abolished tariffs and lowered non-tariff barriers. This has led to trade creation within Europe and to trade diversion between EU countries and outsiders. The Transatlantic Trade and Investment Partnership TTIP (or other trade agreements with third countries) will undo some of these effects by means of preference erosion, so that cross-country trade links within Europe may lose relative prominence at the expense of additional trade with the US. However, the presence of a rich fabric of regional value chains in Europe and substantial income effects could counter this development. In this paper, we provide insights based on a New Quantitative Trade Model. We show that TTIP could indeed lower trade integration in Europe since predicted income effects turn out not to be large enough to overcome the effects of preference erosion. Moreover, trade diversion effects in value added terms tend to be even more pronounced than in gross (official) trade flows. However, there is substantial heterogeneity across sectors and countries. To avoid the political costs associated with weaker intra-EU ties, Europe should deepen the single market alongside the formation of large trade agreements with outsiders.

JEL Code: F13, F14, F17.

Keywords: TTIP, single market, European integration.

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1 Motivation

Theory suggests that European trade agreements with third countries should have effects on the structure of trade within the European Union. The reason is that these agreements – if they are effective – lower trade costs between EU members and their external partners while keeping trade costs with internal partners unchanged. This leads to trade diversion: The cost competitiveness of European producers in the external partners’ markets improves, which allows them to sell a larger share of their output there. Producers from the non-EU partner countries become more competitive in European markets, partly crowding out their European peers.

This Vinerian trade diversion phenomenon should lower the share of member states’ trade with each other. EU members depend less on each other; the degree of European integration goes down. From a purely economic point of view, this need not be a reason to complain. The European customs union and the Single Market are second-best projects. They have lowered trade barriers within Europe while maintaining those with third countries. This discriminatory nature of European integration has implied trade creation between the parties to the treaties, but trade diversion with outsiders. Such regional integration is welfare-improving only if trade creation outweighs diversion. The same is true for trade deals with third countries: If trade creation effects dominate, trade agreements will be welfare-improving. Whether this is indeed the case is an empirical question, which may be addressed with the help of quantitative trade models.

However, the European integration process has a political rationale alongside its economic aspects. By erecting the customs union and the single market, EU members engaged into a process of deepening economic ties. The motto of the liberal agenda was “Make Trade, Not War”. Indeed, there is robust evidence that countries with stronger bilateral trade ties have a lower likelihood to go to war (Martin et al., 2008, 2012). One may also expect that the likelihood of cooperation in other areas of political conflict goes

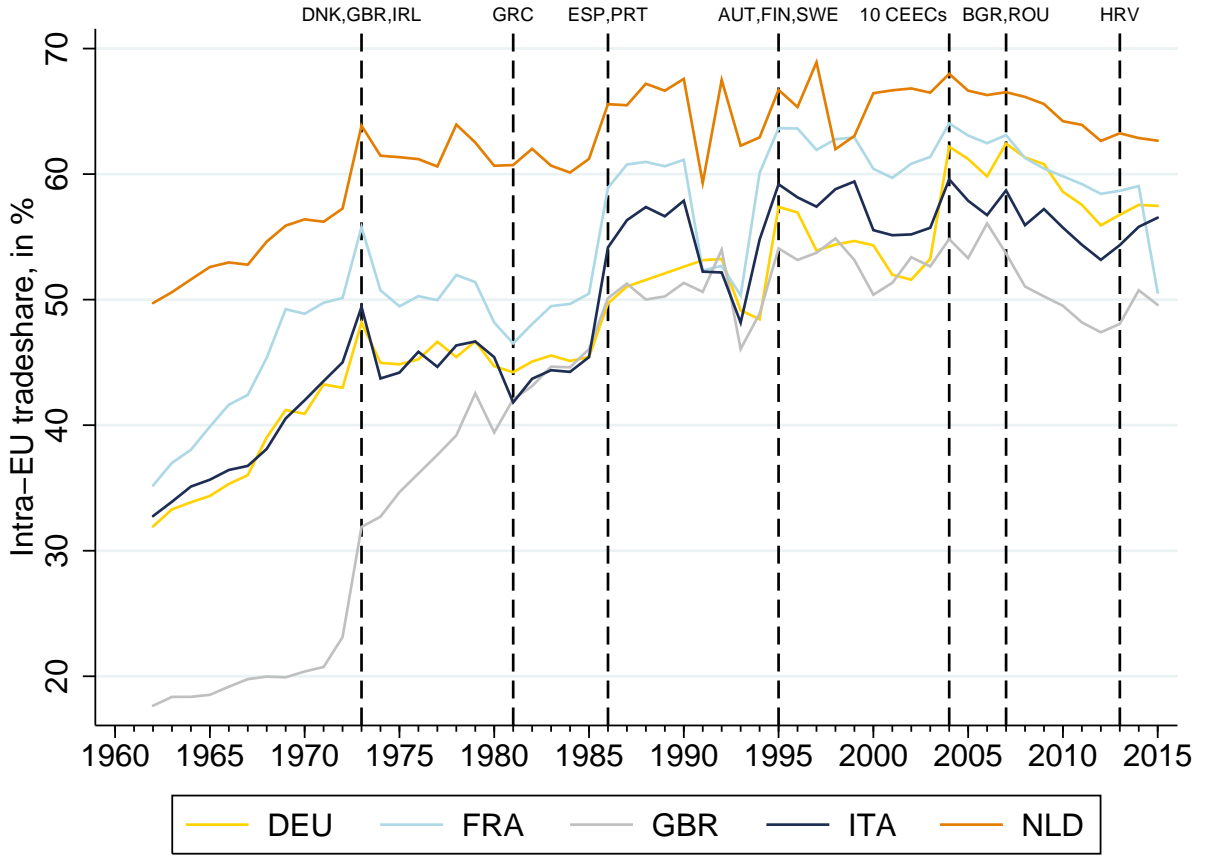
up as well. Thus, to the extent that trade agreements with third parties erode internal economic ties, the political ties can be expected to weaken, too. In that sense, trade agreements with third parties come at a political price. Indeed, it may not be a mere coincidence that support for the European Union is waning at a time where, in many countries, the share of trade conducted with other EU members has been falling.

Figure 1 shows the evolution of intra-EU trade shares over time for a number of core EU members and the UK from 1962 to 2015. Over time, the membership of the EU expanded from 6 to 28 countries in seven waves of enlargement. Thus, naturally, the share of intra-EU trade increased. For example, the German share increased from just about 30% in 1962 to more than 60% in 2007, when it reached an all-time high. Since then, the share has fallen back slightly. Similar dynamics are visible in other countries. The case of the United Kingdom is interesting, too. In the 1960s, the country's trade share with EU countries was just about 20%; after the entry into the EU in 1973, the share quickly increased and peaked in 2006 at about 56%; since then, it has fallen to below 50%. It may not be by accident that the country has decided to quit the EU at a time, where internal trade links are getting weaker.

Hence, the time pattern of the intra-EU trade share looks inversely hump-shaped for most countries. This evolution reflects the fact that GDP growth has been faster outside the EU for the last few decades, and that the last substantial enlargement of the EU has happened more than ten years ago. Demographic trends and productivity catch-up in emerging and developing countries will contribute towards a continuation of this trend. Moreover, the falling intra-EU shares are also influenced by the EU's own activist trade policy, both at the multilateral and the bilateral level, which facilitated easier access to foreign markets for European firms, but also opened up the EU market to foreign competition.

In this paper, we simulate the effects that a potential trade agreement with the US could have on intra-EU trade. The issue of trade diversion features prominently in the

Figure 1: Intra-EU trade shares over time



Note: Exports to plus imports from other EU members divided by total trade (exports plus imports). EU membership expands over time; vertical lines mark the timing of enlargements. CEEC denotes central and eastern European countries: Czech Republic, Cyprus, Estland, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia. Trade data from UN Comtrade.

theory of preferential trade liberalization as laid down in Jacob Viner’s (1950) book “The Customs Union Issue”. At that time, economists and politicians in the US were debating whether the nascent European free trade zone was actually in the member states’ and the US’s economic interest. Viner (1950) showed that trade diversion effects could harm insiders of a customs union because preferential trade liberalization induces them to source from less efficient producers while foregoing tariff revenue. Also, outsiders such as the US would suffer. However, Viner (1950) did understand very clearly that the US also had a strong political interest in the integration of Europe.

