Under Debate

Rahel Aichele, Gabriel J. Felbermayr* and Inga Heiland

TTIP and Intra-European Trade: Boon or Bane?

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Abstract: The European Union is the world's 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. Deep trade integration and the resulting mutual dependence has, in the eyes of many, facilitated political integration. The Transatlantic Trade and Investment Partnership (TTIP) will undo some of these effects by means of preference erosion, so that cross-country trade links within Europe may lose relative prominence. However, the presence of a rich fabric of regional value chains in Europe and substantial income effects could counter this development. We provide insights on the empirical importance of these effects 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. However, there is substantial heterogeneity across sectors and countries. One way to minimize preference erosion would be to promote projects and programs to further deepen the EU's single market.

Keywords: TTIP, single market, European integration
JEL Classification: F13, F14, F17

***Corresponding author: Gabriel J. Felbermayr,** Ifo Institute – Leibniz Institute for Economic Research at the University of Munich, Ludwig-Maximilians-University Munich; CESifo, Poschingerstr. 5, 81679 München, Germany; GEP, Sir Clive Granger Building, University of Nottingham, University Park, Nottingham, NG7 2RD, UK, E-mail: Felbermayr@ifo.de
Rahel Aichele, Ifo Institute – Leibniz Institute for Economic Research, Center for International Economics, University of Munich, Poschingerstr. 5, 81679 München, Germany; CESifo, Poschingerstr. 5, 81679 München, Germany
Inga Heiland, Ifo Institute – Leibniz Institute for Economic Research at the University of Munich, Poschingerstr. 5, 81679 Munich, Germany; CESifo, Poschingerstr. 5, 81679 München, Germany

1 Motivation

> After experiencing political oppression and war in the first half of the twentieth century, Europe undertook to build a new order for peace, freedom, and prosperity. Despite its predominantly economic content, the European Union is an eminently political construct.
>
> Tommaso Padoa-Schioppa (2004)

> Through the consolidation of basic production and the institution of a new High Authority, whose decisions will bind France, Germany and the other countries that join, this proposal represents the first concrete step towards a European federation, imperative for the preservation of peace.
>
> French Minister of Foreign Affairs Robert Schumann (1950)

Schumann made the statement cited above shortly before the European Coal and Steel Community (ECSC) was founded in 1951 a crucial precedent for the European customs union and single market. Almost at the same time, Jacob Viner published his book "The Customs Union Issue", which provides a clear theoretical justification for the most favored nation clause contained in Art. 1 of the General Agreement on Tariffs and Trade (GATT) and which explains that customs unions (and other preferential trade agreements) need not be beneficial for insiders and disadvantage outsiders. By eliminating import tariffs amongst themselves, these agreements improve the price competitiveness of insiders the partner country, crowding out exports of outsiders. This trade diversion means that insiders may start importing from less efficient insiders instead of outsiders. Insiders lose tariff income, and outsiders suffer a deterioration of the terms of trade.

The US (and, to some degree the UK) welcomed European integration, despite it being potentially harmful for them. Part of the rationale for this reaction is commonly traced to the 'liberal peace hypothesis'. Deeper trade integration fosters political cooperation and reduces the likelihood of conflict; see Schrodt (2004) for a short survey and Martin et al. (2008) for an empirical analysis. A lot of time has gone by since the creation of the ECSC; in the EU of today, military conflicts seem all but impossible. However, recent years have shown that political ties within the Union may have been weaker than what many pundits had assumed: see the event of Brexit and lack of cooperation and solidarity in the debt or refugee crises.[1]

1 The empirical literature tests for a correlation between trade links and cooperation using military conflicts; however, the theoretical argument (e. g., as put forward by Martin et al. (2008)) applies for other (non-military) types of conflicts as well.

