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Trade Policies and Integration of the Western Balkans

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Abstract

Based on a newly constructed multi-country input-output table including all European countries, we estimate the economic effects of the EU accession countries entering the 'Stabilisation and Association Agreement' (SAA) with the EU and the potential effects of joining the European Single Market applying a structural gravity framework. The results point towards strong positive effects on trade for the SAA countries, but only small effects for the EU Member States. Conducting a counterfactual analysis, the paper gives an indication of the magnitude of the positive impacts on GDP for these countries. In addition, a detailed industry breakdown of these effects is provided.

Keywords: structural gravity, modelling, EU accession, Western Balkans, multi-country input-output table

JEL classification: C54, C55, C67, F13, F14, F15, F17

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1 Introduction

This paper draws on a newly constructed multi-country input-output database that - for the first time - includes *all European countries* to investigate the effects of wider EU integration. More exactly, the economic effects of the (i) "Stabilisation and Association Agreements" (SAA) that the EU signed with the Western Balkan countries Albania, Bosnia & Herzegowina and Montenegro and Serbia and (ii) the effects of the EU membership of Romania, Bulgaria and Croatia are analysed. The database provides a balanced panel of 50 countries (of which 39 European countries when including Russia and Turkey) plus eleven other major economies over the period 2005 to 2014.

In line with the recent literature we apply a structural gravity model to assess the effects of trade integration with the EU for these countries. Using a multi-country input-output database for gravity estimation has a number of advantages: First, trade flows are balanced, which means that the reported exports by A to B are always equal to the reported imports of B from A. This is rarely the case in trade databases (such as UN COMTRADE). Second, an input-output database provides consistent information on intra-country flows which is recommended to be included in the gravity estimations. Third, the data allows for separate estimation by industries, as well as for final demand and intermediate input trade flows. Finally, fourth, the data not only allows us to analyse gross aggregate trade flows, but also flows in value added terms.

The results point towards positive effects of SAAs and EU membership for the countries under investigation. The effects of signing an SAA with the EU are, however, substantially higher than the effects from joining the EU. The largest positive effects of SAAs can be found in the agricultural sector and low-tech manufacturing sectors (the sectors where these countries have a revealed comparative advantage). The effects of joining the EU (i.e. entering the European Single Market) are more diverse: The largest beneficiaries are again the agricultural sectors, but also the high-tech manufacturing sectors gain.

The paper is structured as follows: The next section provides a short review of the relevant literature. Section 3 then introduces the econometric approach as well as an overview of the data used in the analysis. Section 4 gives an overview of the regression results and Section 5 provides the details of the counterfactual analysis. Section 6 concludes. In the Appendix technical details on data, methods and results are provided.

2 Literature Review

2.1 Gravity Model

Methodologically, the paper follows the recent strand of literature which started with Anderson and Van Wincoop (2003). They introduced the concept of "multilateral resistances" which solved the econometric problem that trade between two nations depends not only on the distance (or trade friction) between the two nations, but also on the distances to other nations. Furthermore, they popularised the idea that these multilateral resistances can be estimated using exporter-time and importer-time fixed effects.

Silva and Tenreyro (2006) showed that the gravity estimates are biased when using ordinary least squares and suggested estimating the equation with Poisson pseudo-maximum likelihood (PPML) instead. Recently, Fally (2015) argued that estimating a gravity specification with exporter-time and importer-time fixed effects using PPML has the additional advantage of being immediately consistent with the multilateral resistances from theory and the equilibrium constraints they entail.

Baier and Bergstrand (2007) stressed the importance of controlling for the endogeneity of FTAs. Their recommendation to use country-pair fixed effects is now standard practice in the empirical implementation. P. H. Egger and Nigai (2015) reiterate this point by arguing that trade costs are best accounted for by asymmetric pair fixed effects. They demonstrate that – using simulations – pair fixed effects lead to substantially less biased coefficients compared to empirical specifications which use a parameterised function for trade costs (such as bilateral distance, common language, etc).

Larch, Wanner, Yotov, and Zylkin (2017) re-asses the effect of a currency union (not to be confused with custom union, which is also sometimes abbreviated with "CU") using data on trade flows from more than 200 countries over 65 years. They rely on a "full set" of fixed effects, i.e., exporter-time, importer-time and pair fixed effects. Using the recommended PPML estimator for this exercise, they find that currency unions, in general, have a large positive and significant effect, *except* the European Monetary Union (EMU). The effect of the EMU is small, though positive, however insignificant (when using the recommended clustered standard errors). Though they analyse the effects of the EMU, their result is indicative for our case looking at the effects of a European customs union as done in this paper.

Finally, Anderson, Larch, and Yotov (2015) show how the structural gravity framework can be employed for counterfactual analysis, using iterations of constraint regressions. In section 5 we follow their recommendations when we estimate scenarios of EU accession for the Western Balkan countries.

So, the recommendations about how to estimate the gravity equation are quite clear: use exporter-time and importer-time fixed effects to account for the multilateral resistances and use (asymmetric) pair fixed effects to take care of the bilateral trade costs. Trade policy variables are bilateral and time-varying and can be additionally included in the estimation. The findings and best practices of this research area were summarised comprehensively in the "Advanced Guide to Trade Policy Analysis: The Structural Gravity Model" by Yotov, Piermartini, Monteiro, and Larch (2016).

2.2 Stabilisation and Association Agreements

This paper particularly considers the potential economic effects of the EU "Stabilisation and Association Agreements" (SAA). These are signed by countries that are candidates to join the European Union (EU). Before signing such a SAA, the "Stabilisation and Agreement Process" needs to be passed. This process aims at initiating reforms that contribute to stability and the democratic development and will eventually lead to EU membership.

The literature on the economic effects of the SAA is rather scarce and most of the contributions focus on particular countries. For example, Zahariadis (2007) using the GTAP model estimates that the Stabilisation and Assocation Process could bring an increase in GDP of as much as 1.5% in Albania. He proposes that even 2% could be possible, if Albania would fully implement all EU legislation on trade related standards and modernise all custom administration.

Pula (2014) provides an overview concerning the impacts on various countries and draws conclusions for Kosovo. Monastiriotis, Kallioras, and Petrakos (2014) study the impact of pre-accession agreements in Central and Eastern European countries and argue that such agreements accelerate growth, though highly unevenly across regions. Based on these results they derive similar conclusions on the new European Neighbourhood Policy (ENP) framework.

Sebastian (2008) is more cautious and raises questions if the current Western Balkan candidate countries are able to fulfill the required reforms and if the EU's policies were adequate. She concludes that the "lack of clear benchmarks, the EU's divisions, and the uncertainty around the SAP" may "have diminished the effectiveness of EU inducements".

This paper contributes to this literature providing evidence from a cross-country perspective based on the newly created multi-country input-output database and applying a structural gravity modelling approach.

3 Estimation strategy and data

3.1 Gravity equation approach

To assess impacts of SAA and EU accession we apply a gravity model to bilateral international trade flows which allows us to capture the effects of various trade policy measures on these flows. These equations can be derived from several different angles, from supply side or from demand side oriented models as neatly summarised in Head (2014) or Yotov et al. (2016). These contributions provide an overview over the possible theoretical underpinnings of the gravity equation as well as practical guidelines for estimation and trade policy analysis.

Specifically, we employ a “standard” formulation[1] of the gravity equation:

$$X_{ij,t} = \exp\Big[\pi_{i,t} + \chi_{j,t} + \mu_{ij} + \beta_1 \text{FTA}_{ij,t} + \beta_2 \text{SAA}_{ij,t} + \beta_3 \text{EFTA}_{ij,t} + \beta_4 \text{CU}_{ij,t} + \beta_\tau \tilde{\tau}_{ij,t}\Big] \times \epsilon_{ij} \qquad (1)$$

where i and j are the exporter and importer indices and t is a time index. The dependent variable $X_{ij,t}$ denotes either gross exports or value-added exports between the exporter and the importer.

Country-pair fixed effects are denoted by μ_{ij}. We also include a set of exporter-time and importer-time fixed effects given by $\pi_{i,t}$ and $\chi_{j,t}$. For capturing trade policy effects two sets of variables are included: First, $\tilde{\tau}_{ij,t}$ denotes bilateral tariffs. Second, the four variables $\text{FTA}_{ij,t}$, $\text{SAA}_{ij,t}$, $\text{EFTA}_{ij,t}$ and $\text{CU}_{ij,t}$ capture whether a free trade agreement (FTA), a “Stabilisation and Assocation Agreement” (SAA), a free trade agreement with a EFTA member (EFTA) or a customs union (CU) exists between the two countries i and j at time t.

Equation (1) is the recommended specification by Yotov et al. (2016) as the country-time fixed effects control for any unobservable multilateral resistances. Additionally, the pair fixed effects take care of potential endogenous trade policy as stressed by Baier and Bergstrand (2007).

