



# The impact of regional trade agreements on European exports

Zuzanna Studnicka<sup>1</sup> · Wouter Thierie<sup>2</sup> · Jan Van Hove<sup>3,4,5</sup>

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## Abstract

This paper studies the impact of European regional trade agreements on European export patterns. Using a simple fixed effects estimation method, it appears that only the extensive margin is positively affected by trade agreements, while the impact on total exports and on the intensive margin is insignificant. This finding breaks down, however, if one distinguishes between individual European countries. There appears to be substantial heterogeneity across European Union member states. Moreover, the impact on the extensive margin can be explained by the inclusion of various trade-related aspects in trade agreements, which deepen the effective trade integration between the European Union and its trading partners. Finally, using a composite indicator capturing the intensity of trade integration across twelve recent European trade agreements, we cannot conclude that more comprehensive trade agreements enhance exports more.

## 1 Introduction

The number of regional trade agreements (RTAs)<sup>1</sup> notified to the World Trade Organization (WTO) is remarkably high and continues to increase. Especially since the early 1990s, RTAs became increasingly popular. Fig. 1 shows the evolution of RTAs notified to the WTO between 1948 and 2019. While under the General Agreement on Tariffs and Trade

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<sup>1</sup>RTA is the general name referring to five kinds of trade agreements: Preferential Trade Agreements (PTAs), Free Trade Agreements (FTAs), Customs Unions (CUs), Common Markets and Economic Unions.

✉ Jan Van Hove  
jan.vanhove@kuleuven.be

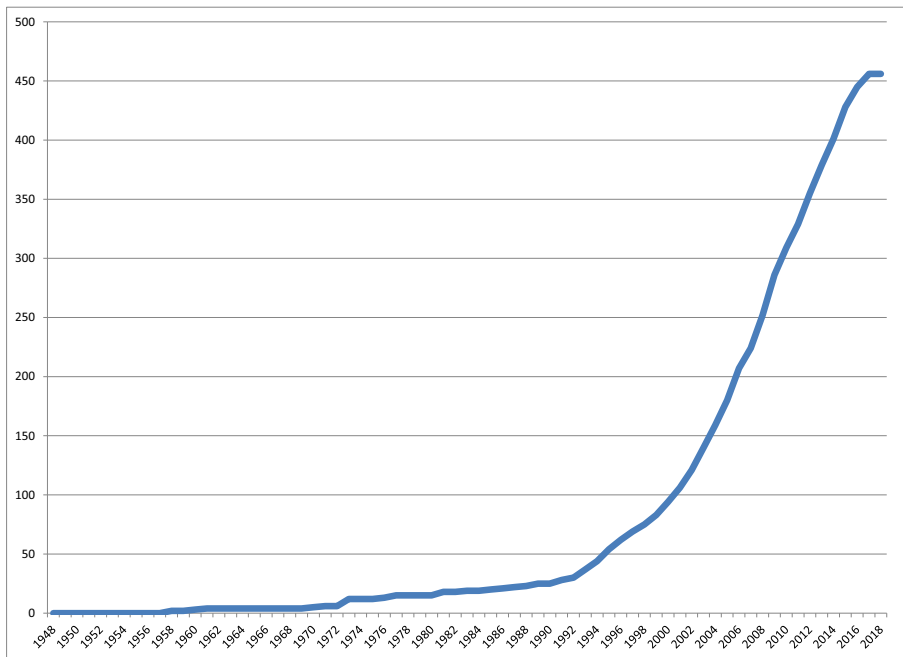
<sup>1</sup> University College Dublin, Dublin, Ireland

<sup>2</sup> Vrije Universiteit Brussel, Brussels, Belgium

<sup>3</sup> INFER, Cologne, Germany

<sup>4</sup> Department of Economics, University of Leuven, Naamsestraat 69, B-3000 Leuven, Belgium

<sup>5</sup> KBC Group, Brussels, Belgium



**Fig. 1** Evolution of RTAs notified by the GATT/WTO between 1948 and 2019

(GATT), the predecessor of the WTO, 123 agreements have been notified between 1948 and 1994, this list was supplemented by more than 300 additional agreements since 1994.<sup>2</sup> Currently over 450 agreements are in force and have been notified to the WTO. One of the main reasons behind the strong growth of RTAs is the lack of progress in multilateral trade talks in recent years. Notwithstanding the recent tendency of increasing protectionism, RTAs remain the favorite trade policy tool. Many countries appreciate the flexibility of RTAs in terms of the way trade is being liberalized. From the 1980s onwards, the scope and depth of RTAs has increased (Dee and Gali (2003)). Recent RTAs include chapters on rules of origin, non-tariff barriers, dispute resolution and competition policy. Some RTAs go beyond trade aspects by including issues like migration, intellectual property protection, balance-of-payment problems or investments. As a result, RTAs became a preferred and more effective way of further liberalizing trade flows.

According to the European Commission, in 2018, the European Union (EU) has the largest web of regional trade agreements in place world-wide, around 70 in total spanning five continents. The RTAs concluded by the EU can roughly be divided into three groups. The first group covers the agreements with future members and neighbors. On the one hand, this group includes the RTAs concluded with the Faroe Islands, Norway, Iceland and Switzerland and, on the other hand, the agreements with the Western Balkans. The second group of RTAs is related to all countries that border the EU broadly defined, such as the Euro-Med countries, the Gulf States, and Ukraine. With the 2004 and 2007 enlargements and the outward shift of the eastern border of the European Union, several new countries, such as Russia and Ukraine are now immediate

<sup>2</sup> [http://www.wto.org/english/tratop\\_e/region\\_e/regfac\\_e.htm](http://www.wto.org/english/tratop_e/region_e/regfac_e.htm)

neighbors of the EU. The EU is particularly active in concluding RTAs with its neighboring countries: the European Commission developed in 2004 the European Neighborhood Policy (ENP) Strategy Paper<sup>3</sup> with the objective of strengthening regional integration and building long lasting relations with these countries. All other RTAs are in the third group, including countries like the USA, Canada, Chile, India, Mexico, South Africa, the Republic of Korea, Peru, Colombia, Singapore and Vietnam, as well as regions like ASEAN, the Andean Community, Central America and Mercosur. RTAs in the first two groups aim to build stable relations with EU neighbors, while the RTAs in the last category focus more on fulfilling commercial purposes, in particular obtaining better market access for European firms in global markets.