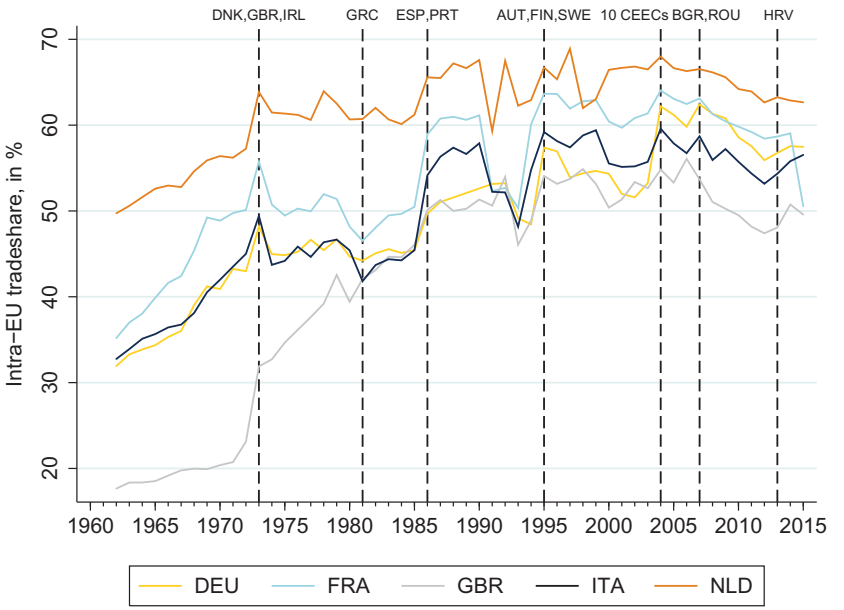

Figure 1: Intra-EU trade shares over time.
Note: Exports to plus imports from other EU members divided by total trade (exports plus imports). EU membership expands over time; vertical lines mark the timing of enlargements. CEEC denotes central and eastern European countries: Czech Republic, Cyprus, Estland, Hungary, Latvia, Lithuania, Malta, Poland, Slovak Republic, Slovenia. Trade data from UN Comtrade.

It may not be entirely unrelated that the intensity of European integration – as measured by the share of members' trade within the EU – has peaked in the mid 1990s and has been going down slowly but steadily since then; see Figure 1. The graph 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%.

From a Vinerian point of view, the falling intra-EU trade share is to be welcomed: as trade barriers with other countries fall, for example as a consequence of China's entry into the WTO, the discriminatory nature of EU integration

decreases. The value of preferences that insiders grant themselves is eroded, initial trade diversion effects are undone, and additional welfare gains are unlocked. However, this creeping trade reduction due to preference erosion[2] comes with a political cost as the trade ties binding European countries together become weaker.

For the first fifty years of its existence, Europe pursued preferential trade agreements with other countries either to prepare their future accession to the Community, or for political reasons, for example, to help stabilize neighboring countries in Northern Africa or the Middle East. Only in 2006 did the EU adopt explicitly economic objectives in its Global Europe Strategy.[3] The strategy does not mention the effects that agreements with third countries would have on intra-European political ties. The political costs are also largely missing from the current trade policy debate in Europe.

The European Union is currently negotiating free trade agreements with a large number of countries, most prominently the US (the Transatlantic Trade and Investment Partnership), Canada (CETA), 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. Ex post and ex ante analyses of these undertakings tend to show that they are indeed welfare-improving since the positive effects of trade creation outweigh the negative diversion effects. 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. (2015a), or Aichele et al. (2016) for an ex ante analysis of the proposed Transatlantic Trade and Investment Partnership (TTIP).

In this paper, we investigate the effects of a potential transatlantic trade agreement with the US on intra-EU trade. The price competitiveness of US firms in Europe will increase and allow them to crowd out European competitors. The value of trade preferences that European competitors enjoy in EU markets erodes. In turn, for the same reasons, European firms will gain market share in the US. TTIP undoes some of the problematic trade diversion which the creation of the European Single Market has necessarily generated. Thus, the expectation is that TTIP would indeed lower intra-EU trade shares due to preference erosion. This is an important driver of the welfare gains from TTIP.

2 We are thankful to a referee for suggesting this terminology.

3 In a communication, European Commission (2006) views the promotion of growth and employment as the central objectives of Europe's trade policy strategy.

However, there are a number of theoretical ambiguities: First, not all bilateral links will be similarly affected. It is possible that, for example, higher German car exports to the US lead to larger exports of car parts, say, from Slovakia to Germany. Moreover, it is possible that domestic (that is, e. g., intra-German) trade flows absorb the adjustment more than bilateral flows.[4] Second, gross trade (as recorded by conventional trade statistics) may change differently than the value added contained in those flows. Third, it is possible that intra-EU shares fall while the level of intra-EU trade does not. 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. To assess these possibilities, simulation of a quantitative trade model is required.

Existing literature on EU agreements with third parties has rarely looked into the details of intra-EU trade effects. Often, this issue is side-lined, as, for example, in the EU Commission's official study on TTIP by Francois et al. (2013) or in the analysis of Fontagne et al. (2013). Capaldo (2014) expresses concern about a possibly negative effect of TTIP on integration within Europe. However, he talks about trade policy without using a trade model, so he cannot discuss preference erosion effects. 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 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) and recently revised in Aichele et al. (2016). This model builds on the work of Caliendo and Parro (2015), which in turns generalizes the stochastic Ricardian trade model of Eaton and Kortum (2002) to many industries connected by domestic and international input-output linkages. Compared to the standard computable general equilibrium (CGE) models offered, for