The European Union is currently negotiating free trade agreements with a large num-

ber of countries, most prominently the US, Japan, India, and the member states of Mercosur (a customs union in South America). It has already concluded about three dozens of agreements with third countries, and over time those deals have become ever deeper and more comprehensive. The EU's objective, according to its 2006 "Competitive Europe" strategy, is to tap deeper into the gains from trade. Ex post and ex ante analyses of these undertakings tend to show that the conditions – more trade creation than diversion – are generally met. A large body of literature makes this point; see Egger and Larch (2011) for an ex post assessment of the Europe Agreements, Keuschnigg and Kohler (2012) for an ex ante analysis of the EU eastern enlargement, and Egger et al. (2015), Felbermayr et al. (2015), or Aichele et al. (2016) for an ex ante analysis of the proposed Transatlantic Trade and Investment Partnership (TTIP).

However, existing literature on EU agreements with third parties has rarely looked into the details of intra-EU trade diversion. Often, this issue is side-lined, as, e.g., in the EU Commission's official study on TTIP by Francois et al. (2013). Moreover, even if the textbook arguments regarding the effects of TTIP on intra-EU trade flows is relatively clear as far as import shares are concerned, it is not necessarily the case that the absolute level of bilateral trade between EU members falls. The reason is that higher aggregate income caused by a successful agreement with the US creates more demand for goods from all countries, including fellow EU member states. Moreover, there may be offsetting effects from increased input trade within the union. In other words, even if German exports to the US increase at the expense of German exports to France, it may well be that Germany's imports of intermediate inputs from France increase. To the extent that production networks are regional, this effect may mitigate the political costs of external agreements.

Capaldo (2014) is one of the very few papers expressing concern about a possibly negative effect of TTIP on integration within Europe. However, he talks about trade policy without using a trade model, and his analysis does not feature any positive effects

of trade on productivity, prices, or product variety. Rather he employs a very simplistic Keynesian framework which can, at best, shed light on short-run effects. Bauer and Erixon (2015) forcefully criticize the assumptions of the analysis. In our analysis, we wish to quantify the importance of the concern about disintegration of the EU and understand the structure of intra-EU trade diversion effects based on a general equilibrium trade model.

We conduct a detailed analysis of the intra-EU trade effects that TTIP might bring about. To this end, we use the quantitative trade model developed by Aichele et al. (2014), which builds on the work of Caliendo and Parro (2015). Complementing the analysis of TTIP's global welfare and value added effects presented in Aichele et al. (2016), which is based on the same methodology, this paper provides an in-depth look at the intra-EU trade network. We distinguish between gross trade flows and value added trade flows as defined by Johnson and Noguera (2012), using the tools for counterfactual analysis of value added trade and production networks developed by Aichele and Heiland (2014). Our analysis thus captures the fact that TTIP induced growth in bilateral trade between a pair of countries as measured at customs implies an increase in value added imports from third countries which supply intermediate goods at earlier stages of the production process. Changes in intra-EU value added trade patterns may thus differ from the changes in gross trade transaction values recorded at customs, depending on the sourcing structure of countries and sectors involved.

Our simulation results generate a number of important insights. First, TTIP would indeed reduce EU countries' intra-EU trade shares. Second, those shares would fall not only because overall trade of EU members increases, but also because intra-EU trade flows fall in absolute value. Hence, trade creation effects due to higher income do not suffice to overturn trade diversion effects caused by preference erosion. Third, whether one looks at the dynamics of bilateral trade flows using transaction values (gross trade) or using the value added content of these flows does not change the overall picture. Fourth, there is

substantial heterogeneity among EU members and industries. Disintegration effects are stronger in bilateral relations involving Germany or the UK, and the chemicals, metals, and transport sectors are more affected than others. Fifth, supply networks will change as producers from the US become more important as suppliers of intermediate inputs for European producers. In the manufacturing sectors, the US's gains are mostly absorbed by smaller flows between EU member states. In the services sectors, the US's gains are mostly absorbed by smaller intra-national flows.

TTIP meets strong resistance from the public. However, the negative views on the agreement have nothing to do with the integration effects which we wish to highlight in this paper. Rather, they relate to a wide-spread suspicion that TTIP could erode consumer and worker rights and limit governments' rights to regulate. Even if the agreement does not turn out to be feasible, it still offers an interesting opportunity to shed light on the intra-EU trade flow effects of comprehensive international trade agreements signed by Europe.

The remainder of this paper is structured as follows. In Section 2 we briefly discuss the simulation model and its main characteristics. In Section 3 we perform our counterfactual analysis addressing the question as to what extent intra-EU trade ties and production networks would change with TTIP. The clear answer is that, despite variation across countries and sectors, a deep trade agreement with a large country such as the US will weaken European integration through preference erosion and trade diversion. Section 4 concludes. It argues that these results imply that an active trade policy agenda needs to be accompanied by further effort to deepen the EU single market in order to foster the union's cohesion. Moreover, in an ever more deeply integrated world, the EU needs to demonstrate its importance beyond the narrow realm of trade and investment.

2 Methodology

We use a quantitative trade model developed and described by Aichele et al. (2016) and Aichele and Heiland (2014). This framework builds on and extends earlier work by Caliendo and Parro (2015) which, in turn, is a generalization of the stochastic Ricardian trade model of Eaton and Kortum (2002). The framework falls into the class of quantitative trade models surveyed by Costinot and Rodriguez-Clare (2014). Its advantage is that it can be solved in changes (the so called “exact hat algebra”; see Dekle et al., 2007). This means, that certain constant model parameters – such as those describing the sector-country levels of technology – drop out and need not be calibrated, which makes numerical implementation much easier and reduces errors due to mismeasurement. The exact hat solution also sheds light on the model’s mechanics and thus it reduces the black-box problem inherent to large-scale computable general equilibrium (CGE) models. Moreover, the model’s key parameters can be estimated based on general equilibrium consistent relationships derived from the model itself and based on the exact same data that describes the model-consistent baseline of the counterfactual analysis.

The model is calibrated with data from the GTAP consortium. The data cover 140 countries and 38 sectors, including 13 services sectors.⁴ It provides consistent input-output tables, sectoral value added and output data, and bilateral sectoral trade data for the base year 2011.⁵

Before moving on, it is worthwhile to briefly compare our setup to other frameworks used in the literature.⁶ First, the study of Francois et al. (2013) uses a more traditional CGE model, whose properties relative to the benchmark cases discussed in Costinot and Rodriguez-Clare (2014) are unknown. In any case, the model needs to be solved in levels,

⁴Note that the GTAP 9 database features 57 sectors. We aggregate some agricultural and food sectors to reduce the number of parameters that need to be estimated and to reduce the computational burden.

⁵Note that exactly the same model calibration underlies the results presented in Aichele et al. (2016), which constitutes an update of Aichele et al. (2014).

⁶Felbermayr (2016) provides a more complete overview of modeling frameworks applied to TTIP.

and its more complicated structure increases the demands on data availability and quality. While our model also is a CGE model, its calibration does not rely on a collection of different estimates from different papers pertaining to different time periods or samples. Rather, it relies on the estimation of parameters based on a structural relationship generated by the model and based on data that replicates the baseline of the counterfactual analysis.

Also, our definition of the scenario for the comparative statics analysis is data-driven: We exploit the gravity equation to estimate the trade cost effects of existing trade agreements – differentiated according to their depth – and assume that trade cost reductions across the Atlantic could have a similar quantitative and cross-sectoral structure. Clearly, this is a strong assumption. However, in the absence of a fully negotiated text, we view this as the best possible strategy. It makes sure that the scenario is feasible, as it is based on the ex post analysis of existing agreements. And it makes expert judgement on the size of realistic trade cost reductions, which is necessarily ad hoc, redundant. The downside, of course, is that we provide information about the potential of TTIP, and shy away from assessing whether it is realistic that transatlantic trade liberalization can actually deliver as much as other deep agreements (such as the agreements of the EU and the US with Korea or with a number of South American Countries, NAFTA, or the EEA) have. For this reason, we want our results to be considered as potentials, and not as forecasts or predictions.