Moreover, as Ahearn (2011) notes, trade agreements concluded by the EU differ substantially among trading partners. The EU differentiates its RTAs according to the level of development, the economic performance and the proximity of the country. Trade agreements between the EU and developing countries are, for instance, not solely focused on promoting trade, but also on stimulating growth and reducing poverty in these countries. In 2006, the European Commission adopted the Global Europe Strategy. It reorients European trade policy to fast-growing emerging markets as well as towards trade-related aspects such as innovation, intellectual property protection, services liberalization and the efficient use of resources. This process of increasing comprehensiveness of trade agreements was enhanced during the most recent trade policy updates, as reflected in the DG Trade's Management Plan 2017. Recently, the EU reached agreements with major advanced and emerging economies, including South-Korea, Canada (CETA) and Japan. The trade deal with South Korea is generally considered the first new generation trade agreement. Despite these successful negotiations, the ratification and implementation process turns out to be often challenging.

Despite the growing importance and comprehensiveness of RTAs, surprisingly few studies have looked into the impact of RTAs on international trade patterns, and mostly only in a too parsimonious way. Many studies rather looked into RTAs' total welfare implications, generally pointing to substantial welfare gains for all parties involved (and often neglecting possible negative effects on outside countries). Moreover, various studies called for more attention to the diversity of RTAs and how this diversity affects trade patterns (see e.g. Magee 2008, Roy 2010, Baier and Bergstrand 2009). The aim of this paper is to close this gap. This study aims to measure the impact of EU trade agreements on EU trade flows, taking into account the complex and diverse nature of recent trade agreements. More precisely, we estimate an augmented gravity model, taking into account various detailed features of trade agreements which have been neglected so far. We proceed in two steps. In the first step, we analyze the impact of RTAs on total exports from the EU towards the rest of the world as well as on the intensive and extensive margins of trade. Additionally, we analyze whether the impact of RTAs on total exports and on the margins of trade is homogenous or heterogeneous across EU-member states by assessing the impact for each EU member state separately. In the second step, we assess the impact of various trade agreement features on total exports and on the margins of trade. These features include whether or not the trade

<sup>3</sup> European Commission (2004). European Neighbourhood Policy: Strategy Paper. Brussels, Communication from the Commission, COM(2004) 373 final.

agreements pay attention to non-tariff measures (NTMs- such as anti-dumping and countervailing measures), government procurement, intellectual property rights (IPRs), investment issues and labor aspects.<sup>4</sup> We control for each of these features separately. Moreover, in order to fully capture the varying scope and depth of EU trade agreements, we construct a benefit-of-the-doubt Composite Indicator (CI) and include this indicator in the gravity specification.

We obtain various interesting findings. First, it appears that the trade enhancing effect of European RTAs is restricted to the extensive margin, at least when considering all EU member states together. Second, there appears to be substantial heterogeneity across EU member states in terms of RTA effects on exports and on the margins of trade. Third, specific trade agreement features, reflecting various regulations and other trade-related aspects, have a significant and specific effect on exports, again in particular on the extensive margin. Finally, within a sample of twelve recent EU trade agreements, we cannot conclude that deeper trade integration generally enhances trade.

The remainder of this paper is organized as follows. Section 2 discusses our empirical strategy. Section 3 presents the data. Section 4 presents the results. The final section concludes.

## 2 Empirical strategy

In order to assess the impact of European RTAs on European exports, we estimate an augmented gravity model explaining bilateral trade between trading partners. This approach has been popular in the international trade literature. The most common way to assess the impact of RTAs is to augment the traditional gravity equation with a dummy variable equal to one when any RTA is active between trading partners, and equal to zero otherwise (see e.g., Linneman 1966; Aitken 1973; Braga et al. 1994; Rose 2000). The ease and straightforward interpretation of the coefficients of dummy variables explain the frequent use of this approach. Frankel and Wei (1998) note that dummy variables are also an obvious tool to reduce bias resulting from policy differences among countries. Nevertheless, this approach is subject to criticism too. First, since RTAs can differ considerably in scope and depth, including only one dummy does not fully account for the differences across RTAs (Benedictis and Taglioni (2011)). In addition, as highlighted by Bayoumi and Eichengreen (1997), one has to be careful when interpreting the coefficients of these dummy variables. Coefficients of RTA dummies may pick up the effect of unobserved differences in trade performance between countries, but which are not included in the gravity equation (Mátyás 1997). Thirdly, RTA dummies do not reflect differences in the comprehensiveness of the trade agreement. This may result in biased estimates (Baldwin and Seghezza 2010). The best solution to these problems is to control for various other bilateral features of each trade relationship, in particular by including measures reflecting various and more specific features of trade agreements. Therefore, this paper will replace the single RTA dummy by various dummies capturing various features of trade agreements. In a final step, we will also replace the single RTA dummy by a composite indicator reflecting the deepness of each trade agreement. Some previous studies followed a similar index-

<sup>4</sup> Table 3 in the Appendix gives an overview of all trade topics considered in this study.

based approach (Dee and Gali (2003) using a member liberalization index described by Adams et al. (2003); Mordonu (2006) using a trade diversion index, a trade creation index and an export computability index to stimate trade diversion potential from the Russian Federation caused by the 2004 EU enlargement). Our study provides an alternative approach using a weighted composite index capturing various aspects of trade liberalization.