4 Indeed, Yotov and Zylkin (2014) show econometrically that free trade agreements lead to trade diversion, and that diversion of trade away from the domestic market is stronger than from foreign countries whose relative trade costs do not change due to the FTA.

example, by the GTAP consortium (Hertel 1997) or CEPII (the MIRAGE model, Fontagne et al. (2013)), our framework falls into the class of New Quantitative Trade Models (NQTM; Costinot/Rodriguez-Clare (2014)): these are simpler models which require much less data, whose theoretical properties are well understood, and which can be structurally estimated.[5]

The policy scenario assumes that, besides eliminating tariffs, a transatlantic trade agreement lowers trade costs between the parties by as much as other deep trade agreements whose effects are already reflected in global pattern of trade. This counterfactual analysis is embedded into data for the year 2011, since more recent comprehensive data is not available. Therefore, we analyze potential effects, not forecasts (which would have to project the data forward to the date at which TTIP is fully operational and also take into account political feasibility constraints). Nonetheless, our methodology allows detecting structures which would presumably also prevail in other large-scale trade agreements of the EU.

Complementing other papers, 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 (2016). 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.

Recently, Krebs and Pflüger (2015) have also studied TTIP using a generalized version of the same model framework. These authors introduce land into the model, allow for labor mobility, and analyze regional effects within Germany. The policy scenario, however, differs from ours, as the authors propose a large interval of possible trade cost reductions. Carrere et al. (2015) also use a multi-sector Ricardian model to study the potential effects of TTIP; they introduce frictional unemployment but do not introduce intermediate inputs.[6]

Our simulation delivers a number of important insights. First, TTIP would indeed reduce EU countries' intra-EU trade shares; domestic trade is less severely affected than bilateral trade. Second, those shares would fall not only because

5 However, NQTMs have to impose more structure. For example, the market structure is assumed to be the same across all sectors.

6 Other studies on TTIP, such as Francois et al. (2013) or Fontagne et al. (2013) have used more conventional CGE tools where parameter estimation and theoretical modeling are not as closely intergrated as in NQTMs.

overall trade of EU members increases, but also because intra-EU trade flows fall in absolute value, at least in most cases. Hence, trade creation effects due to higher income do not suffice to overturn trade reduction 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 little to do with the integration effects 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. We do not address these concerns, but add another one: TTIP would very likely weaken political cohesion in Europe. However, one needs to be very clear about two points. First, from a purely economic point of view (and studied through the lens of a classical trade model), TTIP is clearly beneficial. Even if one could monetize the costs of weaker political integration, it is not clear whether these costs outweigh the benefits. Second, there are still important trade barriers within Europe which lower the degree of integration. Rather than complaining about preference erosion due to TTIP, it would be better to engage in policies aiming at undoing those barriers. This is all the more important as intra-EU trade shares are bound to fall, even if TTIP never materializes, since other big trade agreements and technological change continue to erode the value of EU trade preferences.

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. Section 4 provides some discussion of policy conclusions.

2 Methodology

We use a version of the stochastic Ricardian model developed by Caliendo and Parro (2015). This setup is probably the simplest large-scale NQTM which allows for rich international and domestic input-output linkages across many industries and countries. The model builds on Eaton and Kortum (2002) who have extended

the well-known Dornbusch-Fischer-Samuelson model of 1977 to many countries separated by geographical or political frictions. The trick is to employ a probabilistic formulation of technological heterogeneity. In each sector, there is a continuum of varieties; the efficiency to produce any such variety in any country is determined by a draw from a Frechet distribution. The locational parameters of these Frechet distributions differ across countries and sectors and pin down absolute advantage; their shape parameters, held constant across countries, govern the degree of heterogeneity in comparative advantages.

With these assumptions, the model gives rise to sectoral gravity equations which can be easily brought to bilateral trade data. In particular, using tariff data, one can estimate the shape parameters of the Frechet distribution (these turn out to be identical to conventional trade elasticities), and the treatment effects of existing free trade agreements (possibly of varying depth). Conveniently, the model 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 absolute advantage – drop out and need not be calibrated, which makes numerical implementation much easier and reduces errors due to mismeasurement. Assuming that production functions are Cobb-Douglas in labor and in various intermediate inputs, the cost shares implied by the model can be straight-forwardly matched with cost shares from conventional input-output tables. From which countries these inputs are sourced is determined by the model, as countries import only goods with the lowest prices (inclusive of trade costs).