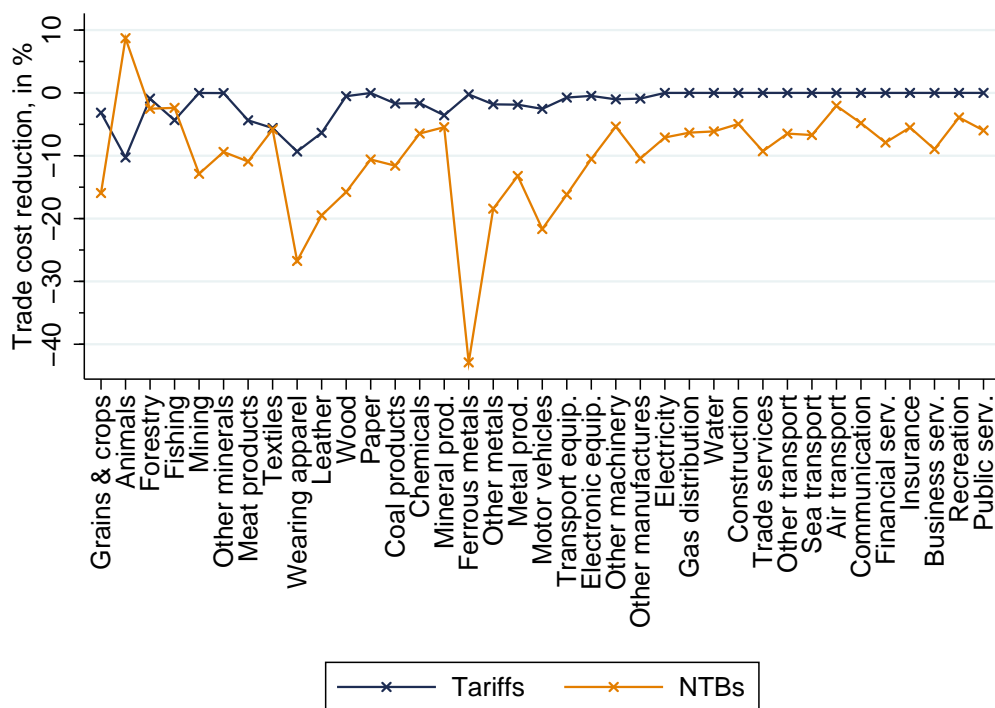
3 Simulation results

3.1 The TTIP scenario

In our simulations, we assume that TTIP will lead to a full elimination of all tariffs between EU states and the US, and to the same proportional reduction of non-tariff trade

barriers as observed in other deep trade agreements. Figure 2 shows how different sectors are affected in the so-defined scenario, on average.⁷ Tariff reductions are most sizeable in the areas of wearing apparel or animals. In many other industries they are already fairly low. In the services industries, there are no tariffs.

Figure 2: The TTIP scenario: average trade cost reductions across sectors, ad valorem trade cost equivalents



Note: For each of the 38 sectors, the graph shows the import-weighted average sectoral tariff reduction (averaged across the US and the EU) and the sectoral reductions in non-tariff trade barrier as measured in other deep trade agreements; see Aichele et al. (2016). The sector Dwellings is not shown because it has no recorded trade flows.

Non-tariff barriers (NTBs) are assumed to fall as in other deep trade agreements. See Aichele et al. (2016) for a description of the empirical strategy and the data used to estimate these trade cost changes. In the services sectors, the implied trade cost reductions vary between 5 and 10%, in some manufacturing sectors they are more substantial (e.g., 20% in motor vehicles, 28% in wearing apparel, and 42% in ferrous metals). The estimates

⁷In the simulations, the US and the EU will be affected asymmetrically because of different external tariffs and because of different weights in the calculation of sector-level averages.

for agriculture and raw materials are somewhat problematic with relatively high variance and low NTB reduction potentials.⁸

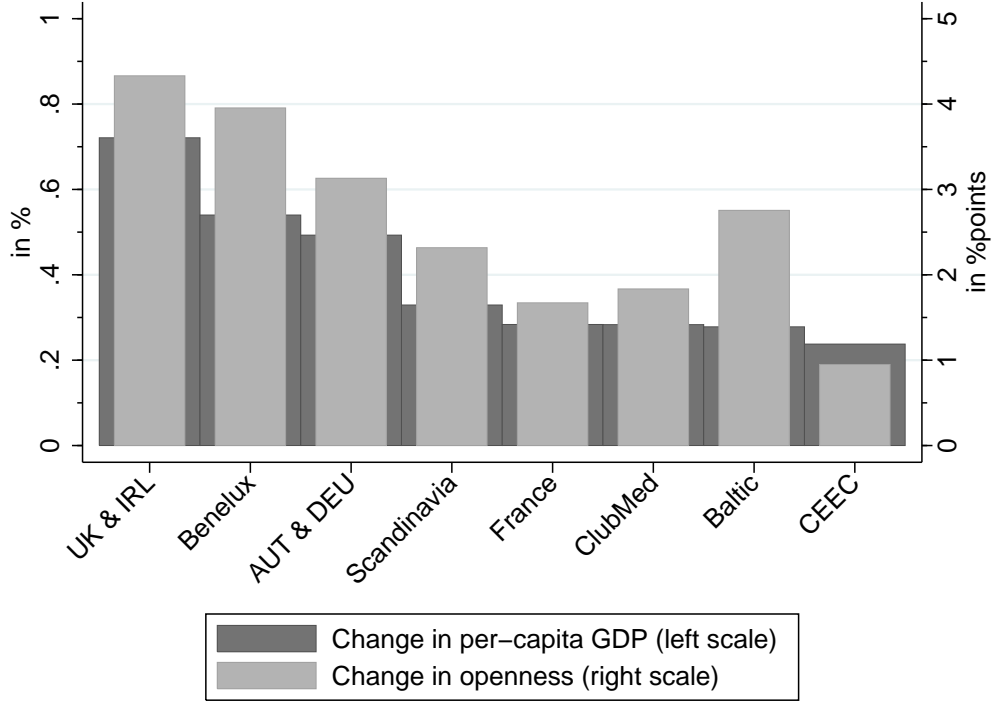
3.2 TTIP: macroeconomic effects

Figure 3 shows the simulated effects of a transatlantic trade agreement on real per capita income and aggregate trade openness in EU countries. The estimates are largely in line with findings presented by WTI (2016) or Krebs and Pflüger (2015). They are smaller than in some of our earlier work (Aichele et al., 2014 or Felbermayr et al., 2015). This is entirely due to a different calibration and a more modest scenario rather than to a different modeling strategy. In all countries (and, a fortiori, in all the aggregated regions shown in the Figure), openness goes up. Hence, trade creation effects dominate trade diversion effects when measured by transaction values. A similar picture emerges when openness is measured as the share of foreign value added absorbed domestically. In the context of the utilized simulation model, this is a necessary condition for a preferential trade agreement to be welfare improving. Because the elimination of tariffs has revenue implications, the trade effects are, however, not sufficient to inform about the welfare effects.

However, our simulation results suggest that all EU member states stand to benefit from TTIP, albeit at different amounts. The strongest gains are to be found in Ireland and the UK, where existing trade links are strong, and a reduction in trade costs has important first-order effects. In this region, real per capita income is reckoned to increase by about 0.7%. The Benelux countries, which are also strongly integrated across the Atlantic, feature gains of slightly more than 0.5%, followed by Austria and Germany with gains of a bit less than 0.5%. In Scandinavia, the Mediterranean countries, the Baltic states, and the Central and Eastern European countries (CEEC) the gains range between

⁸With the exception of animals, forestry, fishing, and mining, all estimated trade cost reductions are statistically significant at the 5% level.

Figure 3: Effects of TTIP on real per capita income and openness



Note: The figure shows population-weighted effects of a transatlantic trade and investment partnership on EU members. Openness is defined as the sum of exports and imports divided by two times GDP.

0.3% and 0.2%.