[1] For the interested reader we provide results for another formulation of the gravity model, one using economic mass variables instead of fixed effects, in part C in the appendix.

This gravity equation is estimated at the national but also industry level as well as for final demand and intermediate trade flows. Estimating equation (1) at the industry level (or for demand components) is, due to the so-called "separability" property of structural gravity models, analogous to estimating the equation at the country level.

3.2 Data

3.2.1 Country sample and time period

The data on gross exports and value added exports are based on multi-country input-output tables (MC-IOTs) that include all European countries (except Kosovo and Belarus) together with a couple of other major economies in the world. We refer to this database as the "wiiw Wider Europe Multi-Country Input-Output Database". It contains 50 countries and 32 industries and comprises the period 2005-2014.

This database resulted from an effort to provide data for a larger set of countries as so far available in the World-Input-Output Database (WIOD); see Timmer, Dietzenbacher, Los, Stehrer, and Vries (2015) and the recent WIOD release 2016 documented in Timmer, Los, Stehrer, and de Vries (2016). In particular this effort aimed at including all European countries to be able to capture production linkages between all European countries. At this stage all EU-28 countries together with the non-EU European countries Iceland, Norway, Switzerland, the five Western Balkan countries (Albania, Bosnia & Herzegovina, Former Yugoslav Republic of Macedonia (Macedonia hereafter), Montenegro and Serbia), Russia, Turkey and Ukraine are included.[2] Additionally, the data covers the biggest non-European economies, such as Australia, Brazil, Canada, China, India, Indonesia, Japan, Mexico, South Korea, Taiwan, the United States of America. The Input-Output database furthermore includes a Rest-of-the-World region, which however is not used in the gravity estimations.

These MC-IOTs have been constructed similarly to the approach used for the World Input-Output Database as documented in Timmer et al. (2015) and the recent update which has been undertaken Timmer et al. (2016). For most European countries a full set of supply and use tables has been available for at least one year according to ESA2010 (SNA2008) methodology. Particularly, most countries now also provide use tables in basic prices as well as import use tables. Concerning the EU-28 countries, import use tables were however missing for Germany, Latvia and Luxembourg while for Greece, Netherlands and Spain no valuation matrices have been available (i.e. the use tables are only provided in

[2] Unfortunately, Kosovo and Belarus are still missing from a full coverage of all European countries due to severe data constraints.

purchaser's prices) and therefore also no import use matrices are reported. In these cases import use tables have been constructed according to WIOD methodology. Concerning the European non-EU Member States decent data have been available for Norway and Switzerland. Iceland's supply and use tables are benchmarked on Norway's tables. For the Western Balkan countries data for Albania and Macedonia could be collected; however, import use tables have not been available. For Bosnia & Herzegovina and Serbia the tables from Macedonia have been used as a benchmark. Similarly, we use the Croatian supply and use tables for Montenegro and the Polish tables for Ukraine as a benchmark. Supply and use tables for the remaining non-European countries have been taken from the WIOD release 2016.

To arrive at a proper time series the supply and use tables have been benchmarked to official National Accounts data which have generally been available for all countries (though some slight adjustments had to be made in some cases at the industry level). However, data availability forced us to aggregate to 32 industries, as more detailed data on services industries have been missing for a number of European non-EU countries. There are further some distinct differences between the construction process of our database and that of the WIOD (release 2016) which are reported in detail in the Appendix A).[3] The most important difference is that we use import use tables in the construction process to the extent available which has implications for the size of re-exports and the size of gross export flows reported in the MC-IOTs. In particular, the levels of re-exports have been calculated based on the information provided in the export column of the import use tables.[4]

A second difference exists concerning the calculation of domestic transport margins on exports which in this case have been assumed to be zero.[5]

Third, bilateral trade flows might differ because the RAS-procedure which has to be applied to balance trade flows and reconcile them with values from the global supply and use tables start from a different set of benchmark values. Finally, the construction of the rest-of-world category has been undertaken in a different manner. In particular, the strategy was that we calculate a consistent supply and use system for the rest-of-world. Only after this step, the

[3] It should be noted that in this effort the construction process for all European countries differ from the WIOD approach though the same method has been applied for all countries. For the non-European countries WIOD Release 2016 data have been taken.

[4] In the WIOD Release 2016 re-exports have been calculated as the difference between imports and total use in case the total use is smaller than imports. The figures provided in the import use tables however show that re-exports take a much larger amount. As re-exports vanish from the system in the way the international use tables are calculated the level of gross trade flows tends to be lower. It should however be noted that this does not impact on the share of value added exports in GDP or the domestic and foreign content of exports.

[5] In In the WIOD Release 2016 part of the domestic transport margins have been allocated to exports therefore reducing the level of exports.

global supply and use tables are transformed to an global input-output tables by assuming an fixed product sales structure (called "Model D").[6]

3.2.2 Inter- and intranational trade flows

In the estimation, we use two types of dependent variables: First, as usually done, bilateral gross trade flows are investigated. Secondly, the MC-IOTs allow us to take bilateral value added exports as a dependent variable. These are computed according to Johnson and Noguera (2012); see Stehrer (2012) for an explanation of the calculation of value-added exports. This allows us to investigate if bilateral value added trade flows behave differently compared to the gross trade flows.

Yotov et al. (2016) argue that the inclusion of *intra*-national trade flows is a very important condition to arrive at unbiased gravity estimates. Fortunately, these can be extracted from the the intra- and international trade flows of *both* the gross exports and the value-added exports on *sectoral* level from the "wiiw Wider Europe Multi-Country Input-Output database". The intra-national value added flow is simply the total produced value added minus the sum of all value added exports.

3.2.3 Trade agreements

Data capturing free trade agreements and custom unions are taken from Mario Larch's database of regional trade agreements (see P. Egger and Larch (2008)). Because we already include bilateral fixed effects, bilateral trade agreements that are in effect over the whole time period (in our case 2005 to 2014) are deleted from the database to avoid collinearity. For example, the effect of the custom union between Austria and Germany is already subsumed in the bilateral dummy of Austria and Germany.

There are in total five countries in our sample that initiated trade agreements between 2005 and 2014. The first four countries are Albania, Bosnia & Herzegowina and Montenegro and Serbia. They signed "Stabilisation and Association Agreements" (SAA) with the members of the European Union and – more or less at the same time – free trade agreements with the EFTA states[7]. Table 1[8] gives an overview of the dates of these agreements for the countries of our interest.

[6] In the WIOD release Model D is applied to all countries in the database; then in a second step the IOT of the rest-of-world is calibrated. See Eurostat (2008) for a detailed explanation of the "Model D" the transformation of supply and use tables to a symmetric input-output table.

[7] Iceland, Norway and Switzerland. Liechtenstein is also a member of EFTA, but not in our country sample.

[8] "IA" stands for "Interim Agreement".

An SAA is usually implemented by a potential EU accession candidate in which it commits to certain political and economical reforms. We separate SAA and EFTA free trade agreements in our analysis into an SAA and an EFTA dummy as they may have different effects.

Table 1: Summary of SAA process

Country	SAA/IA signed	SAA/IA in force	SAA in force	EFTA signed
Albania	2006	2006	2009	2010
Bosnia & Herzegowina	2008	2008	2015	2015
Montenegro	2007	2008	2010	2012
Serbia	2008	2010	2013	2010

Source: Author's elaboration.

We use the year the SAA/IA came into force as the starting point and calculate economic effects from then on. In the Appendix section C.2 results when using other starting dates are reported.

The fifth country that was actively signing free trade agreements during the observed time period is South Korea. It signed FTAs with the EU and the EFTA countries, as well as one with Australia and one with the USA (called "KORUS FTA"). These agreements will be captured in the FTA dummy. Here, however, we will not differentiate between EU, EFTA, Australia or USA as signing partner. All of these agreements will be captured by the same FTA dummy.

Bulgaria and Romania's accession in 2007 and Croatia in 2013 to the EU and thus to the European Single Market is counted as a an entry to a customs union (CU), thus the coefficient of the CU dummy will capture the effect the EU accession had on those countries[9].

The regional trade agreements database covers two more types of agreements: "Partial scope" and economic integration agreements. Partial scope agreements proved to be highly collinear and economic integration agreements had only a negligible effect in all tested regressions. So we excluded them for ease of presentation.

3.2.4 Tariffs

Tariff data are taken from the WTO Trains[10] and are reported according to the harmonised system (HS) six digit level. To be able to use the tariff data in conjunction with our industry or national level data, the tariff data are aggregated to the corresponding industries.

[9]These countries had an SAA with the EU before becoming EU members themselves. However, since we are interested in the effect of their entry to the European Single market, we set the SAA dummy for these countries to 0. If we were to keep the SAA dummy, we would run in collinearity problems, as the SAA dummy together with the EU dummy would coincide – in sum – with the bilateral pair dummy.