Given these insights from the literature, we proceed in two steps. In the first step, we analyze the impact of an RTA on trade by including an RTA dummy which equals one when two countries concluded an RTA and zero otherwise. We analyze the impact of an RTA on total trade and on the intensive margin and extensive margin of exports from the EU towards the rest of the world. We estimate the following model:

$$\ln(Y_{ijt}) = \beta_0 + \beta_1 \ln(\text{GDP}_{it}) + \beta_2 \ln(\text{GDP}_{jt}) + \beta_3 \ln(\text{dist}_{ij}) + \beta_4 X_{ij} + \beta_5 \text{WTO}_{jt} + \beta_5 \text{RTA}_{ijt} + \mu + \gamma + \eta + \varepsilon_{ijt} \quad (1)$$

where  $Y_{ijt}$  stands for, depending on the specification, total exports, the intensive margin or the extensive margin of exports from  $i$  (the EU) towards trading partner  $j$  at time  $t$ . While the intensive margin represents the average exports per product, the extensive margin is the number of products exported.  $\text{GDP}_{it}$  is the GDP of the exporter,  $\text{GDP}_{jt}$  is the GDP of the importer,  $\text{dist}_{ij}$  is the population weighted distance in kilometers,  $X_{ij}$  is a vector of characteristics common to the exporter and the importer, such as a language dummy (equals one if a common language is spoken by at least 9 % of the population in both countries), colony and religion dummies (equals one when the two trading partners have a past colonial relationship, respectively a common religion). The  $\text{WTO}_{jt}$  dummy controls for the destination country belonging to the WTO. Our main variable of interest is  $\text{RTA}_{ijt}$ , a dummy that equals one if there is an RTA concluded between the exporting and importing country. Note that we focus on contemporaneous effects only. We leave the analysis of leading or lagging effects for further study (see e.g., Soete and Van Hove (2017)). Finally,  $\mu$  represents exporter fixed effects,  $\gamma$  importer fixed effects,  $\eta$  year fixed effects, and  $\varepsilon_{ijt}$  represents the error term.

In addition, we analyze whether the impact of an RTA on total exports and the margins of trade is homogenous or heterogeneous across EU member states. Thus, the impact is assessed for each EU member separately and allows indicating which EU member states lose and which ones gain from an active European trade policy.

In the second step, we investigate whether the scope and depth of an RTA have a different impact on trade. To do that, we estimate the impact of various trade topics separately on total trade and on the margins of trade. In addition, we include a benefit-of-the-doubt composite indicator in the gravity model instead of the RTA-dummy. Thus, our model becomes:

$$\ln(Y_{ijt}) = \beta_0 + \beta_1 \ln(\text{GDP}_{it}) + \beta_2 \ln(\text{GDP}_{jt}) + \beta_3 \ln(\text{dist}_{ij}) + \beta_4 X_{ij} + \beta_5 \text{WTO}_{jt} + \beta_5 \text{depth}_{ijt} + \mu + \gamma + \eta + \varepsilon_{ijt} \quad (2)$$

where the new variable  $\text{depth}_{ijt}$  stands for different trade topics dummies or for the benefit-of-the-doubt composite indicator.

Constructing a composite indicator for each RTA, reflecting the depth of each trade agreement, allows us to estimate the trade-enhancing effect of RTAs more precisely.

Various construction methodologies for Composite Indicators have been suggested in the literature. Most composite indicators work with predetermined fixed weights, but the subjectivity involved in the choice of an appropriate weighting scheme may undermine the credibility of the results. This problem is of a particular importance when the exact knowledge of weights is not available as in our context. In addition, uniform weighting fails to recognize that countries may have different policy priorities with respect to the different topics included in RTAs. A predetermined fixed weighting scheme implicitly assumes that all trade topics gain the same importance for the countries concluding the agreement. To deal with this problem, Cherchye (2001) and Cherchye et al. (2007) discuss how Data Envelopment Analysis (DEA) helps to overcome the issue by applying a benefit-of-the-doubt weighting procedure. This procedure allows weights to be endogenously determined and allows weights to vary over topics and RTAs. The procedure applies the most favorable weights for each RTA. Melyn and Moesen (1991) originally proposed this procedure in the context of macroeconomic performance evaluation. Since then, benefit-of-the-doubting composite indicators have been adopted for cross-country assessments of human development (Mahlberg and Obsteiner 2001), sustainable development performance (Cherchye and Kuosmanen 2006), the Growth Competitiveness Index developed by the World Economic Forum (Bowen and Moesen 2005), EU Internal Market effects (Cherchye et al. 2007), EU member states' performance with regard to social inclusion (Cherchye et al. 2004), the macro-economic performance of twenty OECD countries (Cherchye and Moesen 1998) and have been applied by the European Commission to evaluate the performance of its member states with regard to the Lisbon strategy.