3.3 Bilateral trade effects of a deep TTIP

Status quo of intra-EU trade. Table 1 shows the bilateral trade links amongst the EU countries (or groups thereof) in our data. The upper half of the table looks at exports as recorded by official statistics (gross trade). The second half looks at value added transfers through trade. Both are measured in billion US dollars and refer to our base year 2011. The right-most column presents the share of exports to other EU members of the countries listed in the left-most column. The lowest row in each of the two halves denotes the share of imports of each country listed on the column head from other EU countries. Diagonal elements refer to trade within the countries (or groups of countries). The intra-EU shares do not include intra-national trade (but they do include all trade

Table 1: Aggregate intra-EU trade: the Status quo

Region	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	AUT&DEU	Baltic	Benelux	CEEC ^a	ClubMed ^b	France	Scandi- navia	UK&IRL	Intra-EU share
<i>Exports (in bn USD) from ... to</i>									
AUT&DEU	5939.8	7.8	145.4	192.7	183.8	134.7	73.3	116.6	56.6%
Baltic	5.1	149.5	1.6	3.5	2.2	2.6	10.2	2.5	65.7%
Benelux	170.9	3.3	2212.8	37.1	90.6	83.4	36.1	91.1	68.7%
CEEC ^a	205.0	7.7	27.1	2371.8	76.3	40.7	23.1	36.0	75.8%
ClubMed ^b	160.8	3.8	60.2	75.6	7252.7	126.9	28.3	100.4	58.2%
France	108.5	1.8	88.3	30.8	117.4	4583.9	17.0	58.5	57.9%
Scandinavia	56.5	8.0	30.5	21.4	30.5	19.6	1764.3	35.0	55.4%
UK&IRL	100.1	2.1	88.4	25.6	92.7	56.6	39.7	4015.7	51.7%
Intra-EU share	47.6%	55.7%	52.6%	58.2%	46.7%	47.5%	54.7%	43.5%	
<i>Value added transfers (in bn USD) from ... to</i>									
AUT&DEU	2607.4	5.5	71.1	97.0	127.4	84.4	43.6	81.9	49.6%
Baltic	2.6	58.7	0.8	1.5	1.5	1.1	4.0	1.4	58.1%
Benelux	69.1	1.7	852.2	18.8	47.9	39.6	16.3	44.3	59.7%
CEEC ^a	93.8	4.1	15.0	840.9	46.9	25.0	13.2	24.0	66.3%
ClubMed ^b	100.9	2.9	35.3	44.9	3155.5	81.5	20.6	71.8	52.9%
France	64.3	1.5	43.1	19.6	76.3	2038.7	11.8	41.9	51.5%
Scandinavia	34.2	4.2	15.4	13.5	23.7	14.7	716.3	23.0	49.4%
UK&IRL	64.3	1.7	38.4	19.1	67.9	39.8	25.1	1857.7	45.1%
Intra-EU share	57.8%	59.7%	59.0%	67.4%	53.0%	55.8%	63.2%	50.1%	

Note: The table shows bilateral trade flows and value added transfers (in bn USD) in the simulated 2011 benchmark with Croatia as EU member. The diagonal describes intra-national trade and/or the trade volume within a region. The share of intra-EU exports in column (9) and the share of intra-EU imports in the last row of each sub-table does not include intra-national trade. ^a CEEC refers to the Central and Eastern European countries Bulgaria, Czech Republic, Croatia, Hungary, Poland, Romania, Slovakia, and Slovenia. ^b ClubMed is short for Cyprus, Greece, Italy, Malta, Portugal, and Spain.

between EU countries).

The value added content of trade flows is computed based on the model. Using the factual input-output data, and assuming Cobb-Douglas sectoral production functions together with the (common) assumption, that, in each sector, the share of inputs from one country is equal to that country's share in total imports, the model generates value added flows.⁹

Austria and Germany (AUT & DEU) export goods and services worth 134.7 bn USD to France, they import goods and services worth 108.5 bn. In value added terms, trade

⁹For more details on the computation of value added flows see Aichele and Heiland (2014).

flows are substantially lower. Austria and Germany transfer value added worth 84.4 bn USD to France and receive value added transfers worth 64.3 bn. The difference is due to double counting in the (gross) flow data based on transaction values: French imports from Germany may contain inputs from France or other countries (inside and outside of the EU). Netting out intermediate goods trade, we obtain value added flows which are much smaller. The more countries rely on international sourcing, the larger turns out the gap between gross and value added trade flows.

The share of French exports to other EU countries is 57.9%; the share of its imports from other EU countries is 47.5%. In value added terms, the shares are 51.5% and 55.8%. Clearly, gross exports (measured at transaction value) to EU countries are larger than when measured in terms of their value-added content, the opposite is true for imports. A similar pattern emerges for Austria and Germany as well. This implies that imports from third countries contain substantial amounts of value added originating from Europe, while exports contain a substantial share of value added that originated outside the EU.

Effects of TTIP on intra-EU trade flows. Table 2 shows how bilateral intra-EU trade flows change with TTIP. The emerging picture is quite uniform: all cells feature entries with negative signs. The level of intra-EU trade is predicted to fall, and the share of intra-EU trade in total trade is predicted to fall even more strongly. This result shows that the trade agreement will indeed lead to trade diversion as a consequence of preference erosion: before the agreement, intra-EU trade was high because tariffs and other trade barriers kept US competitors out of the market; after the agreement, EU producers lose market share to American producers, but they gain market share in the US. The increase in transatlantic trade will also tend to reduce intranational trade, as can be very clearly seen in the case of France (the only single country in Table 2, whose internal trade will shrink by 0.5%). As production expands in the EU, demand for labor goes up and so do wages. The wage increase reduces EU producers' competitiveness in their home market,

Table 2: Aggregate trade effects of a deep TTIP

Region	(1) AUT&DEU	(2) Baltic	(3) Benelux	(4) CEEC ^a	(5) ClubMed ^b	(6) France	(7) Scandi- navia	(8) UK&IRL	(9) Intra-EU share
<i>Export growth (in %) from ... to</i>									
AUT&DEU	-0.3	-1.5	-2.2	-0.9	-0.7	-1.8	-0.8	-2.1	-2.7%p
Baltic	-0.5	-0.1	-1.1	-0.3	-0.6	-3.3	-0.1	-0.8	-1.8%p
Benelux	-0.0	-0.3	-0.3	0.0	0.1	-0.8	0.6	-0.4	-2.5%p
CEEC ^a	-0.6	-0.6	-1.4	-0.1	-0.4	-1.1	-0.5	-1.5	-1.2%p
ClubMed ^b	-0.1	-0.9	-1.2	-0.9	-0.3	-1.0	-0.3	-0.1	-2.1%p
France	-0.5	-1.9	-1.0	-0.3	-0.2	-0.4	-0.1	-0.6	-2.0%p
Scandinavia	-0.2	-0.8	-1.4	-0.5	-0.5	-1.3	-0.4	-0.9	-1.8%p
UK&IRL	-0.8	-0.8	-1.9	-0.6	-1.2	-2.0	-1.1	-0.4	-3.9%p
Intra-EU share	-2.4%p	-1.5%p	-2.7%p	-1.5%p	-1.8%p	-2.2%p	-2.4%p	-2.8%p	
<i>Growth of value added transfers (in %) from ... to</i>									
AUT&DEU	-0.7	-3.0	-3.8	-2.3	-2.3	-3.3	-2.7	-3.5	-2.7%p
Baltic	-1.5	-0.4	-2.4	-1.2	-1.4	-2.3	-1.2	-2.1	-1.3%p
Benelux	-2.0	-2.4	-0.5	-1.9	-1.7	-2.4	-1.9	-2.4	-2.6%p
CEEC ^a	-2.2	-1.7	-2.9	-0.3	-1.5	-2.4	-2.0	-2.7	-1.8%p
ClubMed ^b	-1.9	-2.2	-2.6	-1.9	-0.5	-2.0	-1.8	-1.5	-2.2%p
France	-2.2	-2.8	-2.2	-1.6	-1.2	-0.5	-1.7	-1.9	-2.1%p
Scandinavia	-1.8	-2.2	-3.2	-1.8	-1.7	-2.5	-0.8	-2.5	-2.0%p
UK&IRL	-3.0	-2.7	-4.4	-2.6	-3.0	-3.5	-3.4	-0.9	-3.5%p
Intra-EU share	-2.4%p	-1.5%p	-2.8%p	-1.1%p	-1.7%p	-2.2%p	-2.0%p	-3.3%p	

Note: The table shows bilateral changes in trade flows and value added transfers (in %) from deep TTIP. The diagonal describes changes in intra-national trade and/or in the trade volume within a region. The change in the share of intra-EU exports in column (9) and the share of intra-EU imports in the last row of each sub-table does not include intra-national trade.^a CEEC refers to the Central and Eastern European countries Bulgaria, Czech Republic, Croatia, Hungary, Poland, Romania, Slovakia, and Slovenia. ^b ClubMed is short for Cyprus, Greece, Italy, Malta, Portugal, and Spain.

in each others' markets, and in third countries.