[10]This database can be accessed through WITS at `http://wits.worldbank.org/`

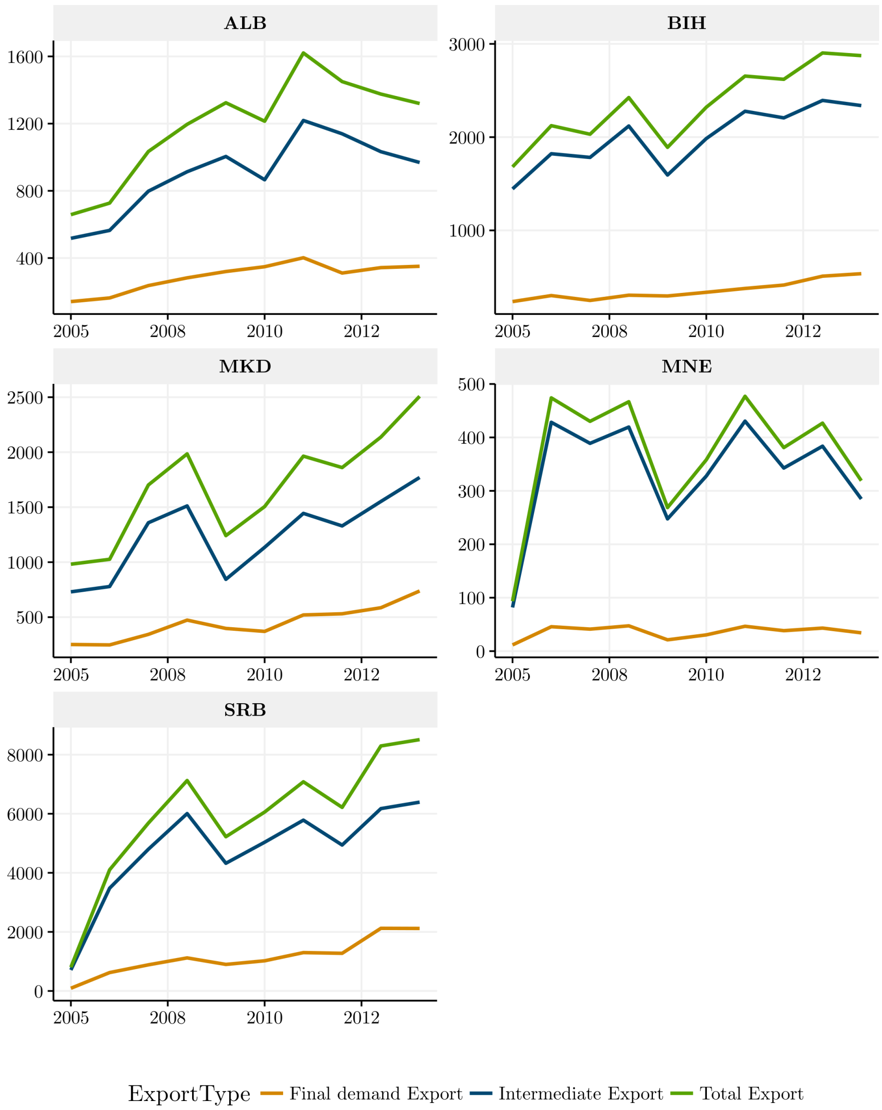
It is, however, not fully clear what the best way of aggregation is: One could simply use the arithmetic mean of tariffs over all HS codes. This may lead to misleading and arbitrary results, since all products have the same weight in this procedure, irrespective of their importance in the bilateral trade flow. The second option, aggregation by weighted means, has a similar caveat: Since tariffs influence the trade flows quantitatively, products with high tariffs will have lower trade volumes and thus also lower weights[11]. Bouët, Decreux, Fontagné, Jean, and Laborde (2004) recommend to use a "reference group weighted method" to aggregate tariffs: This method assigns a given importer country X to a reference group and uses then the exports of the trade partner country Y to the reference group of X as weights in the aggregation. See Bouët et al. (2004) for a more thorough treatment of the issue.

We observe, however, no big (systematic) differences in the aggregated tariffs. All three types of aggregated tariffs follow the same path over time and are already very low at the beginning of our observed period. Thus it comes as no surprise that the results in the gravity estimation do not differ much between the three types of tariffs. For this reason and for easier interpretation we only report results with the weighted tariffs[12].

[11]It is revealing to think of two extreme cases: One, where there is a tariff so high that it completely inhibits trade (and there is no trade of that product). Secondly, a situation where there is no tariff at all but the traded quantity is huge. In both cases, the contribution of that product to the aggregated tariff will be 0.

[12]Results with the mean tariff and reference group weighted tariffs are given in the Appendix in section C.1.

Figure 1: Export growth of Westbalkan countries with the EU28, by type of export



4 Gravity estimation

Following Silva and Tenreyro (2006) and Silva and Tenreyro (2011) we apply the pseudo-Poisson maximum likelihood (PPML) estimator for estimating the gravity equation as stated in equation (1). Furthermore, White's heteroscedastic-consistent standard errors are reported in parentheses in all regressions.

4.1 National level

Table 2 provides the regression results at the national level.

Table 2: Estimation results

	Dependent variable:	
	total exports	value-added exports
FTA	0.091*** (0.019)	0.067*** (0.021)
SAA	0.236*** (0.031)	0.231*** (0.035)
EFTA	0.224* (0.118)	0.226* (0.118)
CU	0.051** (0.021)	0.044** (0.020)
weighted Tariff	−0.003* (0.002)	−0.004** (0.002)
Exporter-Time FE	Yes	Yes
Importer-Time FE	Yes	Yes
Bilateral FE	Yes	Yes
Observations	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: data as described above, wiiw calculations

The results show positive impacts on trade for the free trade agreements (FTA), the Stabilisation and Assocation Agreements (SAA) and for custom unions (CU). The coefficient for the free trade agreements with the EFTA countries is positive, but only significant at the 10% level. We find similarly strong and significant effects for the three trade agreements when considering value-added exports. When interpreting the coefficient for the free trade agreements, one has to bear in mind that all agreements that were in effect for the whole period have been removed. Thus, the positive coefficient for FTA is entirely driven by the trade deals that South Korea signed in that period.

The coefficient for SAA captures exactly the effect of signing an "Stabilisation and Association Agreement" with the European Union. For example, Albania signed such an agreement in 2006. According to our results, this agreement had a positive effect of 26.6%[13] on gross trade flows and about the same (26%) on value-added exports.

[13]This is calculated as $(\exp(0.236) - 1) * 100 = 26.6\%$

Similarly, the positive coefficient for joining a custom union can be attributed to the accession to the EU single market of Bulgaria, Romania in 2007 and Croatia in 2013. The coefficient of 0.051 means that those countries experienced an increase in gross exports of about 5.2%. Value-added exports rose by 4.5%. The coefficient for EFTA of 0.224 would translate in a 25.1% increase in trade flows.

The results concerning the applied tariffs are in line with our expectations: We find negative effects, with a coefficients around −0.003 for total exports. As above, a coefficient of −0.003 translates into a −0.3% decrease of the trade flow, if the applied tariff increases, e.g., from 3% to 4%. The coefficient is even stronger and more significant in the value added exports case.

All in all, the results for gross exports and value-added exports on national level are very much alike. The coefficients exhibit similar values and are comparably significant.

As an additional illustration of the benefit of using an input-output database for gravity model estimation, we separate trade flows into final demand exports and intermediate input exports. The results of these estimations are presented in Table 3.

Table 3: Estimation results

	Dependent variable:	
	Final demand exports	intermediate exports
FTA	0.070*** (0.018)	0.106*** (0.021)
SAA	0.326*** (0.043)	0.206*** (0.032)
EFTA	0.353*** (0.104)	0.169 (0.126)
CU	0.095*** (0.023)	0.027 (0.024)
weighted Tariff	0.001 (0.002)	−0.005*** (0.002)
Exporter-Time FE	Yes	Yes
Importer-Time FE	Yes	Yes
Bilateral FE	Yes	Yes
Observations	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: data as described above, wiiw calculations

Overall, one finds a similar picture compared to the results in Table 2: FTA, SAA, EFTA and CU have, as above, strong positive impacts on final demand exports. The effects of these trade agreements are much less pronounced for intermediate trade: FTA and SAA are still associated with positive increases of trade flows, but for EFTA and CU we cannot find significant effects. Interestingly, the coefficient for SAA is considerably bigger for final demand exports than for intermediate input exports. It is however surprising that the coefficient for custom unions is lower and not significant for intermediate input exports.

One would expect that a “deep” trade integration like a custom union leads to a better integration in existing production networks, thus increases intermediate exports. However, our results cannot confirm this intuition. These findings might depend on the specific country sample and the time frame: The new EU members in our data are Bulgaria, Romania and Croatia which are less attractive as production sites as, e.g., the Czech Republic, Slovakia and Poland turned out to be. This could be one explanation of a small effect of a custom union on intermediate exports. Furthermore, integration in such networks may also need an extended amount of time, so that we cannot see these effects yet in our data set. Further, specialisation patterns of the countries involved might play a role.