The determination of weights can be written as the following linear programming problem:

$$CI = \max w_i \sum_{i=0}^{25} w_i y_i \quad (3)$$

Subject to the following constraints:

$$\sum_i^{25} w_i y_i \leq 1 \quad (4)$$

$$w_i > 0 \quad (5)$$

The CI is found by maximizing the sum over all products of  $w_i$  and  $y_i$  over  $w_i$  where  $w_i$  reflects the weight chosen for the  $i$ th topic and  $y_i$  is a dummy variable reflecting whether the trade topic is included in the RTA. Equation (4) defines an upper bound on the weights, stating that no other RTA in the set has a resulting CI greater than one when applying the most favorable weights for the evaluated RTA. Equation (5) is a non-negativity constraint, putting a lower-bound on the weights. To obtain these CIs, we put some additional constraints on the maximization problem. First, we allow the weights to vary between a bandwidth of 1.5% around their fixed weight equivalents, namely 4%. Thus, the weights assigned to different topics always lie between 2.5 and 5.5%. By making a ranking of the most popular topics among the RTAs considered in our analysis, we impose additional constraints on the weights according to the frequency they are included in RTAs. In this way, the weight assigned to e.g. competition policy, which is included in eleven of a total of twelve RTAs under consideration, can

never be lower than the weight assigned to e.g. government procurement which is included in eight out of twelve RTAs. By using a Data Envelopment Analysis (DEA)-inspired linear programming model which exhibits benefit of the doubt weighting, we found the Composite Indicators in Table 4 in the Appendix.

Note that the information on specific trade topics is only available for twelve EU RTAs. Hence our composite indicator is based on information for these twelve RTAs only.<sup>5</sup> Nevertheless, this approach allows us to study whether the intensity of trade liberalization matters rather than the fact of liberalization.

### 3 Data

In our empirical analysis, we use four different sets of data: the BACI (CEPII 2018a) trade data set developed by CEPII, covering trade flows between the EU and its trading partners, the CEPII gravity data set (CEPII 2018b) including all relevant gravity variables, data from the IMF (IMF 2018) on GDP, to complement the CEPII data for the years 2006 till 2010 and finally the Integrated Trade Intelligence Portal (I-TIP) of the WTO (WTO 2018).

The Integrated Trade Intelligence Portal (I-TIP), developed by the WTO, provides detailed information on NTMs applied by WTO members in merchandise trade. Some trade topics in the I-TIP are anti-dumping and countervailing measures, government procurement, intellectual property rights (IPRs), investment and labor. Table 3 in the Appendix gives an overview of all trade topics considered in this study. Even if a large and growing number of different trade topics are now included in RTAs, they are unequally distributed over the different EU RTAs. Some underlying trade issues are much more popular than others. Among the most popular trade topics are anti-dumping measures, balance-of-payments measures, competition policy, customs-related procedures, dispute settlement mechanisms, exceptions, intellectual property rights, rules of origin, safeguard measures, subsidies and goods which appear in all twelve RTAs considered. Least popular is labor which is included in only one of the twelve agreements under consideration. Merging these data with the first two data sets mentioned above allows us to follow a more differentiated approach through a closer examination of the different aspects of trade agreements, which is the main contribution of this paper to the literature.

In our analysis, we focus on the RTAs notified by the World Trade Organization (WTO) in which the European Union is a party and entered into force between the first of January 1998 and the 31th of December 2010. The main reason for that is that we want to focus on RTAs with increasing levels of sophistication and therefore containing a wider range of trade topics relatively to older agreements.<sup>6</sup> Table 2 in the Appendix gives an overview of the twenty RTAs considered in this analysis.

<sup>5</sup> The RTAs in gray in Table 2 in the Appendix are left out for the construction of the composite indicator.

<sup>6</sup> The agreements the EU recently concluded with the Republic of Korea in 2011, the Eastern and Southern African states in 2012 and Central America, Peru and Colombia in 2013 were left out the analysis because the time period for these RTAs was too short to precisely analyze their trade-enhancing effects.



## 4 Empirical findings

We proceed in two steps. First, we analyze the impact of an RTA on trade patterns using the RTA dummy. Second, we analyze whether different trade topics affect trade pattern in different ways.

Table 1 shows the results of the estimations for the impact of RTAs on total bilateral exports by EU countries as well as on the intensive margin and on the extensive margins of trade.<sup>7</sup> It appears that RTAs have no significant impact on total exports. Also the impact on the intensive margin is insignificant. RTAs have, however, a significantly positive effect on the extensive margin. This implies that the impact of RTAs on European exports operates through the extensive margin only, i.e. RTAs increase the number of products exported by European exporters to their RTA trading partners, but they do not intensify exports of existing products to these markets. Hence, it appears to be crucial to decompose total trade into margins of trade in order to correctly assess the impact of RTAs on trade.

In terms of the control (gravity) variables, we find that the exporter GDP and importer GDP are insignificant, which is likely to be caused by the inclusion of various fixed effects, as has been noted in previous studies too (e.g., Baier and Bergstrand 2009). Distance has a statistically significant negative effect on bilateral exports. Sharing a common language, religion or colonial past have a positive effect on exports (note that the coefficient of religion is only significant for the extensive margin). By contrast, WTO-membership has no significant impact, neither on total exports, nor on the margins of trade.

Next we analyze whether the impact of RTAs on total exports and on the margins of trade is homogenous or heterogeneous across EU member states. Although we find that the impact of an RTA on European exports only works through the extensive margin, the picture is different when we look to all EU member states separately. Table 5 in the Appendix and Fig. 2 below show the impact of RTAs on respectively total exports and the margins of trade for all EU-member countries.

Our previous findings have to be fine-tuned. It appears that RTAs have a negative impact on total exports of Belgium-Luxemburg, Cyprus, Denmark, Estonia, France, United Kingdom, Italy and the Netherlands. The impact is positive for Bulgaria, the Czech Republic, Spain, Finland, Greece, Hungary, Ireland, Poland, Portugal, Romania, Sweden, Slovenia and Slovakia. The impact is especially strong in Hungary, Romania and Slovenia with coefficients larger than 0.6. In the remaining EU member states (Austria, Germany, etc.), the impact of an RTA on total exports is not significantly different from zero based on a 95% significance level. Thus, we can conclude that there is substantial heterogeneity across EU countries in terms of the general impact of RTAs on their bilateral exports.