Both gross flows and value added flows between EU members are bound to decline with the agreement. Quite strikingly, the rates of change in value added flows are larger (in absolute values) than the rates of change in gross trade flows. This is a strong indication that the transatlantic agreement will affect the structure of production networks: For example, rather than sourcing car parts from France, German car manufacturers will now increasingly turn to the US. While this is also reflected in smaller intermediate goods flows from France to Germany in gross terms, the fact that trade cost reductions and, therefore, the US's gains in trade shares, are particularly strong in the manufacturing sectors where foreign value added content shares are disproportionately large, implies that aggregate

intra-EU value added trade is more affected than aggregate gross trade flows.

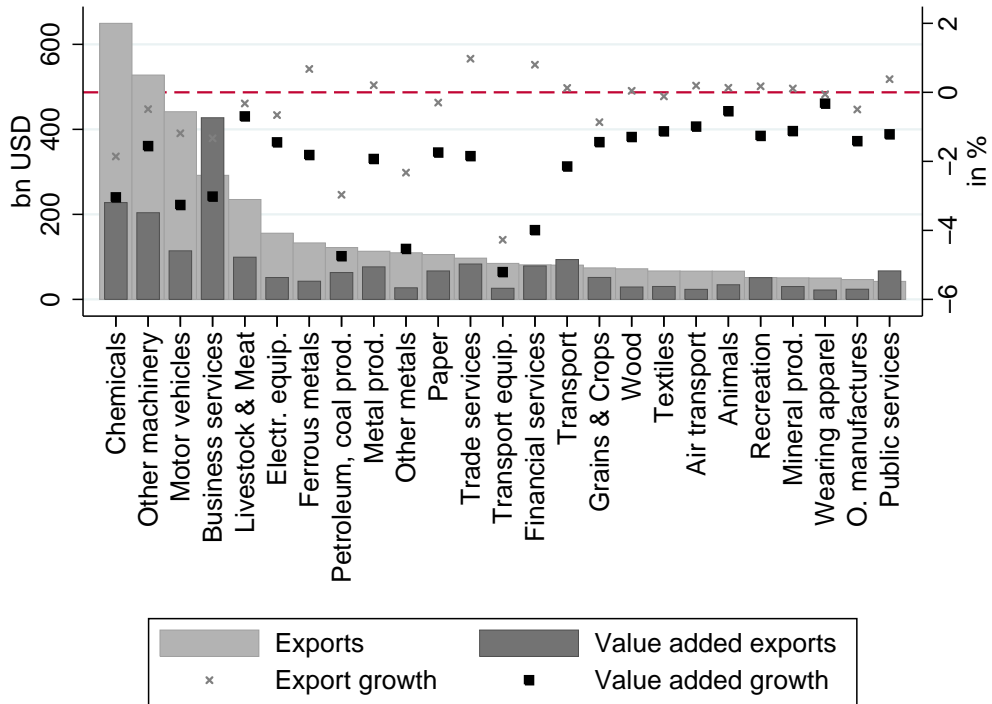
Interestingly, the entries on the diagonal (intranational trade) tend to be smaller in absolute value than the off-diagonal elements (international intra-EU trade) and the differences in growth rates between intranational gross and value added flows are much less pronounced. This reflects the relative importance of services in national value chains. Domestic trade shares in services are very high due to large trade barriers, and the potential reduction of these trade costs due to the TTIP are also relatively small. Hence, intranational trade is less affected by trade diversion.

The largest changes in bilateral gross trade flows are found between AUT&DEU and their trade partners, and between UK&IRL and their trade partners. Again, this has to do with those countries' position in the regional value chain.

Sectoral Impacts. Next, we dive more deeply into industry-level details. Figure 4 selects the 25 industries in the EU with the highest exports. The three most important industries are chemicals, other machinery, and motor vehicles, with intra-EU gross trade flows roughly worth of 600, 500, and 400 bn USD, respectively. Value added trade flows are substantially lower than gross flows, which is particularly visible in the automotive industry where the foreign value added share is fairly large. In these three industries, our simulations suggest that TTIP will reduce intra-EU gross trade by between 1% and 2%. As before, changes in the value added content of trade flows are much more pronounced. In the areas of chemicals and motor vehicles the changes are close to -3%.

The business services sector is the EU's fourth most important industry. Here, gross trade is smaller than value added trade because of the sector's upstreamness. Manufacturing output often contains a large share of services inputs, so that services are traded indirectly across EU borders. However, US providers of business services will gain market shares in Europe; and this will show up in the form of a 3% reduction in intra-EU transfers of value added.

Figure 4: Sectoral intra-EU trade changes with TTIP



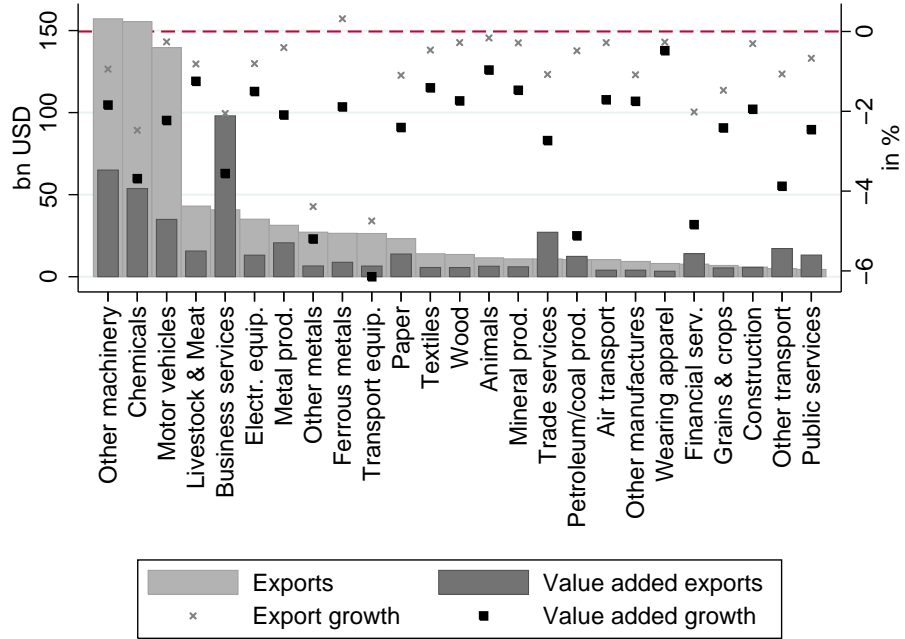
Note: The figure shows intra-EU sectoral exports and the corresponding sectoral value added exports (in bn USD, left scale). It also shows the expected changes thereof with a deep TTIP (in %, right scale). The figure only shows the EU's 25 most important sectors in terms of export values. Intra-EU trade refers to trade flows among the current 28 EU countries.

There are a number of industries where the effect of TTIP on intra-EU flows of gross trade is positive, but the effect on value added trade is negative. Gross trade of financial services is predicted to grow by about 1%, but the value added content of this trade is bound to fall by about 4%. The reason for this outcome is that the positive effect of TTIP on overall economic activity in the EU will increase the demand for financial services from London or Luxembourg, but the importance of European value added in these services flows will fall at the expense of US providers.¹⁰

Figure 5 repeats the same exercise for Germany. The ranking of sectors, the structure of TTIP-induced changes, and the comparison between gross and value added flows is

¹⁰In existing deep trade agreements, there have been substantial trade cost reductions in the financial sector. In the case of TTIP, however, the chances are high that the financial sector will be excluded altogether from the agreement.