4.2 Industry groups

The same approach of estimating a gravity equation for both gross exports and value added exports can be applied at the industry level. Tables 4 and 5 present the results at a rather aggregated industry differentiating agriculture and mining, manufacturing, and service industries for gross and value added exports, respectively.

Table 4: Total exports, by industry group

	Dependent variable: Total exports		
	Agriculture/Mining	Manufacturing	Services
FTA	−0.194***	0.143***	−0.056
	(0.074)	(0.018)	(0.040)
SAA	0.364***	0.264***	0.136***
	(0.087)	(0.042)	(0.034)
EFTA	0.808**	0.107	0.252*
	(0.338)	(0.141)	(0.136)
CU	0.495***	0.047	0.064**
	(0.059)	(0.029)	(0.025)
weighted Tariff	0.001	−0.006***	0.022***
	(0.001)	(0.002)	(0.007)
Exporter-Time FE	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes
Bilateral FE	Yes	Yes	Yes
Observations	25,000	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: Data as described above, wiiw calculations.

Doing so, simply requires to restrict the estimation procedure to the trade flows of the respective industries. Whereas free trade agreements are modelled the same as at the country level, the weighted tariff is the only variable which changes at the industry level. The exact

Table 5: Value added exports, by industry group

	Dependent variable: Value added exports		
	Agriculture/Mining	Manufacturing	Services
FTA	-0.192^{**}	0.138^{***}	-0.057
	(0.092)	(0.023)	(0.041)
SAA	0.376^{***}	0.364^{***}	0.127^{***}
	(0.089)	(0.068)	(0.034)
EFTA	0.864^{**}	0.135	0.224^{*}
	(0.347)	(0.143)	(0.133)
CU	0.535^{***}	0.056	0.062^{**}
	(0.066)	(0.045)	(0.026)
weighted Tariff	0.001	-0.008^{***}	0.021^{***}
	(0.001)	(0.002)	(0.008)
Exporter-Time FE	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes
Bilateral FE	Yes	Yes	Yes
Observations	25,000	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: Data as described above, wiiw calculations.

list of industries that are contained in each industry group is given in Table A.1[14]. We defined "Services" to include everything that is not "Agriculture/Mining" or "Manufacturing". Thus, there are still some goods included in the services sector. E.g. the good "Cinematographic film" is attributed to the service sector "Information and Communication", which, when traded between nations, can also be subject to tariffs.

The findings suggest that at the industry group level the effects are more diverse: There are marked differences between agriculture/mining on the one hand and manufacturing and the services group of industries on the other hand. The estimates for manufacturing resemble the estimates for the national level the most. This is not that surprising, since more than 70% of the *international* trade flows are made up of manufacturing products. We find the same large positive coefficients for SAA, and even a stark negative and significant effect of tariffs on the trade flow. The CU dummy shows a similar value as on national level, but is not significant here.

For agriculture and mining, the coefficients for SAA, EFTA and CU are much stronger and more significant, however, we do not see a negative effect of tariffs on agricultural trade. Somewhat surprising is the strong negative effect of FTAs: part of this may be explained by the fact that all FTAs in this sample were signed by South Korea, where agriculture may

[14] The industry group "Manufacturing" consists of low, medium-low, medium-high and high tech manufacturing as described in the Table A.1.

not feature that prominently.

We find a negative (though insignificant) impact of FTA for services, but also positive signs for SAAs and custom unions. The coefficient for tariffs is positive and significant.

Services play a minor (but growing) role only in *international* trade, with about 19% of total exports being services. These are, however, a major part (67%) of *intranational* trade flows. This circumstance, along with the fact that trade in services is a more complex phenomenon (e.g. the modes of services trade play an important role) and its statistical recording is still developing allows only for cautious interpretations of the estimation results for service trade.

As at the national level, the results for gross exports and value added exports resemble each other very much. When comparing Tables 4 and 5 we see that the coefficients are again very similar. The coefficients for value added exports are in general slightly larger, implying that they seem to react more to all sorts of regional trade agreements and tariffs than gross exports.

Finally, we disaggregate the manufacturing industries even further into low, medium-low, medium-high and high tech manufacturing industries. Again, the free trade agreements are the same as at the national level, but the trade flows and the tariffs are at the specific industry level. Since the results for value added and gross exports are again similar, we only report results for gross exports.

Table 6: Total exports, by detailed manufacturing industry

	Dependent variable: Total exports			
	Low Tech	Medium-low Tech	Medium-high Tech	High Tech
FTA	0.152***	0.163***	0.233***	−0.014
	(0.025)	(0.032)	(0.025)	(0.032)
SAA	0.353***	0.208***	0.201***	0.316***
	(0.043)	(0.051)	(0.066)	(0.066)
EFTA	0.152	−0.326	0.172	0.214**
	(0.110)	(0.342)	(0.105)	(0.099)
CU	0.132***	−0.069	0.005	0.300***
	(0.032)	(0.048)	(0.040)	(0.052)
weighted Tariff	−0.001	−0.026***	0.005*	−0.009***
	(0.001)	(0.005)	(0.003)	(0.002)
Exporter-Time FE	Yes	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes	Yes
Bilateral FE	Yes	Yes	Yes	Yes
Observations	25,000	25,000	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: Data as described above, wiiw calculations.

We see from the results in Table 6 that the benefits of trade agreements are not evenly distributed among the manufacturing industries. Gains from SAAs are found in all manufacturing subgroups, but low and high tech industries tend to gain more than the two "medium"-tech industries. The coefficient for custom unions is positive and significant in the low and high tech sector, but not in the medium tech sectors. We even find a negative effect in the medium-low sector, however not significant. The EFTA dummy is only significant in the high tech sector.

Tariffs have a negative and highly significant impact in the medium-low tech and the high tech sector, as well as a positive effect in the medium-high sector which is significant at the 10% level.

5 Counterfactual exercises

In this section we provide estimates of the effects of signing an SAA or joining the EU on GDP using a general equilibrium setting. A short overview over the estimation process is given in Appendix B, but interested readers are referred to the comprehensive explanations given in Yotov et al. (2016) or Anderson et al. (2015).

In the first part we investigate the effects of signing an SAA with Serbia in 2010. In the second part we investigate the economic effects of a potential EU enlargement of the Western Balkan countries in this framework.

5.1 Effect of SAA on Serbia

First, we use our results from Table 2 to answer the question "By how much did Serbia's economy grow, due to the enforcement of the SAA in 2010?". We have already seen that the SAAs substantially increased trade flows. But it will be also interesting to see what impact the SAA had on GDP in Serbia and other countries.

To carry out this counterfactual scenario, we set the SAA dummy for Serbia and the EU countries to 0. Then, we follow the steps as described in Appendix B. The results will then tell us what the GDP of Serbia would have been (and thus how much it profited), had they not signed the SAA in 2010.

Table 7 and Figure 2 present the results for this exercise. For sake of brevity, we only show the results for the countries with real GDP changes greater than 0.001%. We see that, not surprisingly, Serbia was the main beneficiary of the agreement: Our results suggest that

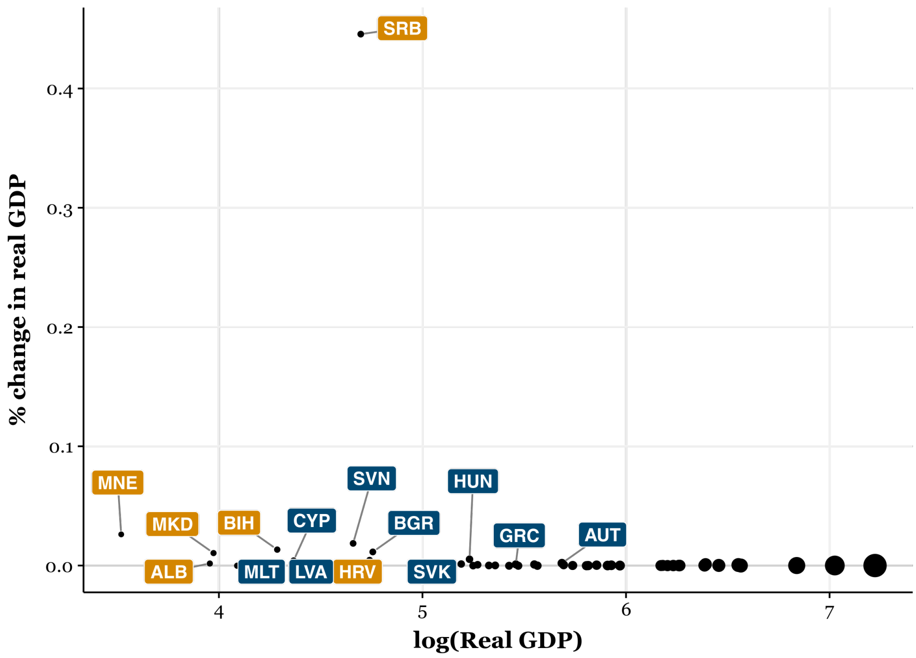
Table 7: Full equilibrium changes, Serbia's SAA signing