Admittedly, this model is stylized. However, it shares its main characteristics with a broader class of NQTMs which give rise to a gravity equation, including the even more simplistic Armington model of national product differentiation used in the conventional CGE models and the Melitz (2003) model of heterogeneous firms; see Costinot and Rodriguez-Clare (2014). Conditional on observed changes in openness (and keeping central assumptions on preferences and production constant), these models even give identical welfare results. They give rise to different quantitative predictions in an ex ante framework like ours, but the structure of these predictions is very similar.[7]

7 Table 1 in Costinot and Rodriguez-Clare (2014) compares different models and shows that, for a sample of 40 countries, our model (perfect competition with multiple sectors and intermediate inputs) generates global gains from trade (27%) that lie in the upper middle of the range obtained from various setups (4% to 40%). In general, our Ricardian model generates only somewhat smaller welfare effects than a model with monopolistic competition and firm selection would (Felbermayr et al. 2015b). In particular, because productivity differences between the EU and the US are relatively small, we expect only relatively small welfare gains from TTIP.

The model features two types of trade costs: tariffs and resource-wasting iceberg trade costs. Reducing either by the same proportional amount changes the relative price competitiveness of countries in the same way; however, welfare effects are very different. The reason is that the reduction of iceberg costs leads to first-order effects due to resource savings; these effects are always positive even if terms of trade move against the liberalizing country, and they are proportional to the trade volume affected by the measure. Reducing tariffs, in contrast, yields no resource savings; they come together with redistribution from the government to consumers. Therefore, gains are of second-order; they can even be negative if tariffs are very low to start with (as negative terms-of-trade effects dominate beneficial efficiency gains).

Regardless of the exact microfoundation, trade cost reductions between a set of countries (the EU member states and the US) leads to higher trade costs between them (trade creation), but might divert their trade away from countries whose trade costs have not changed (trade diversion). When tariffs are small, trade diversion leads to little loss in tariff income, and the beneficial trade creation effects outweigh the detrimental diversion effects for the insiders and, typically, on the global level. How third parties are affected depends on whether they compete in similar sectors. If not, third countries benefit from higher incomes as demand for their goods from insiders to the FTA goes up (and their terms of trade improve). If they do compete, the negative trade diversion effects dominate (and their terms of trade fall).

The model is calibrated with data from the GTAP consortium. The data cover 140 countries and 38 sectors, including 13 services sectors.[8] It provides consistent input-output tables, sectoral value added and output data, and bilateral sectoral trade data for the base year 2011.[9]

3 Simulation results

3.1 The TTIP scenario

Our approach differs from other quantitative exercises on TTIP (for example, Francois et al., 2013, or Krebs and Pflüger, 2015) in that the definition of the scenario for the comparative statics analysis is data-driven: We exploit the gravity

8 Note 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.

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

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 to obtain reasonable expectations on the reduction of costs associated to NTMs. 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. We take estimates of these NTM cost reductions from Aichele et al. (2016). In our scenario, we also assume that all bilateral tariffs between the EU and the US are eliminated. Figure 2 shows the sectoral details.[10] 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.

Non-tariff barriers (NTBs) are assumed to fall as in other deep trade agreements. In the services sectors, the implied trade cost reductions vary mostly between 5 and 25%, in some manufacturing sectors they are more substantial. The variance in potential NTM cost reductions across sectors makes sense: Bottom-up estimates such as in Francois et al. (2013) and Egger et al. (2015) also report larger cost savings potentials in manufacturing than in services; within manufacturing the automotive sector (20%), wearing apparel (28%), and metals exhibit large effects while chemicals or machinery show relatively small ones. This is also in line with bottom-up studies. The large effect measured for ferrous metals is, however, an outlier.

Also, the estimates for agriculture and raw materials are somewhat problematic with relatively high variance and low NTB reduction potentials. Not all coefficients in Figure 2 are statistically different from zero at the 5% level. This is so for animals (where the coefficient also has a wrong sign), forestry, fishing, and mining.[11] These sectors account only for a small share of global trade.

10 The tariff changes in displayed in Figure 2 reflect sectoral averages of the changes faced by all TTIP countries. In the simulations, the US and the EU countries will be affected asymmetrically because of different external tariffs and because of different weights in the calculation of sector-level averages.