Figure 5: Germany’s sectoral trade changes to other EU countries with TTIP



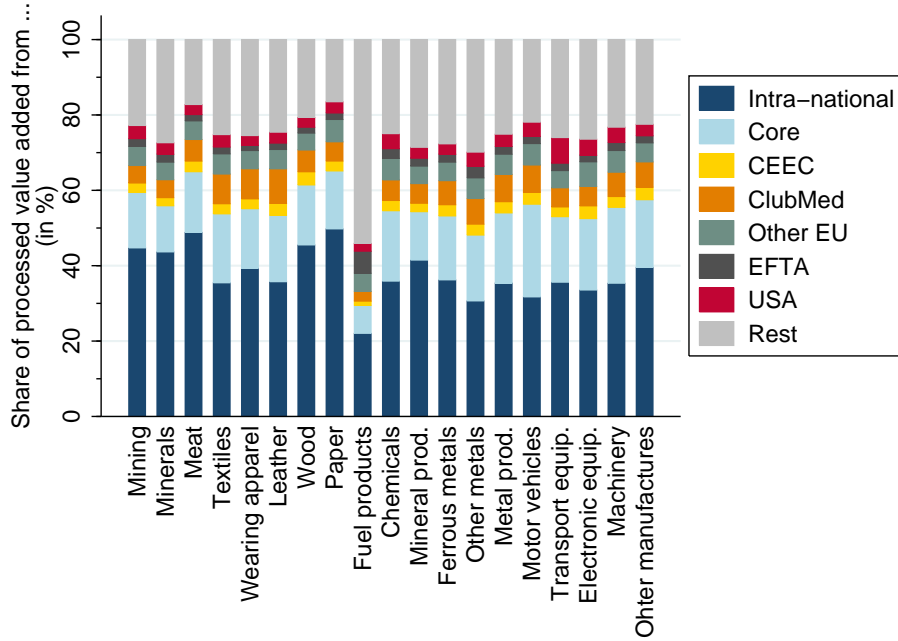
Note: The figure shows Germany’s sectoral exports and the corresponding sectoral value added exports to other EU countries (in bn USD, left scale). It also shows the expected changes thereof with a deep TTIP (in %, right scale). The figure only shows Germany’s 25 most important sectors in terms of export values.

broadly similar to what we find for the EU as a whole. One notable difference is that the German motor vehicles sector features only half the rate of reduction in both gross and value added intra-EU trade flows, reflecting the strength of the German supply networks in this area of activity. Eastern-European car parts producers have such a high degree of comparative advantage that the reduction of trade costs across the Atlantic affects their relative competitiveness only marginally.

3.4 European supply chain effects and production networks

Now, we turn our focus toward the effects of TTIP on the supply networks of European producers. For each sector in every region, we measure the share of value added sourced from a certain region for the production of final goods. That is, we consider a source region’s share in the total value added embodied in intermediate goods (“processed value

Figure 6: EU's supply networks in manufacturing



Note: The figure shows for each downstream manufacturing sector how much value added the EU28 processes from other regions (in % of the totally processed value added), summing over all upstream sectors. Intra-national refers to downstream value added that is processed in the same country. Core are Germany and its neighbors France, Belgium, Luxembourg, Netherlands, Denmark, Poland, and Czech Republic. CEEC are all Central and Eastern European countries in the EU excluding Poland and Czech Republic. ClubMed is short for Cyprus, Greece, Italy, Malta, Portugal, and Spain. EFTA are Iceland, Liechtenstein, Norway, and Switzerland. Other EU are Ireland, Finland, Sweden, and UK.

added”) that enters some other region’s sectoral production of final goods.¹¹

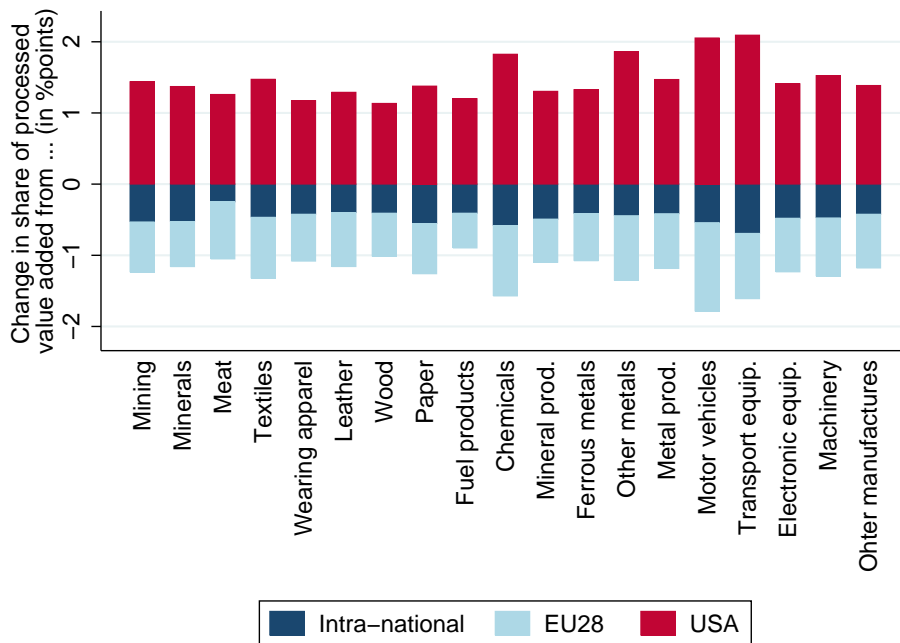
To illustrate the effects of TTIP on the structure of these supply networks, we describe the status quo in the data and illustrate the changes induced by a transatlantic trade agreement. We start with manufacturing and focus on the whole of Europe. Figure 6 shows that the largest share of value added contained in exports of European countries (to any other country) originates from the country in which the final production step takes place. On average, about 40% of upstream valued added falls into this category. The share is highest in industries which strongly rely on locally sourced raw materials, such as the paper or meat industries. It is lowest in industries which rely on imports of raw

¹¹See Aichele and Heiland (2014) for more details on the definition and computation of this network measure.

materials such as fuel products or metals. It is also relatively low in industries which are very strongly integrated into international production networks such as motor vehicles.

Industries differ significantly with respect to the share of processed value added imported from outside the EU (except from the US). Not surprisingly, this share is highest for fuel products. It is also relatively large for metals. Value added from the US does not play an important role in any of the industries. It exceeds 5% only in the transport equipment industry and is substantially lower in the other manufacturing sectors. In contrast, the share of processed value added originating from other EU countries is around 40% on average. Expectedly, the largest share originates from the core EU countries which also make up the largest part of EU GDP. For example, in the motor vehicles industry, value added imports from the core countries amount to almost 30% of total foreign-sourced value added.

Figure 7: Changes in EU's supply networks in manufacturing

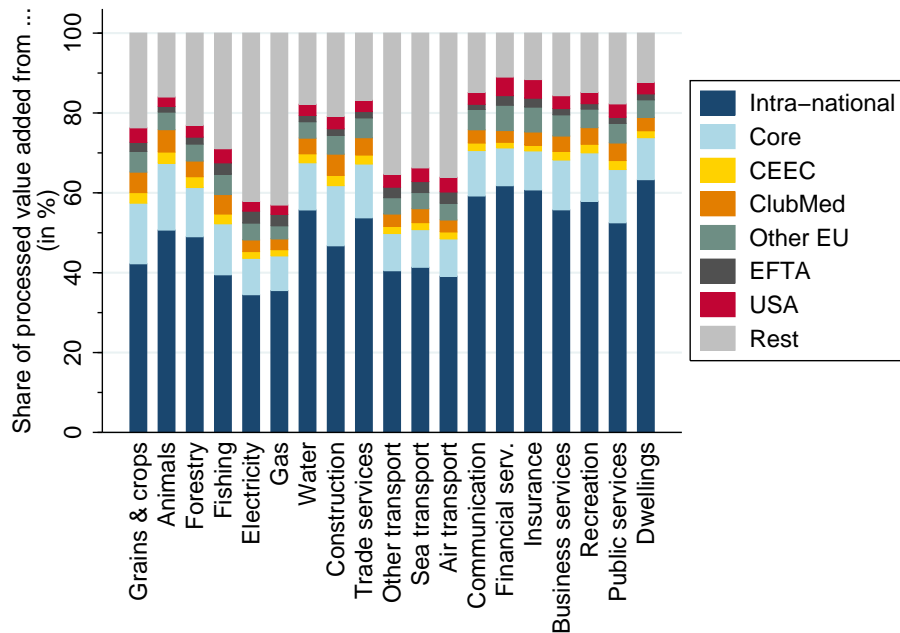


Note: The figure shows for each downstream manufacturing sector how the share of value added the EU28 processes from other regions summed over all upstream sectors changes with TTIP (in percentage points). Intra-national refers to the share of downstream value added that is processed in the same country. EU28 refers to downstream value added that is processed in other EU28 countries.

Figure 7 reports the simulated changes in the shares of value added sourced from different regions after the conclusion of TTIP. Across all 19 manufacturing industries, a common pattern emerges: The share of processed value added originating from the same EU countries in which the final production step takes place falls by about half a percentage point, the share of value added sourced from other EU countries falls by 0.5 and 1 percentage point. The US's share goes up by 1 to 2 percentage points. In all cases, the US gains more than the EU countries (including intra-national suppliers) lose. This reflects trade diversion pertaining to countries outside of TTIP.