	Country	rGDP	price	int'l Exports	Output	OMR	IMR
1	SRB	0.4456	-0.2461	13.3500	-0.2461	-0.2863	0.6948
2	MNE	0.0261	-0.1258	-0.7207	-0.1258	-0.1465	0.1519
3	SVN	0.0186	0.0276	0.5378	0.0276	0.0322	-0.0090
4	BIH	0.0134	-0.0742	-0.5523	-0.0742	-0.0865	0.0876
5	BGR	0.0114	0.0293	0.6439	0.0293	0.0342	-0.0179
6	MKD	0.0105	-0.0570	-0.3999	-0.0570	-0.0664	0.0674
7	HUN	0.0053	0.0160	0.1719	0.0160	0.0187	-0.0107
8	HRV	0.0045	-0.0260	-0.2216	-0.0260	-0.0304	0.0305
9	CYP	0.0042	-0.0041	0.0944	-0.0041	-0.0048	0.0083
10	AUT	0.0020	0.0036	0.0962	0.0036	0.0042	-0.0017
11	ALB	0.0017	-0.0066	-0.0376	-0.0066	-0.0077	0.0083
12	MLT	0.0015	-0.0006	0.0113	-0.0006	-0.0007	0.0021
13	SVK	0.0013	0.0087	0.0767	0.0087	0.0101	-0.0074
14	GRC	0.0010	0.0046	0.2661	0.0046	0.0054	-0.0036
15	LVA	0.0010	-0.0010	0.0210	-0.0010	-0.0011	0.0020

its economy grew by 0.43%. Even though (nominal) output falls, (import) prices fall even more and thus real GDP increases. The columns OMR and IMR indicate the changes for outward and inward multilateral resistances.

As one can see, there are also some third-country effects. For example, Montenegro, which is characterised by strong economic ties to Serbia, profits from the Serbian SAA since its imports from Serbia become cheaper (even though Montenegro has - in this example - itself no SAA with neither the EU nor Serbia).

Figure 2: Change in real GDP for Serbia's SAA signing



5.2 EU enlargement in the Western Balkans

Finally, we investigate the effects for the scenario that current Western Balkan (potential) candidate states Albania, Bosnia & Herzegowina, Macedonia, Montenegro and Serbia all join the European Union (and thus the European Single Market, a customs union) simultaneously.

Table 8: Full equilibrium changes, Western Balkan EU enlargement

	Country	rGDP	price	int'l Exports	Output	OMR	IMR
1	MNE	0.2615	-0.2760	4.9177	-0.2760	-0.3229	0.5361
2	BIH	0.2183	-0.1893	5.4612	-0.1893	-0.2213	0.4068
3	MKD	0.2101	-0.1791	5.3301	-0.1791	-0.2093	0.3884
4	SRB	0.1909	-0.0845	5.6570	-0.0845	-0.0986	0.2749
5	ALB	0.1579	-0.2015	4.7361	-0.2015	-0.2356	0.3588
6	SVN	0.0103	0.0136	0.2541	0.0136	0.0159	-0.0033
7	HRV	0.0094	0.0309	0.5942	0.0309	0.0360	-0.0215
8	BGR	0.0047	0.0116	0.2486	0.0116	0.0136	-0.0069
9	HUN	0.0023	0.0053	0.0605	0.0053	0.0062	-0.0030
10	ROM	0.0015	0.0013	0.0937	0.0013	0.0015	0.0002
11	AUT	0.0011	0.0011	0.0455	0.0011	0.0013	0.0001
12	CYP	0.0010	-0.0003	0.0286	-0.0003	-0.0004	0.0014

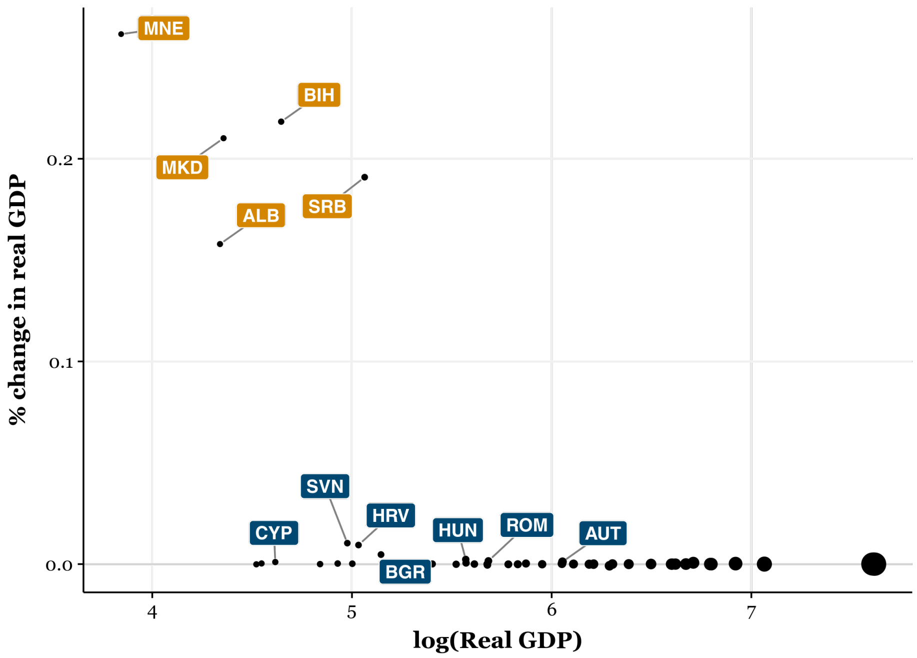
Using the gravity framework this requires to set the CU dummy for these countries and the EU countries to 1 and setting tariffs to 0. The results are shown in Table 8; Figure 3 provides a graphical representation. As above, we only include countries whose real GDP changes by more than 0.001%.

The biggest positive changes in real GDP are found for the five accession countries. The gains in real GDP are about half as high as in the Serbian SAA case above, even though the coefficient for the customs union dummy is only a quarter in magnitude. The countries profit, firstly, from being *themselves* in the custom union and secondly that their main trading partners (the other four countries) are in the custom union too. Just as Montenegro profited from the Serbian SAA, Macedonia profits from Albania (and Serbia and Bosnia) being in the custom union. As above, the main driver of these GDP gain are the reduction in import prices, shown in column 2.

6 Conclusion

This paper uses a time series of multi-country input-output tables including all European countries (with the exception of Belarus and Kosovo) and extends it with tables from non-European countries from the World-Input-Output Database (WIOD). Using these data allows us to study the potential effects of a wider European integration with respect to the signed Stabilisation and Association Agreements and a potential accession of the Western Balkan countries to the EU from an economic perspective.

Figure 3: Change in real GDP in case of Western Balkan EU accession



In general, the results from the gravity estimation are broadly in line with the results in the existing literature. All three kinds of trade agreements modelled are trade enhancing. Particularly, the effect of signing an SAA with the European Union has a strong positive effect in all specifications. Tariffs show the expected negative effect.

We further find that effects of the trade agreements SAA, EFTA and CU are especially pronounced in the agricultural and low-tech manufacturing sectors, i.e. the industries in which the countries under investigation have a comparative advantage. Joining a custom union seems to be especially beneficial to the high-tech manufacturing sector and the agricultural industries. We also find that the results for gross exports and value-added exports do not differ a lot. Sign and value of the coefficients of both specifications can hardly be distinguished from each other: This means that patterns and impacts on gross exports and value-added export flows are very much alike.

Furthermore, based on the results we undertake some counterfactual assessments of the implications of signing a free trade agreement on GDP. We find positive effects on welfare in both scenarios studied and small positive effects on third countries, particularly so on the neighbouring countries.

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A Appendix: Construction issues of the "wiiw Wider Europe Multi-Country Input-Output Table"

A.1 Coverage

In the first phase the underlying data for the construction the multi-country input-output tables (MC IOTs) have been collected and harmonized. Data on the European countries - including all EU-28 Member States, Switzerland, Iceland and Norway, five Western Balkan countries (Albania (AL), Bosnia and Herzegovina (BA), Montenegro (ME), Macedonia (MK), Serbia (RS)) and the Ukraine (UA) - have been collected from Eurostat and national sources. These data include time series of National Accounts data for gross output, value added and intermediate inputs as well as total exports and imports. Further, benchmark supply and use tables when available have been collected and harmonised. If available use tables have been gathered both in basic and purchaser's prices and import use tables (in basic prices) have been collected as well. Furthermore, all these supply and use tables are based on the newest classification of activities (NACE Rev. 2) and commodities (according to CPA 2008) and were compiled according to the recent methodology of the Systems of National Accounts (SNA2008/ESA2010). The only exception to this is Montenegro which has published SNA data according to ESA 1995 only.