11 An open question in the literature is about how to deal with parameter uncertainty. In Aichele et al. (2016) we bootstrap confidence intervals for endogenous variables; however, these turn

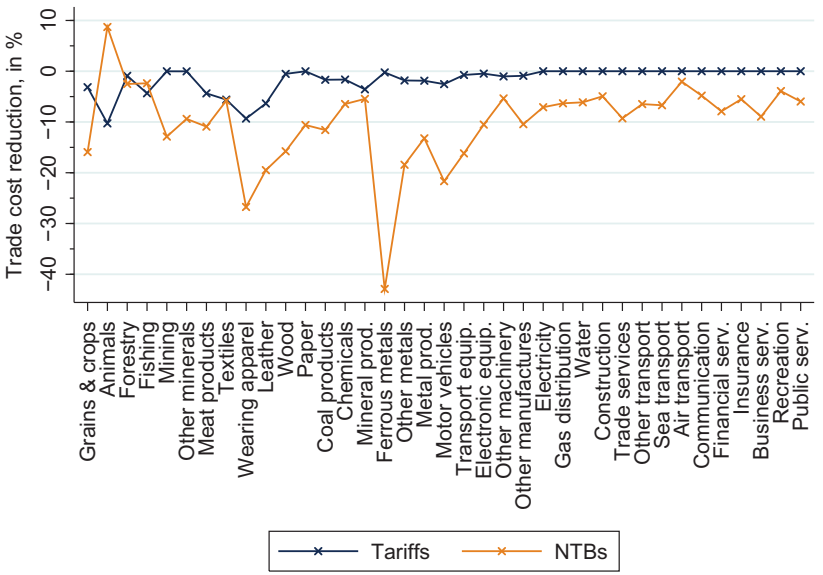

Figure 2: The TTIP scenario: average trade cost reductions across sectors, ad valorem trade cost equivalents.
Note: For each of the 38 sectors, the graph shows the import-weighted average sectoral tariff reduction (averaged across the US and the EU) and the sectoral reductions in non-tariff trade barrier 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.

Our ambition is to map the potential effects of TTIP on intra-EU trade; for this purpose, we find the top-down approach described above sensible, since it reflects experiences with existing FTAs and reveals cross-industry heterogeneity which is broadly plausible. Alternatively, we could have assumed some arbitrary cut in NTMs, or follow the bottom-up approach. It is important to notice that these choices would make little qualitative difference.

3.2 TTIP: macroeconomic effects

Before we move to intra-EU trade effects, we briefly comment on the macroeconomic effects of TTIP. 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

out to be relatively narrow. So, we follow Caliendo and Parro (2015) and simply use parameter estimates at face value.

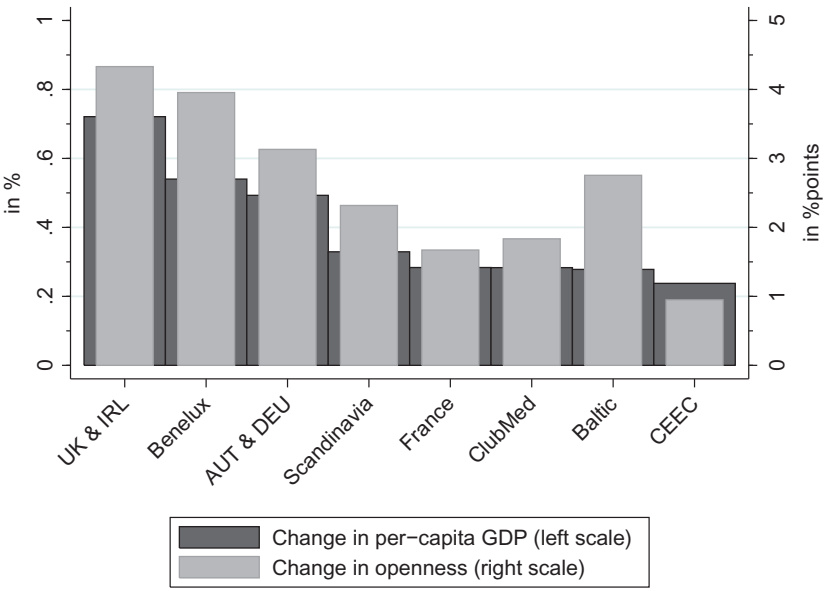

Figure 3: Effects of TTIP on real per capita income and openness.
Note: The figure shows population-weighted effects of a transatlantic trade and investment partnership on EU members. Openness is defined as the sum of exports and imports divided by two times GDP.

Krebs and Pflüger (2015).[12] In all countries (and, *a fortiori*, in all the aggregated regions shown in the Figure), openness goes up. Hence, trade creation effects between the EU and the US dominate trade diversion with third countries and preference erosion effects within the EU. This holds whether openness is calculated in terms of transaction values (as in the figure) or in terms of foreign value added absorbed domestically. In the absence of tariff income, an increase in the latter would be a sufficient and necessary condition for a preferential trade agreement to be welfare improving; see Arkolakis et al. (2012). In our context, the existence of tariff revenue effects complicates the picture, but since initial tariffs are low, their quantitative relevance is low, too; see Felbermayr et al. (2015b).