In order to correctly capture the impact of RTAs, the effect on total trade has again to be split up into the intensive margin effect and the extensive margin effect. The second and third columns of Table 5 in the Appendix show the impact of RTAs on the intensive and extensive margin. Note that the effects on the intensive and extensive margins add up to the effect on total exports because of the OLS estimation methodology. There

<sup>7</sup> Note that the sum of the coefficients of the final two columns is always equal to the coefficients of the first column.



**Table 1** Impact of RTAs on total exports, the Intensive Margin (IM) and Extensive Margin (EM)

	ln Total Exports	ln IM	ln EM
ln gdp origin country	0.003 (0.97)	0.001 (0.49)	0.002 (0.78)
ln gdp destination country	0.005 (0.86)	0.001 (0.35)	0.003 (0.94)
ln distance	-2.105** (69.91)	-0.632** (33.13)	-1.473** (68.38)
Language	0.572** (16.90)	0.126** (5.19)	0.446** (19.87)
Colony	0.970** (26.16)	0.082** (3.78)	0.887** (30.15)
Religion	0.084 (1.90)	0.001 (0.02)	0.084** (3.23)
WTO-member	0.004 (0.09)	0.007 (0.24)	-0.003 (0.13)
RTA	0.067 (1.75)	0.010 (0.35)	0.057* (2.41)
$R^2$	0.84	0.55	0.87
$N$	46,119	46,119	46,119
Importer FE	yes	yes	yes
Exporter FE	yes	yes	yes
Year FE	yes	yes	yes

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; the value between brackets is the corresponding t-statistic. The applied estimation method controls for clustering in the data

appears to be substantial heterogeneity in the effects across EU countries. Moreover, we find several opposing effects for the intensive and extensive margin.

First, from Fig. 2 we learn that the impact on total exports is largely determined by the extensive margin. Except for Sweden, Lithuania, Finland, Estonia, Denmark and Austria, the coefficient of the extensive margin is always larger than the coefficient of the intensive margin in absolute values. Second, by analyzing which EU members gain and which loose from an active EU trade policy, it seems that mainly the Central and Eastern European countries (CEECs) (e.g. Hungary, Romania) and peripheral countries (e.g. Greece, Portugal) are positively affected by RTAs for total trade. For instance, Portuguese exports growth is strongly driven by RTAs. A few EU members export less as a consequence of the RTAs: the countries suffering most from EU RTAs are Cyprus, Denmark and France. Their exports strongly decrease as a consequence of the RTAs concluded by the EU, controlling for alternative explanations. There is also a negative effect on Belgium-Luxemburg, Italy and the Netherlands. The impact on Germany is insignificant. Thirdly, in six EU member states, the coefficients on the intensive and extensive margins show different signs. In three countries, the negative impact on the intensive margin is neutralized (Austria) or outweighed (Poland, Slovenia) by the positive impact on the extensive margin. In three other EU-members the opposite

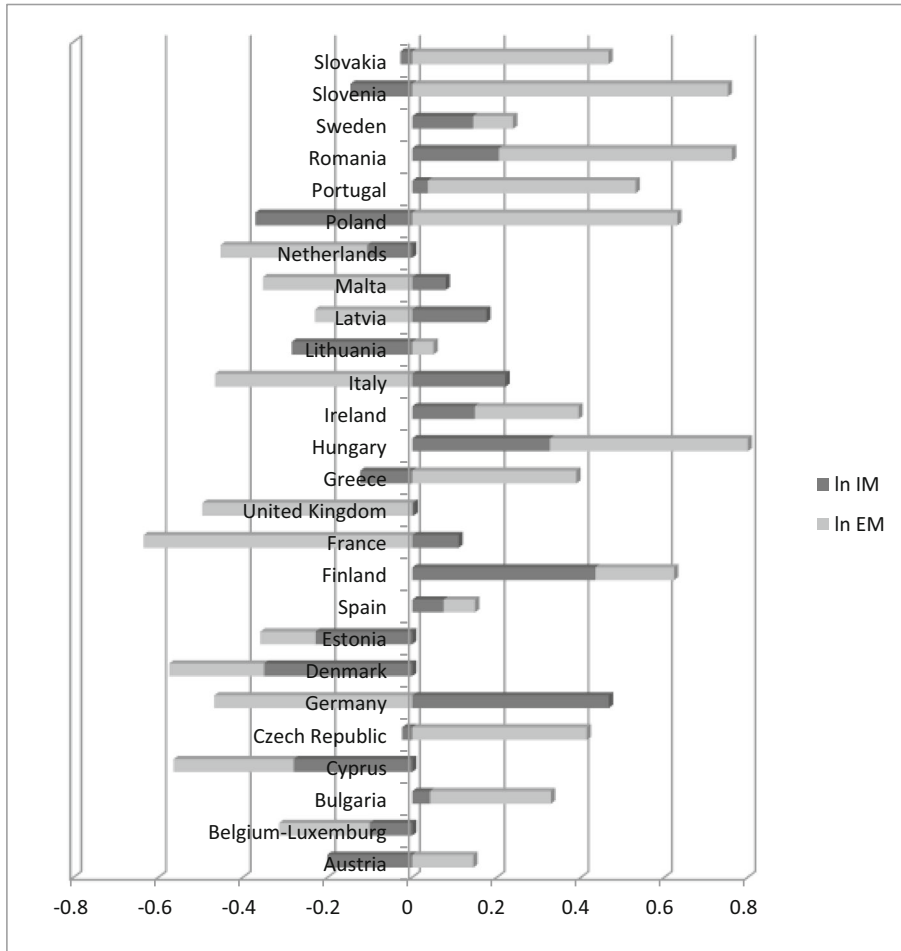


Fig. 2 Impact of RTAs on total exports and the margins of trade

occurs. The positive impact on the intensive margin is offset in Germany and outweighed in France and Italy by a negative impact on the extensive margin.