Data for the other thirteen biggest economies outside Europe – including Australia (AU), Brazil (BR), Canada (CA), China (CN), Indonesia (ID), India (IN), Japan (JP), Korea (KR), Mexiko (MX), Russia (RU), Turkey (TR), Taiwan (TW) and the United States (US) - have been taken over from the WIOD database (see Timmer et al. (2015) for documentation). The WIOD release 2016 also covers the EU-28 countries. However, data for these countries have been computed and updated in the same way as for the other countries; particularly information from purchaser's and basic price tables and import use tables have been taken into account. The advantage is that our slightly different methodological approach allows to us to effectively make use of the full information set by country provided by Eurostat and does less rely on assumptions about, e.g., the import structure of a country. Compared to the data in WIOD this has some implications on the level of export data and export/GDP ratios, the treatment of re-exports and a different assumption concerning the allocation of intermediate trade in services.

Based on these available benchmark supply and use tables (SUTs) and system of national accounts data (SNA) the so-called "SUT-RAS" algorithm (see Temurshoev and Timmer (2011)) has been applied to back- and forecast SUTs according to the most recently available

SNA data. It should be noted that – differently to the WIOD approach – in this exercise the full information from available datasets (i.e. tables in purchaser and basic prices, import use tables) have been used to construct a consistent time series.

The data for these three country groups have been harmonised across countries and time to make them as consistent and comparable as possible: SUTs and SNA data were available on the different level of disaggregation for different countries. While all Eurostat-based data is available for 64 industries, data for the West Balkan countries are only available for about 20 to 30 industries. We chose to use an industry aggregation of 32 industries. For countries which reported more aggregated data we applied shares from more detailed SUT data or used shares of countries with similar industry structure. Therefore, due to these data constraints on industry details in some of the interesting countries the final version of the data comprises 32 industries (see Appendix Table A.1). Furthermore, missing information in the national SUTs has been imputed by various steps: Missing import use tables (or valuation matrices) have been estimated from the total use tables, missing product data in either the supply or use table have also been imputed.

The resulting set of data is documented in Appendix Table A.2 which provides information on raw data (which still had to be harmonised) and estimated time series. The final database therefore covers 50 countries, 32 industries and over the period 2005 to 2014. Some more details concerning construction and assumptions are provided below.

A.2 Benchmarking and estimation of SUTs

Based on these data we have benchmarked SUTs to the most recent SNA data and estimated SUTs for years where this information hasn't been available (again on the basis of the recent SNA data) using the SUT-RAS algorithm as outlined in Temurshoev and Timmer (2011). This resulted in the coverage as presented in Appendix Table A.2.

1. A dark-green colour indicates that for these years SUTs according to ESA2010 and corresponding to NACE Rev. 2 / CPA 2008 have been available and were only benchmarked to the most recent SNA data. In these cases countries also provide valuation matrices - for trade and transport margins (TTM) and taxes less subsidies (TLS) – implying that use tables are available both in purchasers' prices (USEp) and basic prices (USEb). The countries in this category are also reporting import use tables.

2. For a second set of countries – indicated in dark-blue – SUTs are available according

to ESA2010 and corresponding to NACE Rev. 2 / CPA 2008 which have been benchmarked to recent SNA data. Again these countries provide valuation matrices, however import use tables have to be estimated.

3. The third group of countries – indicated in orange – provide SUTs again according to ESA2010 and corresponding to NACE Rev. 2 / CPA 2008 but without valuation matrices, i.e. the use tables are only reported in basic prices. Thus for these countries use tables in purchaser prices have to be estimated using data on trade and transport margins and taxes.

4. Finally, for five countries – Bosnia and Herzegovina (BA), Iceland (IS), Montenegro (ME), Serbia (RS) and Ukraine (UA) – only SNA data are available. Montenegro and Bosnia & Herzegovina published the SNA data using ESA 1995 methodology, while the data for the other three countries is compiled according to ESA 2010. To estimate the SUTs for these countries, we assume that their economic structure is comparable to another country and use those SUTs to estimate the whole SUT time series. The SUT replacements have been indicated by the country codes, as can be seen in Table A.2.

Based on these harmonised benchmark SUTs we then used the SUT-RAS algorithm and SNA data to estimate a whole time series of SUTs from 2005 to 2014.

A.3 Trade data

The next step that followed was the construction of international SUTs, i.e. the breakdown of the import use tables by source country. For this purpose detailed trade data from UN COMTRADE for trade in goods and from the UN Services Trade Database for trade in services have been collected. Both data sources have been harmonised and reconciled with the information in the SUTs. Data on trade in services are patchy, which was another reason for us to aggregate the data to 32 industries, to remedy some of the quality problems that come with even more disaggregated data.

A.4 Estimating Rest-of-the-World region and inter-country IOTs

Additionally, a Rest-of-World country is included in the international SUTs. The structure of the SUTs for Rest-of-World country is based on the average of all 50 countries in the database (see Stadler, Steen-Olsen, and Wood (2014)) and benchmarked to GDP data of the remaining 150 countries (taken from UN) so that we finally arrive at picture of the world's economic structure that is as accurate as possible. This is again done differently as in the WIOD approach where the Rest-of-World has been estimated only after the construction of the international input-output table (see also Streicher and Stehrer (2015) on this).

The resulting international SUTs were then used to derive symmetric, industry-by-industry Input-Output Tables using the assumption of a fixed sales structure. This method of calculating input-output tables has the two advantages: First, it seems the least restrictive to us, and second, it does not produce negative elements in the resulting intermediates matrix, thus does not require any further adjustments.

Table A.1: Industry list of the 'wiiw Integrated Europe IOT

	Code	Industry Group	Description
1	A	Agriculture/Mining	Crop and animal production, hunting and related service activities; Forestry and logging; Fishing and aquaculture
2	B	Agriculture/Mining	Mining and quarrying
3	CA	Low-tech	Manufacture of food products; beverages and tobacco products
4	CB	Low-tech	Manufacture of textiles, wearing apparel, leather and related products
5	CC	Low-tech	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; Manufacture of paper and paper products; Printing and reproduction of recorded media
6	CD	Medium low-tech	Manufacture of coke and refined petroleum products
7	CE	Medium high-tech	Manufacture of chemicals and chemical products
8	CF	High-tech	Manufacture of basic pharmaceutical products and pharmaceutical preparations
9	CG	Medium low-tech	Manufacture of rubber and plastic products; Manufacture of other non-metallic mineral products
10	CH	Medium low-tech	Manufacture of basic metals; Manufacture of fabricated metal products, except machinery and equipment
11	CI	High-tech	Manufacture of computer, electronic and optical products
12	CJ	Medium high-tech	Manufacture of electrical equipment
13	CK	Medium high-tech	Manufacture of machinery and equipment n.e.c.
14	CL	Medium high-tech	Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment
15	CM	Low-tech	Manufacture of furniture; other manufacturing; Repair and installation of machinery and equipment
16	D	Services	Electricity, gas, steam and air conditioning supply
17	E	Services	Water collection, treatment and supply; Sewerage, waste management, remediation activities
18	F	Services	Construction
19	G	Services	Wholesale and retail trade and repair of motor vehicles and motorcycles; Wholesale trade, except of motor vehicles and motorcycles; Retail trade, except of motor vehicles and motorcycles
20	H	Services	Land transport and transport via pipelines; Water transport; Air transport; Warehousing and support activities for transportation; Postal and courier activities
21	I	Services	Accommodation and food service activities
22	J	Services	Publishing activities; Motion picture, video, television programme production; programming and broadcasting activities; Telecommunications; Computer programming, consultancy, and information service activities
23	K	Services	Financial service activities, except insurance and pension funding; Insurance, reinsurance and pension funding, except compulsory social security; Activities auxiliary to financial services and insurance activities
24	L	Services	Real estate activities
25	M	Services	Legal and accounting activities; activities of head offices; management consultancy activities; Architectural and engineering activities; technical testing and analysis; Scientific research and development; Advertising and market research; Other professional, scientific and technical activities; veterinary activities
26	N	Services	Rental and leasing activities; Employment activities; Travel agency, tour operator reservation service and related activities; Security and investigation, service and landscape, office administrative and support activities
27	O	Services	Public administration and defence; compulsory social security
28	P	Services	Education
29	Q	Services	Human health activities; Residential care activities and social work activities without accommodation
30	R	Services	Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities; Sports activities and amusement and recreation activities
31	S_T	Services	Activities of membership organisations; Repair of computers and personal and household goods; Other personal service activities; Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
32	U	Services	Activities of extraterritorial organisations and bodies

Table A.2: Country coverage of Supply and Use Tables

Nr	Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	AT										
2	BE										
3	BG										
4	CY										
5	CZ										
6	DE										
7	DK										
8	EE										
9	EL										
10	ES										
11	FI										
12	FR										
13	HR										
14	HU										
15	IE										
16	IT										
17	LT										
18	LU										
19	LV										
20	MT										
21	NL										
22	PL										
23	PT										
24	RO										
25	SE										
26	SI										
27	SK										
28	UK										
29	CH										
30	IS						NO				
31	NO										
32	AL										
33	BA									MK	
34	ME						HR				
35	MK										
36	RS									MK	
37	UA						PL				
38	AU										
39	BR										
40	CA										
41	CN										
42	ID										
43	IN										
44	JP										
45	KR										
46	MX										
47	RU										
48	TR										
49	TW										
50	US										
Nr	Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014

Legend:

ESA 2010	Estimated tables	Benchmark tables
		Full set
		Import use tables missing
		Valuation matrices missing
ESA 1995	Estimated tables	Benchmark tables
EU-28 Member State		

B Appendix: Modelling strategy

The following short outline is based on Anderson et al. (2015) and Yotov et al. (2016).