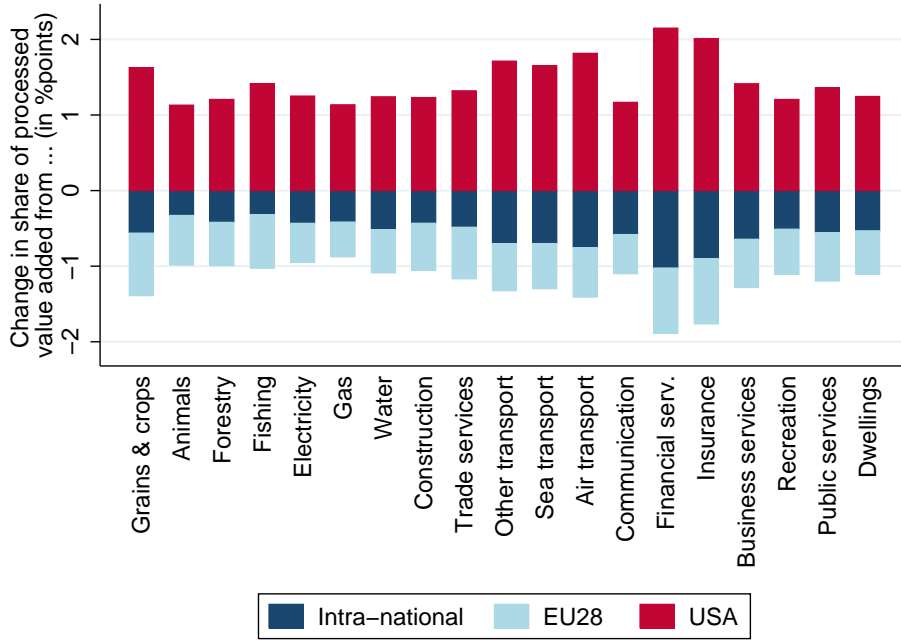
The industries experiencing the largest shifts are chemicals, motor vehicles, and transport equipment, where US suppliers gain about 2 percentage points, mostly at the expense of intra-EU suppliers. In the other metals industry, the US gains a similar share, but here third countries lose relatively more than in other areas.

Figure 8: EU's supply networks in agriculture and services



Note: The figure shows for each downstream agriculture and service sector how much value added the EU28 processes from other regions (in % of the totally processed value added), summing over all upstream sectors. Intra-national refers to downstream value added that is processed in the same country. Core are Germany and its neighbors France, Belgium, Luxembourg, Netherlands, Denmark, Poland, and Czech Republic. CEEC are all Central and Eastern European countries in the EU excluding Poland and Czech Republic. ClubMed is short for Cyprus, Greece, Italy, Malta, Portugal, and Spain. EFTA are Iceland, Liechtenstein, Norway, and Switzerland. Other EU are Ireland, Finland, Sweden, and UK.

Figure 9: Changes in EU’s supply networks in agriculture and services



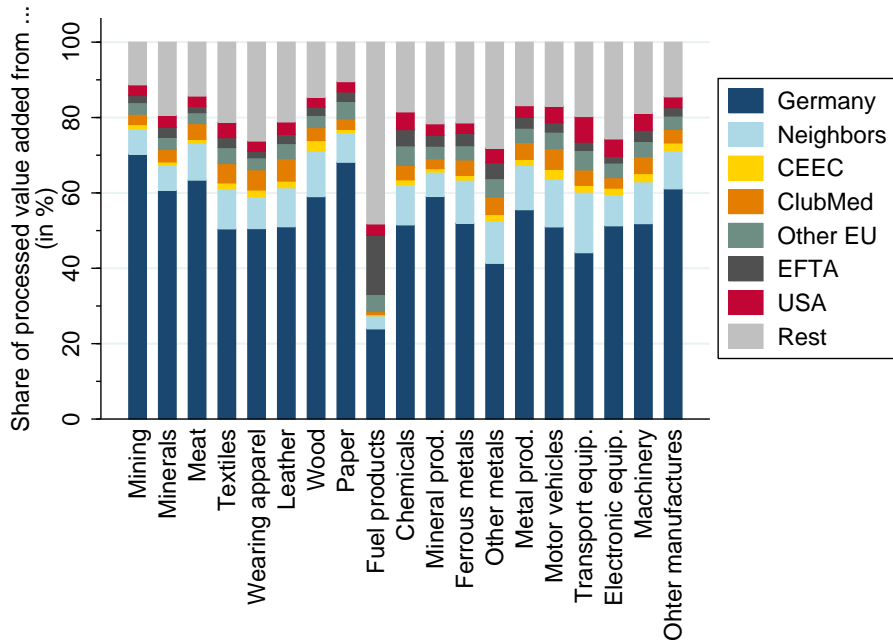
Note: The figure shows for each downstream agriculture and service sector how the share of value added Germany processes from other regions summed over all upstream sectors changes with TTIP (in percentage points). Intra-national refers to the share of downstream value added that is processed in the same country. EU28 refers to downstream value added that is processed in other EU28 countries.

Figures 8 and 9 provide similar illustrations for the EU agricultural and services industries. In many services industries, the share of domestic (intra-national) supply of value added exceeds 50%. Air, sea, and other transport services are exceptions. In those areas, suppliers from outside of Europe and the US play important roles since transportation services are often provided in connection to the international trade of final goods. For very different reasons, a similar pattern is visible in the energy sectors (electricity, gas), which rely on imported resources.

The simulations reveal that with TTIP the US could become substantially more important as a supplier of processed value added. This is most visible in the area of financial, insurance, and transportation services, as well as for grains & crops. As with the manufacturing industries, in both services and agricultural production increasing US shares are compensated for by decreasing shares of intra-national and other EU suppliers.

Finally, Figures 10, 11, 12, and 13 illustrate initial sourcing structures and their simulated changes due to TTIP for Germany. Figure 10 shows that German firms source substantial shares of processed value added from outside their country. This is particularly pronounced in the motor vehicles and other metals industries, where only about 40% of valued added embodied in supplies originates in the domestic economy. Other industries, for example, paper or other manufacturing, rely much more on domestic inputs. As in the broader European context, US suppliers are important in the transport equipment industry, but overall they play a minor role.

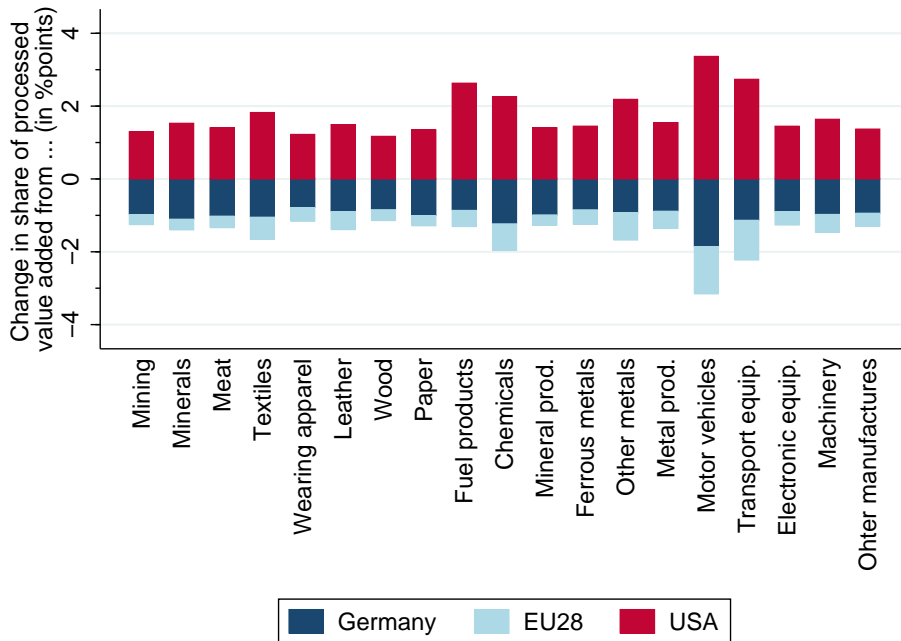
Figure 10: Germany's supply networks in manufacturing



Note: The figure shows for each downstream manufacturing sector how much value added the EU28 processes from other regions (in % of the totally processed value added), summing over all upstream sectors. Neighbors are France, Belgium, Luxembourg, Netherlands, Denmark, Poland, and Czech Republic. CEEC are all Central and Eastern European countries in the EU excluding Poland and Czech Republic. ClubMed is short for Cyprus, Greece, Italy, Malta, Portugal, and Spain. EFTA are Iceland, Liechtenstein, Norway, and Switzerland. Other EU are Ireland, Finland, Sweden, and UK.