Next, we focus on the impact of specific trade topics. Instead of using one RTA dummy, we include dummies for the different trade topics. Table 6 in the Appendix shows the impact of the underlying trade issues on total exports and on the margins of trade. In other words, we assess whether the inclusion of some underlying trade issues in trade agreements induces EU members to export more and whether this happens through an increased number of exported products or through more intensive exports of existing products.

Our findings show that, although RTAs as a whole do not positively affect total exports, some of the underlying trade topics positively or negatively affect exports. The inclusion of environmental regulations in the RTA appears to hinder bilateral trade. Countervailing measures and tariff-rate quotas have a positive and slightly significant impact on total exports. All other technical underlying trade specific issues show no

significant impact on total exports. Hence the impact of various trade agreement features on total exports remains limited.

In order to correctly capture the impact of RTAs, the effect on total exports has to be split up between an intensive margin effect and extensive margin effect. Although most trade topics do not significantly enter the gravity model with the intensive margin as left-hand side variable (only anti-dumping measures negatively affects and environment positively affects the intensive margin), many of them significantly affect the extensive margin. For instance, anti-dumping and balance-of-payments measures, customs-related procedures, dispute settlement, rules of origin and subsidies positively affect the extensive margin. Only environmental regulations have a negative impact on the number of products exported. Thus, in general, trade topics mainly matter for the extensive margin, in line with our previous, general findings that RTAs mainly affect the extensive margin of European exporters.

Finally, in the last step, we incorporate in the specification the benefit-of-the-doubt composite indicator that measures how comprehensive European trade agreements are. In addition, since we are only interested in the countries with which the EU actually concluded an RTA, all other countries are now dropped from the analysis. Hence we are left with twelve countries with which the EU has an RTA in place and for which the information about which underlying trade issues are included in the agreement is available. Restricting the data allows to investigate whether the intensity of trade liberalization matters rather than the fact of liberalization. In this step, we study whether the EU exports more to countries it concluded deeper trade agreements with.

Table 7 in the Appendix shows the impact of the intensity of trade liberalization on total exports and the margins of trade. The results for the control gravity variables are similar to the findings above. It appears that the composite indicator has no significant impact, neither on total exports, nor on the margins. Hence it seems that the impact of RTAs on European trade is mainly driven by very specific trade topics, and – as discussed before – mainly on the extensive margin of exports. Arguing that more in-depth trade agreements lead to a significantly larger impact on European trade compared to more ‘standard’ trade agreements cannot be supported by our findings.

The picture is more nuanced when we assess the impact on all EU member states separately. Table 8 in the Appendix shows that there is heterogeneity among EU exporters. Concluding deeper trade agreements positively affects exports of some EU members (e.g. the Czech Republic, Slovakia) and negatively affects exports of some others (e.g. Bulgaria, United Kingdom, Greece and Slovenia). This result can be explained by the fact that deeper RTAs also contain trade topics with a negative (e.g. environmental regulations) or with no impact on trade-related measures (e.g. labor regulations). The presence of these underlying trade issues positively affects the benefit-of-the-doubt composite indicator, but has no positive impact on European exports. Another explanation for the non-significant impact of the composite indicator on total exports could be the low variation in the composite indicator, which varies between 72,5 and 90%. As the EU is currently negotiating various new trade agreements which are likely to differ in terms of their comprehensiveness, it would be useful to repeat this analysis in the future. In general, we have to be cautious when interpreting the outcome that the EU does not export more to trading partners it concluded deeper trade agreements with. Since the number of destination countries in Tables 7 and 8 in the Appendix under investigation is limited to 12, we have also to be cautious to

generalize these results to other countries or regions in the world. Finally, the CI does not take into account the gradual implementation of RTAs. Sometimes, it takes more than 15 years before trade agreements are fully implemented. Also some trade agreements in our analysis were not fully into force at the moment of this study, providing an explanation why the intensity of trade liberalization does not play a major role. We leave this issue for future research.

Note that we applied several robustness checks to our results. In particular, we checked for the impact of non-zero trade flows by applying a Poisson Pseudo-Maximum-Likelihood estimator (PPLM). Our findings are maintained. Hence we do not report the robustness estimates.

## 5 Conclusion

The European Union has signed many RTAs during the past two decades, following an international trend of regional rather than multilateral trade liberalization. Knowing the impact of RTAs on trade patterns is important information, also for future trade agreement negotiations. This paper assesses the impact of European RTAs on European exports in various ways.

In the first step, we analyze the impact of RTAs on European bilateral exports using a traditional dummy variable approach within a gravity specification. We find that mainly the extensive margin is affected. This implies that new products are traded after the launch of an RTA. Thus RTAs ensure that EU members export a larger range of products to foreign markets and hence diversify European exports. In this step we further analyze whether the impact of RTAs on total exports and the margins of trade is homogenous or heterogeneous across EU member states. By analyzing which EU members gain and which loose from an active EU trade policy, it seems that mainly the Central and Eastern European Countries (CEEC) and peripheral countries are positively affected by RTAs for total exports. Other EU members trade less as a consequence of the RTAs the EU concluded with non-EU members. These heterogeneous effects across EU member states may have political implications and explain why some EU member states try to influence EU policy.

In the second step, we investigate the impact of each trade topic separately on total exports and on the margins of trade. Although the impact of an RTA as a whole does not affect total exports in a significant way, some of the underlying trade issues do have a positive and significant impact. In particular it is again the extensive margin that is mainly affected, while the impact on the intensive margin is mostly insignificant. This implies that the inclusion of some trade topics in an RTA induces EU members to export a larger range of products. Hence, we can reveal which underlying trade issues positively affect the number of products exported and which have no or even a negative impact on the extensive margin. Especially in case of a negative impact on trade, policy makers have to carefully weigh the impact on trade with the other intentions of these policies and regulations. In some cases one should eventually look for other, less trade-restricting ways to achieve these regulations' objectives.