B.1 Structural gravity model: Basics

The empirical equation for the 'structural gravity system' is given by

$$X_{ij} = \frac{Y_i E_j}{Y} \left(\frac{t_{ij}}{\Pi_i P_j} \right)^{1-\sigma} \tag{B.1}$$

where X_{ij} denotes the expenditures on goods shipped from country of origin i to the country of destination j. Further, Y_j is nominal income in country j, E_j denotes the total spending on varieties from all countries (including j itself) at delivered prices (i.e. including bilateral trade costs). These prices are $p_{ij} = p_i t_{ij}$ with $t_{ij} \geq 1$ where p_i denotes the factory-gate price and t_{ij} are bilateral trade costs between partners i and j. $Y = \sum_i Y_i$ denotes world GDP and it holds that world GDP is equal to world expenditures $E = Y = \sum_i E_i$. σ denotes the elasticity of substitution as a parameter in the CES-utility function.

The term $\left(\frac{t_{ij}}{\Pi_i P_j} \right)^{1-\sigma}$ reflects trade costs which drive a wedge between realized and frictionless trade.

First, the term t_{ij} reflects all bilateral trade costs that are incurred when goods are shipped from i to j. These costs are usually proxied by geographical distance, tariffs, presence of free (regional) trade agreements, etc. The second term

$$P_j^{1-\sigma} = \sum_i \left(\frac{t_{ij}}{\Pi_i} \right)^{1-\sigma} \frac{Y_i}{Y} \tag{B.2}$$

is termed *inward multilateral resistance term*[15] and represents importer j's ease of market access. It is a "weighted-average aggregate of all bilateral trade costs for the producers of goods in each country"[16]. Analogously, the term

$$\Pi_i^{1-\sigma} = \sum_j \left(\frac{t_{ij}}{P_j} \right)^{1-\sigma} \frac{E_j}{Y} \tag{B.3}$$

is called *outward multilateral resistance term*[17] and represents exporter i's ease of market

[15] See Anderson and Van Wincoop (2003).
[16] See Yotov et al. (2016, p.72)
[17] See Anderson and Van Wincoop (2003).

access.

Further, the term

$$p_i = \sum_j \left(\frac{Y_i}{Y}\right)^{\frac{1}{1-\sigma}} \frac{1}{\alpha_i \Pi_i} \tag{B.4}$$

denotes the factory-gate price for each variety of goods in country i. Finally,

$$E_i = \varphi_i Y_i = \varphi_i p_i Q_i \tag{B.5}$$

denotes total expenditures in country i with Q_i denoting the endowment or quantity supplied of each variety of goods in country i. Here, φ denotes the relation between value of output and aggregate expenditure. If $\varphi = 1$ the economy is characterised by balanced trade, if $\varphi > 1$ the country faces a trade deficit (expenditures are larger than value of output) and if $\varphi < 1$ the country faces a trade surplus.

B.2 General equilibrium gravity analysis: Estimation approach

B.2.1 Estimate the baseline gravity model

$$X_{ij,t} = \exp\left[\pi_{i,t} + \chi_{j,t} + \mu_{ij} + \mathbf{T}_{ij,t}\mathbf{b}\right] \times \varepsilon_{ij,t} \tag{B.6}$$

where $X_{ij,t}$ denotes the trade flow (in values) from i to j, π_i is the exporter-time fixed effect, $\chi_{j,t}$ is the importer-time fixed effect and μ_{ij} denote country-pair fixed effects. The trade policy variables are grouped in the vector $\mathbf{T}_{ij,t}$ with the associated parameter vector $\mathbf{b}$. $\varepsilon_{ij,t}$ denotes the error term.

B.2.2 Derive the baseline trade cost matrix

As a first step, equation B.6 is estimated using PPML from which the matrix of baseline trade costs can be derived:

$$\hat{t}_{ij}^{1-\sigma} = \exp\left[\hat{\mu}_{ij} + \mathbf{T}_{ij,t}\hat{\mathbf{b}}\right]$$

B.2.3 Define counterfactual

These estimated trade costs $\hat{t}_{ij}^{1-\sigma}$ are then used for our counterfactual experiments. We define a counterfactual scenario and set the trade costs $\tilde{t}_{ij}^{1-\sigma}$ accordingly. E.g.: we set the custom union dummy for all Westbalkan countries to 1.

$$\tilde{t}_{ij}^{1-\sigma} = \exp\left[\hat{\mu}_{ij} + \tilde{\mathbf{T}}_{ij,t}\hat{\mathbf{b}}\right]$$

This "shock" to the trade costs induced changes in the multilateral resistances and thus leads to a new, counterfactual equilibrium.

B.2.4 Solve counterfactual

Next, we solve the counterfactual model. We do this by re-estimating B.6 but holding the trade costs fixed (this is sometimes called an "offset").

$$X_{ij,t} = \exp\left[\pi_{i,t}^{CFL} + \chi_{j,t}^{CFL} + \hat{\mu}_{ij} + \tilde{\mathbf{T}}_{ij,t}\hat{\mathbf{b}}\right] \times \varepsilon_{ij,t}$$

With the new estimates for the fixed effects π^{CFL} and χ^{CFL} we can calculate updated multilateral resistances using a result from Anderson et al. (2015) ($E_{R,t}$ refers to the expenditures of a reference country):

$$\Pi_{i,t}^{1-\sigma} = \frac{Y_{i,t}}{\exp(\hat{\pi}_{i,t}^{CFL})} \times E_{R,t} \tag{B.7}$$

$$P_{i,t}^{1-\sigma} = \frac{Y_{i,t}}{\exp(\hat{\chi}_{i,t}^{CFL})} \times \frac{1}{E_{R,t}} \tag{B.8}$$

We can also calculate the induced change in prices

$$\Delta p_{i,t}^{CFL} = \left(\frac{\exp(\hat{\pi}_{i,t}^{CFL})/E_{R,t}^{CFL}}{\exp(\hat{\pi}_{i,t})/E_{R,t}}\right)^{1/(1-\sigma)} \tag{B.9}$$

as well as the subsequent change in trade flows

$$X_{ij,t}^{CFL} = \frac{\left[\hat{t}_{ij}^{1-\sigma}\right]^{CFL}}{\hat{t}_{ij}^{1-\sigma}} \times \frac{Y_{i,t}^{CFL} E_{j,t}^{CFL}}{Y_{i,t} E_{j,t}} \times \frac{\Pi_{i,t}^{1-\sigma}}{\left[\Pi_{i,t}^{1-\sigma}\right]^{CFL}} \times \frac{P_{j,t}^{1-\sigma}}{\left[P_{j,t}^{1-\sigma}\right]^{CFL}} \times X_{ij,t} \qquad \text{(B.10)}$$

These new estimates of the trade flows $X_{ij,t}^{CFL}$ can be piped into B.7 and the steps repeated until the change in prices in small enough and the new equilibrium has been reached. You can then compute comparative statics and compare the baseline and counterfactual estimates of the trade flows and the multilateral resistances.

For a more complete treatment we refer to Yotov et al. (2016).

C Appendix: Using gross output as mass variable

The specification we test here is

$$X_{ij,t} = \exp\Big[\log((\mathrm{GO}_{i,t}\cdot \mathrm{GO}_{j,t})/\mathrm{MP}_{i,t}) + \log(\mathrm{POP}_{i,t}\cdot \mathrm{POP}_{j,t}) + \mu_{ij} + \beta_1\mathrm{FTA}_{ij,t} + \beta_2\mathrm{SAA}_{ij,t} + \beta_3\mathrm{EFTA}_{ij,t} + \beta_4\mathrm{CU}_{ij,t} + \beta_\tau\tilde{\tau}_{ij,t}\Big] \times \epsilon_{ij} \quad \text{(C.11)}$$

$\mathrm{GO}_{i,t}$ is the gross output and $\mathrm{POP}_{i,t}$ denotes the population of country i at time t. In case the dependent variable is value added exports, we replace gross output $\mathrm{GO}_{i,t}$ with value added $\mathrm{VA}_{i,t}$. $\mathrm{MP}_{i,t}$ denotes the market potential of the exporter. The other variables have the same meaning as described in section 3.1. We follow Baldwin and Taglioni (2011) and define it as

$$\mathrm{MP}_{i,t} = \Big(\sum_j \mathrm{GDP}_{j,t}\cdot \mathrm{DIST}_{ij}^{1-\sigma}\Big)^{1/(1-\sigma)}$$

where DIST_{ij} refers to the distance between the exporter and the importer and σ to the elasticity of the market potential which is set to $\sigma = 4$.