However, our simulation results suggest that all EU member states stand to benefit from TTIP, albeit at different amounts.[13] The strongest gains are to be

12 These results are smaller than in some of our earlier work (Aichele et al., 2014 or Felbermayr et al., 2015a). This is entirely due to a different calibration and a more modest scenario rather than to a different modeling strategy.

13 Note that this is not a necessary outcome, as terms of trade can move against member states such that they lose from the agreement despite resource savings from lower iceberg trade costs.

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 0.3% and 0.2%. As in Krebs and Pflüger (2015), countries with high initial trade shares benefit more strongly from TTIP as a larger share of their trade volume benefits from resource-saving trade cost reductions.

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 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 can be used to predict value added trade flows.[14]

Table 1 shows that 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 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. The more countries rely on international sourcing, the larger turns out the gap between gross and value added trade flows.

WTI (2016) show one single losing EU member: Malta. Krebs and Pflüger (2015) study regions within Germany; they find that all regions benefit. Again, this result is by no means automatic.

14 For more details on the computation of value added flows see Aichele and Heiland (2016).

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

Region	(1) AUT&DEU	(2) Baltic	(3) Benelux	(4) CEEC[a]	(5) ClubMed[b]	(6) France	(7) Scandinavia	(8) UK&IRL	(9) Intra-EU share
Exports (in bn USD) from ... to									
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%	
Value added transfers (in bn USD) from ... to									
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.

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. This implies that those countries 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 but two cells feature entries with negative signs.[15] 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 a reduction of trade due to 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 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, 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

15 BENELUX trade with CEEC and ClubMed countries is predicted to go up. This has to do with the role of entrepot trade in the Netherlands; value added trade between these pairs falls about as strongly as between other pairs.

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) Scandinavia	(8) UK&IRL	(9) Intra-EU share
Export growth (in %) from ... to									
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	
Growth of value added transfers (in %) from ... to									
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.

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 deeper 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

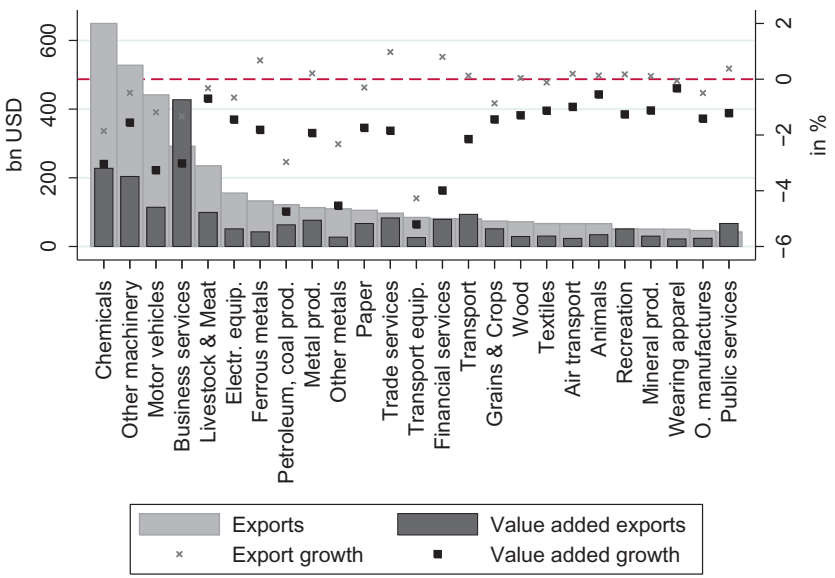

Figure 4: Sectoral intra-EU trade changes with TTIP.
Note: The figure shows intra-EU sectoral exports and the corresponding sectoral value added exports (in bn USD, left scale). It also shows the expected changes thereof with a deep TTIP (in %, right scale). The figure only shows the EU's 25 most important sectors in terms of export values. Intra-EU trade refers to trade flows among the current 28 EU countries.

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 these 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 from this sector.

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.[16]

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 added") that enters some other region's sectoral production of final goods.[17]

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 5 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