In addition, in order to capture the varying scope and depth of European trade agreements, we generate a benefit-of-the-doubt composite indicator for twelve trade agreements of the European Union. The indicator appears to have no significant impact,

neither on total exports, nor on the margins of trade. The EU does not export more to trading partners it concluded deeper trade agreements it. By assessing the impact on all EU member states separately, we find again heterogeneity among EU exporters.

Our analysis is the first step in a more differentiated approach which takes into account the margins of trade as well as the deepness of RTAs. Developing alternative composite indicators based on more and new information on various trade-related aspects of trade agreements could enhance this analysis and would be an interesting further extension of the literature.

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## Appendix

**Table 2** Overview of EU RTAs for goods (G) and services (S)

EU – Albania	07/03/2007 (G) - 07/10/2009 (S)
<i>EU – Algeria</i>	<i>01/09/2005</i>
<i>EU – Bosnia and Herzegovina</i>	<i>01/07/2008</i>
<i>EU - Cameroon</i>	<i>01/10/2009</i>
<i>EU - CARIFORUM States EPA</i>	<i>16/10/2008</i>
EU – Chile	01/02/2003 (G) – 01/03/2005 (S)
<i>EU – Ivory Coast</i>	<i>01/01/2009</i>
EU – Egypt	01/06/2004
EU - Former Yugoslav Republic of Macedonia	01/06/2001 (G) – 01/04/2004 (S)
EU - Israel	01/06/2000
EU - Jordan	01/05/2002
<i>EU – Lebanon</i>	<i>01/03/2003</i>
EU – Mexico	01/06/2000 (G) – 01/10/2000 (S)
EU – Montenegro	01/01/2008 (G) – 01/05/2010 (S)
EU – Morocco	01/03/2000
<i>EU - Papua New Guinea / Fiji</i>	<i>20/12/2009</i>
<i>EU - San Marino</i>	<i>01/04/2002</i>
EU – Serbia	01/02/2010
EU - South Africa	01/01/2000
EU – Tunisia	01/03/1998

The RTAs in italic are left out for the construction of the composite indicator

Note that the EU recently has concluded two additional trade agreements: the first with six Central American countries and the second with Peru and Colombia. The first agreement with Peru and Colombia came into force on the 1st of March 2013, the second not yet entered into force. These agreements are not included in the table. At the time of writing this study, the data on which trade topics are included in the PTAs the EU concluded with Central America and Peru and Colombia were not available in the I-TIP database

**Table 3** Trade issues taken into account in the analysis

Accession	The RTA is an accession (i.e. Accession = Yes) if the agreement provides for a new signatory to adhere to an existing agreement. In that case, the existing agreement appears under “related agreements”.
Anti-dumping measures	The agreement determines how governments can or cannot react to dumping, which occurs when a company exports a product at a price lower than the price it normally charges on its own home market.
Balance-of-payments measures	The provision of protectionist measures, such as import restrictions for countries facing balance-of-payment difficulties.
Competition	One of the so-called “new issues” in the WTO. When domestic and international competition policy instruments, such as antitrust or competition laws, are included in the agreement, a yes appears.
Countervailing measures	The RTA incorporates actions countries can take to counter the effects of subsidies.
Customs-related procedure	The inclusion of cumbersome procedures to the customs, which could form obstacles for trade liberalization.
Dispute settlement	A dispute arises when a member government believes another member government is violating an agreement. The RTA includes a procedure for resolving trade quarrels.
Domestic regulation	By enforcing domestic policy objectives through regulation, governments could undo positive trade liberalization effects. Therefore, distinguishing between domestic regulation and measures subject to trade liberalization is useful to get a more accurate picture of the impact of RTAs.
Environment	While there is no specific agreement dealing with the environment, under WTO rules members can adopt trade-related measures aimed at protecting the environment provided a number of conditions to avoid the misuse of such measures for protectionist ends are fulfilled.
Exceptions, general or for security	The agreement provides some exceptions if some products are excluded from the agreement for general or for security reasons.
Export restrictions	Export restrictions are included when the agreement provides quantitative limitations on imports of certain goods.
Government procurement	The Agreement includes specific rules to open up competition for government procurement by making laws, regulations, procedures and practices regarding government procurement more transparent and to ensure they do not protect domestic products or suppliers, or discriminate against foreign products or suppliers.
Intellectual property rights	Measures for an adequate protection of intellectual property rights are included in the trade agreement.
Investment	The agreement provides articles, which tend to promote foreign direct investment between member countries.
Labor	Measures to harmonize labor market regulation and to deal with labor migration between RTA-members.
Mutual recognition (services)	The harmonization of regulation with respect to services.
Rules of origin	The Agreement provides rules which determine where a product comes from. Rules of origin are important in implementing such

**Table 3** (continued)

	trade policy instruments as anti-dumping and countervailing duties, origin marking, and safeguard measures.
Safeguard measures	RTA members may take a “safeguard” action (i.e., restrict imports of a product temporarily) to protect a specific domestic industry from an increase in imports of any product which is causing, or which is threatening to cause, serious injury to the industry.
Sanitary- and phyto-sanitary measures.	The agreement provides on how governments can apply food safety and animal and plant health measures (sanitary and phytosanitary or SPS measures).
Subsidies	The agreement deals with the granting of subsidies, available only to an enterprise or industry or group of enterprises or industries within the jurisdiction of the authority granting the subsidy.
Tariff-rate quotas	When countries agree to impose no or low tariffs on imports below a quantitative threshold or quota and a prohibitive or much higher tariff on imports above that threshold, the RTA provides Tariff-rate quotas.
Technical regulations, standards and technical barriers to trade	Non-tariff barriers to trade which impose standards or technical regulations on imports.
Services (EIA)	Countries not only agree to open up trade in goods, but also to liberalize trade in services.