Following Baldwin and Taglioni (2011) we use total gross output (GO) in the this gravity specification instead of value added (GDP) as our mass variables. Baldwin and Taglioni (2011) argue that since trade flows are recorded in gross quantities, the mass variables in the gravity estimation should also be gross quantities, i.e. gross output, especially when a considerable part of the trade flow is in intermediate goods. Since our country sample consists of tightly trade-integrated countries, intermediates trade plays an important role (51% percent of exports are intermediate exports in 2014). Again, these variables can be extracted from the "wiiw Wider Europe Multi-Country Input-Output database".

National population numbers are drawn from the World Bank's World Development Indicators. Data for Taiwan, which is not included in the WDI, is taken from the CIA factbook[18]. The bilateral distance for the calculation of the market potential is taken from the gravity data set that was constructed by Head, Mayer, and Ries (2010).

Table C.3 presents the results of the specification above. Both economic mass variables gross output and value-added show the expected positive effects on either bilateral gross

[18] Accessed through `http://www.indexmundi.com/taiwan/population.html` on 10.02.2017

Table C.3: Estimation results

	Dependent variable:	
	total exports	value-added exports
log(GO$_o$ GO$_d$ / MP)	0.517*** (0.005)	
log(VA$_o$ VA$_d$ / MP)		0.522*** (0.006)
log(Pop$_o$ Pop$_d$)	0.078 (0.054)	0.059 (0.058)
FTA	0.037** (0.017)	0.018 (0.020)
SAA	0.226*** (0.033)	0.203*** (0.035)
EFTA	0.190 (0.160)	0.186 (0.154)
CU	0.049** (0.022)	0.039* (0.021)
weighted Tariff	−0.002 (0.002)	−0.004** (0.002)
Time FE	Yes	Yes
Exporter FE	Yes	Yes
Importer FE	Yes	Yes
Exporter-Time FE	No	No
Importer-Time FE	No	No
Bilateral FE	Yes	Yes
Observations	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: data as described above, wiiw calculations

output or value added exports. However, for our country sample the population size is not significant.[19]

Here we can also see that there differences in the regressions with and without the mass variables (see table 2 for reference). In the specifications *with* the mass variables, the coefficients for trade agreements change their significancies between gross exports and value-added exports. If we exclude the mass variables and include exporter-time and importer-time dummies instead (as in 2) we find a positive (and stronger) effect for free trade agreements, assocation agreements and custom unions. This pattern is the same for gross exports and value-added exports, with the coefficients being very similar for exports than value-added exports.

The economic mass variable gross output in table C.4 shows a similar strong effect as on the national level. Population is strongly positive and significant in the final demand case, but not in the intermediate inputs case. It is no surprise that final demand exports react more to population (and consumer) than intermediate inputs, which are directed towards firms, not consumers. Tariffs show only significant negative effects in intermediate goods trade, not in final demand flows. This, again, comes at no surprise that firms react stronger to tariffs than consumer.

[19] The coefficient for population is sometimes found to be negative in the literature. A negative coefficient for population is interpreted that smaller countries tend to export more than larger countries.

Table C.4: Estimation results

	Dependent variable:	
	final demand exports	intermediate exports
$\log(\text{GO}_o\ \text{GO}_d\ /\ \text{MP})$	0.512^{***} (0.005)	0.522^{***} (0.006)
$\log(\text{Pop}_o\ \text{Pop}_d)$	0.193^{***} (0.041)	-0.054 (0.085)
FTA	-0.007 (0.019)	0.067^{***} (0.023)
SAA	0.245^{***} (0.046)	0.219^{***} (0.032)
EFTA	0.285^{*} (0.149)	0.163 (0.163)
CU	0.069^{**} (0.027)	0.035 (0.025)
weighted Tariff	0.004^{*} (0.002)	-0.005^{**} (0.002)
Time FE	Yes	Yes
Exporter FE	Yes	Yes
Importer FE	Yes	Yes
Exporter-Time FE	No	No
Importer-Time FE	No	No
Bilateral FE	Yes	Yes
Observations	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: data as described above, wiiw calculations

C.1 Mean and reference weighted tariffs

Here we report estimation results where reference weighted tariffs and mean tariffs were used.

Table C.5: Estimation results

	Dependent variable:	
	total exports	value-added exports
FTA	0.091^{***} (0.019)	0.065^{***} (0.021)
SAA	0.236^{***} (0.031)	0.230^{***} (0.034)
EFTA	0.220^{*} (0.118)	0.218^{*} (0.118)
CU	0.049^{**} (0.022)	0.037^{*} (0.021)
mean Tariff	-0.005 (0.004)	-0.009^{**} (0.004)
Exporter-Time FE	Yes	Yes
Importer-Time FE	Yes	Yes
Bilateral FE	Yes	Yes
Observations	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: data as described above, wiiw calculations

Table C.6: Estimation results

	Dependent variable:	
	total exports	value-added exports
FTA	0.091*** (0.019)	0.067*** (0.021)
SAA	0.236*** (0.031)	0.231*** (0.035)
EFTA	0.224* (0.118)	0.226* (0.118)
CU	0.051** (0.021)	0.044** (0.020)
ref. weighted Tariff	−0.003* (0.002)	−0.004** (0.002)
Exporter-Time FE	Yes	Yes
Importer-Time FE	Yes	Yes
Bilateral FE	Yes	Yes
Observations	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: data as described above, wiiw calculations

C.2 SAA endogeneity, SAA in force dates

We compare alternative dates for the SAA entry of a country. "SAA.inf" is the SAA in force date, dates can be seen in table 1. SAA.endo are the "pre-dated" SAA signings: The dummy is the for the same reporter-partner pair, but starts two years before the actual signing. We used the following dates: For Bosnia & Herzegovina and Montenegro 2006 and for Serbia 2008. With this dummy we can capture possible endogeneity of the SAA signing. A positive and significant coefficient means that the tradeflows were already above-average before the actual signing of the SAA. Finally, SAA.{country} is a dummy for each country that signed a SAA separately.

Table C.7: Estimation results

	Dependent variable: total exports			
	(1)	(2)	(3)	(4)
FTA	0.091***	0.090***	0.091***	0.091***
	(0.019)	(0.019)	(0.019)	(0.019)
SAA	0.236***		0.095***	
	(0.031)		(0.023)	
SAA.inf		0.257***		
		(0.028)		
SAA.endo			0.339***	
			(0.064)	
SAA.ALB				0.208*
				(0.119)
SAA.BIH				−0.004
				(0.035)
SAA.MNE				−0.123
				(0.118)
SAA.SRB				0.321***
				(0.040)
EFTA	0.224*	0.211*	0.224*	0.232**
	(0.118)	(0.119)	(0.124)	(0.117)
CU	0.051**	0.051**	0.051**	0.051**
	(0.021)	(0.021)	(0.021)	(0.021)
weighted Tariff	−0.003*	−0.003*	−0.003*	−0.003*
	(0.002)	(0.002)	(0.002)	(0.002)
Exporter-Time FE	Yes	Yes	Yes	Yes
Importer-Time FE	Yes	Yes	Yes	Yes
Bilateral FE	Yes	Yes	Yes	Yes
Observations	25,000	25,000	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: data as described above, wiiw calculations

C.3 Symmetric pair fixed effects

In this specification we use *symmetric* bilateral effects instead of *asymmetric* that are used in all other specifications. P. H. Egger and Nigai (2015) recommend asymmetric over symmetric bilateral pair dummies (and that is why we use them for all regular specifications). Here however, for completeness, we also report the results if symmetric bilateral fixed effects were used.

Table C.8: Estimation results

	Dependent variable:	
	total exports	value-added exports
FTA	0.085^{**} (0.038)	0.069^{*} (0.041)
SAA	0.244^{***} (0.039)	0.237^{***} (0.040)
EFTA	0.215 (0.159)	0.215 (0.155)
CU	0.052^{**} (0.026)	0.048^{*} (0.025)
weighted Tariff	-0.004^{*} (0.002)	-0.004^{*} (0.002)
Exporter-Time FE	Yes	Yes
Importer-Time FE	Yes	Yes
Bilateral FE	Yes	Yes
Observations	25,000	25,000

Note: *p<0.1; **p<0.05; ***p<0.01
Source: data as described above, wiiw calculations

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