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

17 See Aichele and Heiland (2016) for more details on the definition and computation of this network measure.

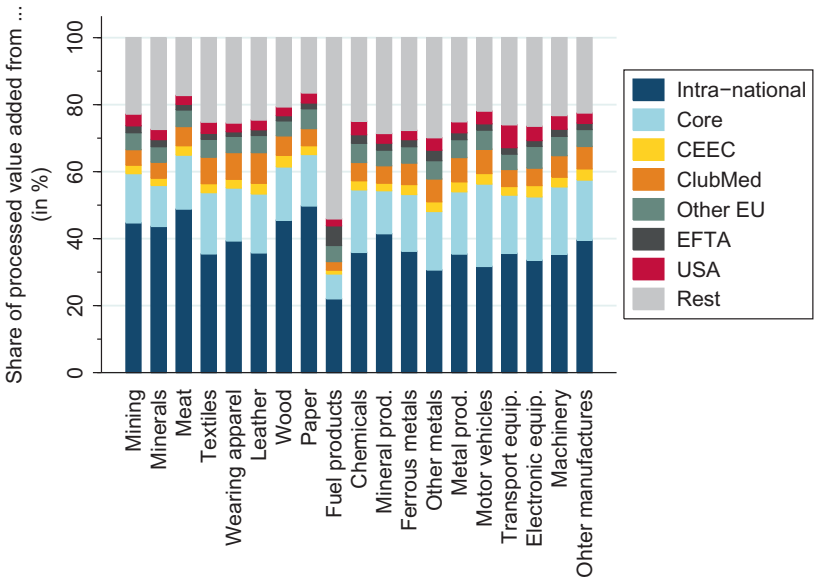

Figure 5: EU's supply networks in manufacturing.
Note: The figure shows for each downstream manufacturing sector how much value added the EU28 processes from other regions (in % of the totally processed value added), summing over all upstream sectors. Intra-national refers to downstream value added that 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.

rely on locally sourced raw materials, such as the paper or meat industries. It is lowest in industries which rely on imports of raw 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

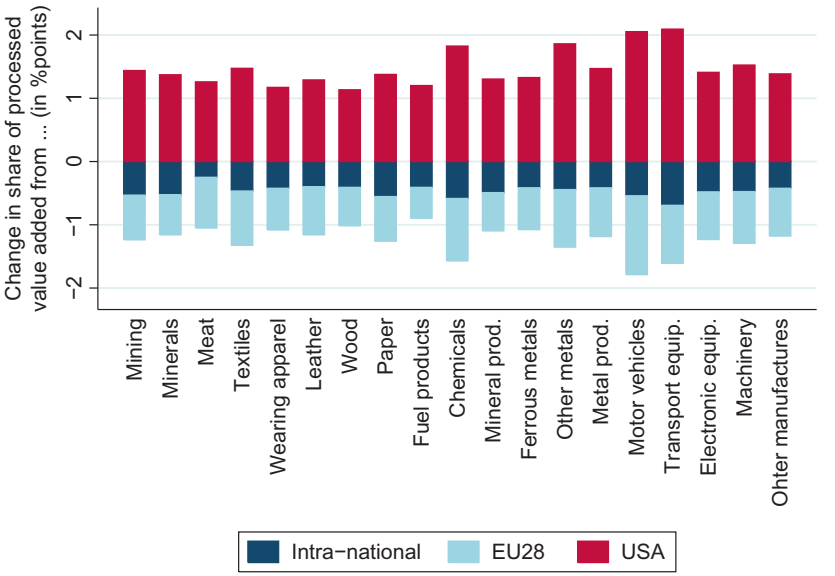

Figure 6: Changes in EU's supply networks in manufacturing.
Note: The figure shows for each downstream manufacturing sector how the share of value added the EU28 processes from other regions summed over all upstream sectors changes with TTIP (in percentage points). Intra-national refers to the share of downstream value added that is processed in the same country. EU28 refers to downstream value added that is processed in other EU28 countries.

from the core countries amount to almost 30% of total foreign-sourced value added.

Figure 6 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 to 1 percentage points. 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.

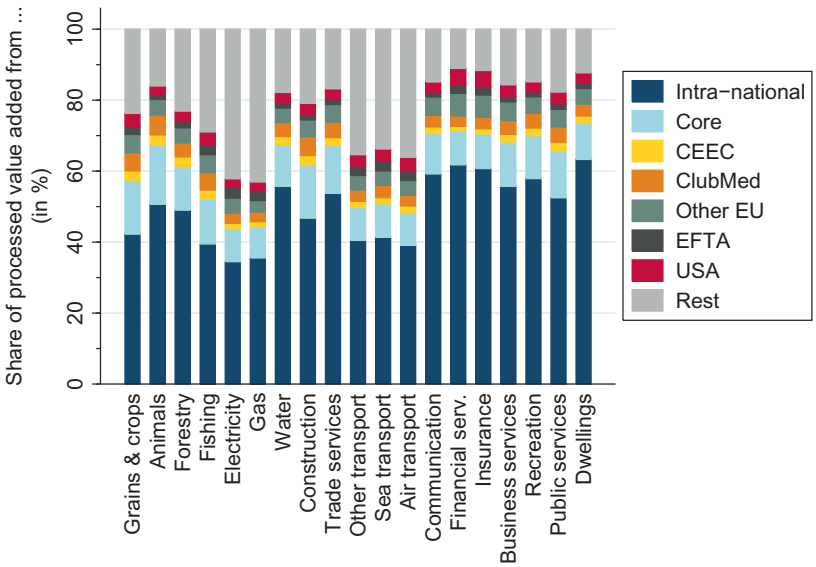

Figure 7: EU's supply networks in agriculture and services.
Note: The figure shows for each downstream agriculture and service sector how much value added the EU28 processes from other regions (in % of the totally processed value added), summing over all upstream sectors. Intra-national refers to downstream 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.