Our simulations imply that TTIP will affect the German supply network most strongly in the area of motor vehicles, where the share of US supply increases by more than 3 percentage points. This gain comes mostly at the expense of domestic suppliers and to a much smaller extent at the expense of suppliers in other EU countries; see Figure 11. It

Figure 11: Changes in Germany's supply networks in manufacturing



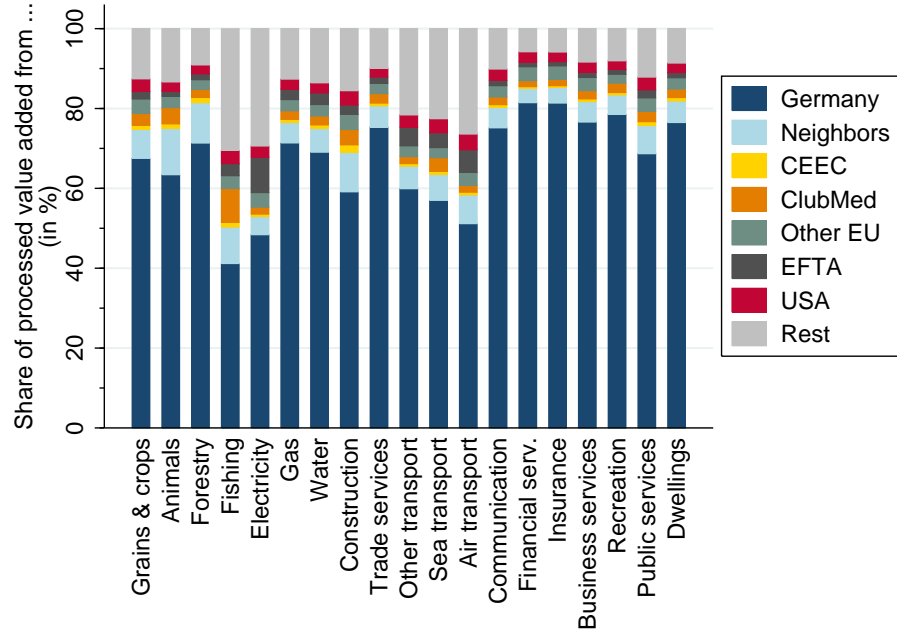
Note: The figure shows for each downstream manufacturing sector how the share of value added Germany processes from other regions summed over all upstream sectors changes with TTIP (in percentage points). EU28 are all EU member countries excluding Germany.

is interesting to compare this to the pattern of changes for the EU as a whole (Figure 7), where the adjustment fell mostly on suppliers from other EU countries. Germany differs from the EU aggregate, because of its relatively large interior market. For this reason, it is a relatively large supplier of inputs to itself, but also to other EU countries.

Turning to the agricultural and services industries, domestic sourcing dominates in all areas except fishing and electricity (Figure 12). The domestic value added share exceeds 80% in some service industries such as financial services or insurance. Across the board, US inputs account for no more than 5% of total processed value added. Suppliers from the rest of the world are most important in the areas of fishery, electricity, and transportation services.

Figure 13 illustrates the changes in the German sourcing structure in the agricultural and service industries that TTIP could bring about. The largest gains for suppliers from the US are to be found in the transportation industry, with US air transport experiencing

Figure 12: Germany's supply networks in agriculture and services



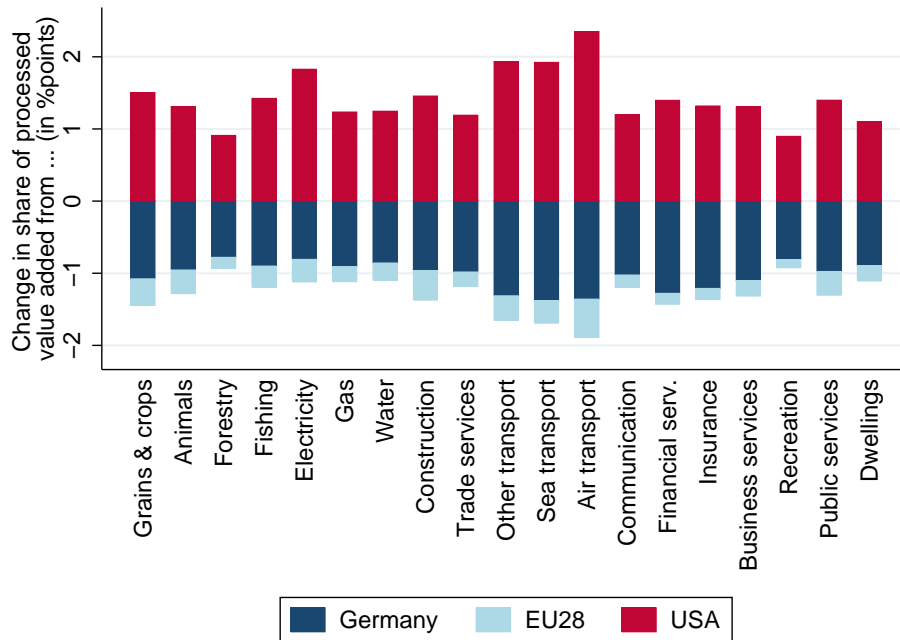
Note: The figure shows for each downstream agriculture and service sector how much value added Germany processes from other regions (in % of the totally processed value added), summing over all upstream sectors. Neighbors are France, Belgium, Luxembourg, Netherlands, Denmark, Poland, and Czech Republic. CEEC are all Central and Eastern European countries in the EU excluding Poland and Czech Republic. ClubMed is short for Cyprus, Greece, Italy, Malta, Portugal, and Spain. EFTA are Iceland, Liechtenstein, Norway, and Switzerland. Other EU are Ireland, Finland, Sweden, and UK.

a gain of more than 2 percentage points. Again, as seen for manufacturing, the US gains come largely at the expense of German suppliers. EU suppliers lose market share as well, but those losses always remain below 2 percentage points.

4 Conclusion

Many consecutive steps towards an integrated Europe, most prominently the customs union formation in 1969, the Single European Act of 1987, the creation of the European Monetary Union in 1999, and the Schengen Agreement in 1995, have contributed towards lowering trade costs within Europe. These steps have also yielded an important political dividend: By making European economies depend more strongly on each other, economic integration has increased the incentive for cooperation. Mutual dependence may also

Figure 13: Changes in Germany's supply networks in agriculture and services



Note: The figure shows for each downstream agriculture and service sector how the share of value added Germany processes from other regions summed over all upstream sectors changes with TTIP (in percentage points). EU28 are all EU member countries excluding Germany.

have instilled a feeling of solidarity which justifies substantial net payments of some of the richer countries into the central EU budget.

Since 2006 the EU has been pursuing an activist trade policy with the objective to contribute to growth and employment in Europe. It has singled out large trade partners such as the US, Japan, Mercosur, or India, and started to engage in trade negotiations with these countries. Clearly, the formation of trade agreements with large partners bears economic promise. However, as we argue in this paper, such agreements erode some of the trade preferences that EU countries have granted each other. Deep trade agreements with other countries will undo some of the intra-EU trade creation and weaken within-EU integration. On efficiency grounds, one can argue that these external agreements reduce the distortions that are inherent to preferential trade liberalization. However, one may also argue that relatively weaker trade ties amongst EU countries will have political economy repercussions in other areas of European politics.

One way to square the circle is to strike a balance between the deepening of intra-European economic relations and the conclusion of new agreements with third parties. It is well known that the single market is by no means completed (Marienello et al., 2015) and that intra-European borders still impose substantial barriers to the movement of goods, services, and people within the continent (Nitsch, 2000). If Europe wants to tap into the gains from trade promised by the formation of comprehensive trade agreements with third countries and keep centrifugal forces within the EU at bay, strategies to tackle the remaining intra-EU impediments will be crucial.

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