Figures 7 and 8 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 value added for final goods production in the EU. 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.

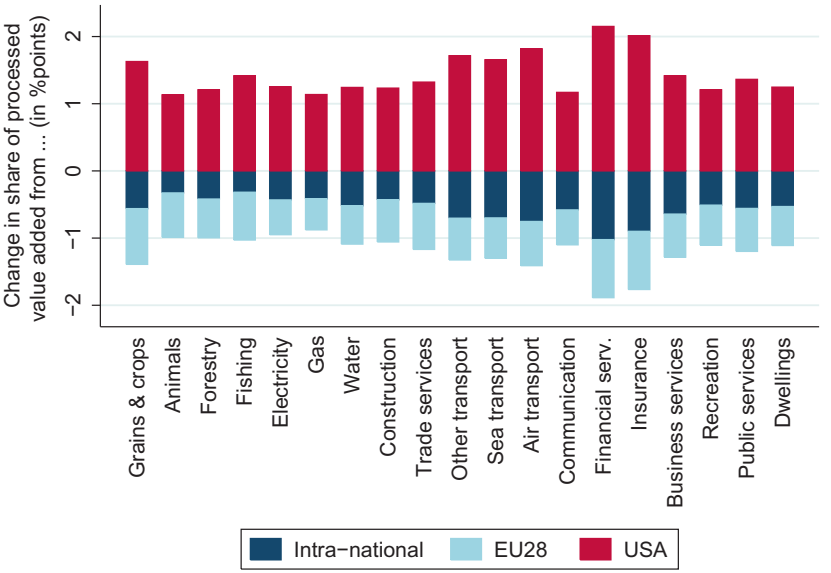

Figure 8: Changes in EU's supply networks in agriculture and services.
Note: The figure shows for each downstream agriculture and service sector how the share of value added Germany processes from other regions summed over all upstream sectors changes with TTIP (in percentage points). Intra-national 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.

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 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. 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.

There is strong empirical evidence providing support to the hypothesis that closer economic integration increases the likelihood of cooperation; see Martin et al. (2008) and Martin et al. (2012) for recent examples studying military conflict and Egger et al. (2011) and Egger et al. (2013) for the link between cooperation in trade and environmental questions. Also, a casual look at Europe lends credibility to this hypothesis: from the 1960s on, ever closer political union in Europe was accompanied by an increase in intra-EU trade; however, since about 1995 intra EU-trade is stalling or falling (for example, for the UK).

We do not wish to pretend that political integration is a function of trade integration alone. Labor market integration might actually lead to disunity, in particular when it involves low skilled individuals such as in the mass migration of Eastern Europeans to Britain from 2004 onwards, or in the current refugee crisis. Similarly, the European debt crisis and its handling has led to an erosion of trust and solidarity. We also do not deny that it is quite possible that megaregionals, such as TTIP, breed discord, as EU member states seem to have very heterogeneous preferences regarding their negotiation priorities and reservations. The latest Eurobarometer poll, for instance, suggests that majorities in Germany and in some of its neighboring countries (in particular in Austria) are strongly opposed to TTIP, while there are large majorities in favor, for example, in Scandinavia, or in Southern and Eastern Europe.

However, when countries depend less and less on their regional neighbors for their economic well-being, it is very likely that their incentives to make concessions in a regional political club such as the EU will not increase. As economies diversify their trade patterns away from Europe, their interest in Europe falls. It is well possible that increasing disunity amongst European countries in the last years is, amongst other things, driven by this phenomenon.

Given this diagnosis, it looks like a paradox that the European Union is actively pushing for ambitious trade deals with third countries. However, it is in a strategic dilemma: To remain attractive to member states and citizens, the EU has to foster a climate conducive to growth; trade deals are an instrument. At the same time, such deals necessarily weaken the degree of economic integration within the EU.

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). In 2014, the EU Parliament had commissioned a series of studies (summarized by Pataki (2014)) on the cost of Non-Europe. These document the consequences of market fragmentation and of the gaps and shortcomings in five areas: the free movement of goods, the free movement of services, public procurement, the digital economy, and the body of consumer law known as the consumer acquis. Reducing frictions in these areas could increase intra-EU trade by 5% to 10%, depending on the member state.

So, 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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