**Table 4** Benefit of the doubt composite indicator for selected RTAs

Country	CI BoD(%)
Albania	87.5%
Chile	89.6%
Egypt	79.6%
Former Yugoslav Republic of Macedonia	85.0%
Israel	75.0%
Jordan	80.0%
Mexico	79.6%
Montenegro	90.0%
Morocco	77.5%
Serbia	72.5%
South Africa	85.0%
Tunisia	77.5%



**Table 5** Impact of RTAs on total exports and the margins of trade

EU-member	lnTotal Exports	ln IM	ln EM
Austria	-0.057 (0.96)	-0.201** (4.61)	0.144** (4.05)
Belgium-Luxemburg	-0.315** (4.21)	-0.101 (1.71)	-0.214** (5.09)
Bulgaria	0.328** (3.61)	0.042 (0.61)	0.286** (5.13)
Cyprus	-0.564** (3.49)	-0.280** (2.78)	-0.284** (3.19)
Czech Republic	0.390** (6.26)	-0.024 (0.46)	0.414** (11.99)
Germany	-0.001 (0.01)	0.467** (8.57)	-0.468** (13.03)
Denmark	-0.575** (10.44)	-0.350** (8.46)	-0.224** (6.30)
Estonia	-0.359** (2.71)	-0.228* (2.23)	-0.131 (1.86)
Spain	0.148* (2.41)	0.074 (1.91)	0.074 (1.24)
Finland	0.623** (8.34)	0.435** (7.45)	0.188** (4.65)
France	-0.526** (8.03)	0.109* (2.49)	-0.635** (11.77)
United Kingdom	-0.493** (8.90)	0.003 (0.05)	-0.496** (9.85)
Greece	0.267** (2.70)	-0.123 (1.80)	0.389** (6.83)
Hungary	0.799** (11.55)	0.326** (5.50)	0.474** (12.16)
Ireland	0.394** (6.00)	0.148** (2.75)	0.246** (6.46)
Italy	-0.246** (4.56)	0.220** (5.21)	-0.466** (11.68)
Lithuania	-0.235 (1.70)	-0.285** (2.58)	0.050 (0.63)
Latvia	-0.055 (0.33)	0.175 (1.21)	-0.230** (2.73)
Malta	-0.274 (1.49)	0.079 (0.55)	-0.353** (4.19)
Netherlands	-0.453** (7.34)	-0.106* (2.45)	-0.347** (7.74)

**Table 5** (continued)

EU-member	lnTotal Exports	ln IM	ln EM
Poland	0.260** (3.46)	-0.371** (5.90)	0.631** (11.65)
Portugal	0.532** (6.62)	0.037 (0.67)	0.494** (9.48)
Romania	0.762** (8.45)	0.205* (2.52)	0.557** (10.81)
Sweden	0.238** (3.89)	0.144** (3.17)	0.094** (2.83)
Slovenia	0.606** (5.37)	-0.146* (2.31)	0.752** (10.88)
Slovakia	0.438** (5.31)	-0.028 (0.46)	0.466** (9.23)
Importer FE	yes	yes	yes
Exporter FE	yes	yes	yes
Year FE	yes	yes	yes

\*  $p < 0.05$ ; \*\*  $p < 0.01$ **Table 6** Impact of trade topics on total exports and the margins of trade

Trade topics	lnTotal exports	lnIM	lnEM
RTA	-0.274 (1.49)	0.079 (0.55)	-0.353** (4.19)
Accession	0.007 (0.07)	-0.178* (2.48)	0.185** (3.51)
Anti-dumping measures	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
Balance-of-Payments measures	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
Competition	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
Countervailing measures	0.185* (2.11)	-0.063 (0.99)	0.249** (4.74)
Customs-related procedures	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
Denial of benefits	-0.043 (0.47)	-0.090 (1.39)	0.047 (0.93)
Dispute settlement	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)

**Table 6** (continued)

Trade topics	lnTotal exports	lnIM	lnEM
Domestic regulation	-0.043 (0.47)	-0.090 (1.39)	0.047 (0.93)
Environment	-0.038 (0.41)	0.153* (2.07)	-0.191** (3.68)
Exceptions, general or for security	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
Export restrictions	0.067 (0.81)	0.026 (0.39)	0.041 (0.89)
Government procurement	-0.129 (1.12)	-0.051 (0.60)	-0.078 (1.05)
Intellectual Property Rights	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
Investment	-0.041 (0.50)	0.046 (0.74)	-0.088 (1.87)
Labor	0.046 (0.31)	0.142 (1.19)	-0.096 (1.21)
Mutual recognition	-0.043 (0.47)	-0.090 (1.39)	0.047 (0.93)
Rules of origin	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
Safeguard measures	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
(Phyto-)sanitary measures	-0.082 (0.98)	-0.082 (1.26)	-0.001 (0.02)
Subsidies	0.217 (1.58)	-0.082 (0.73)	0.299** (3.27)
Tariff-rate quotas	0.197* (2.07)	0.013 (0.17)	0.184** (3.48)
Technical regulations, standards and technical barriers to trade	0.024 (0.25)	0.033 (0.50)	-0.010 (0.18)
Services	0.103 (1.41)	0.055 (1.01)	0.048 (1.17)
Importer FE	yes	yes	yes
Exporter FE	yes	yes	yes
Year FE	yes	yes	yes

\*  $p < 0.05$ ; \*\*  $p < 0.01$

**Table 7** Impact of the intensity of trade liberalization on total exports and the margins of trade

	ln Total Exports	ln IM	ln EM
ln gdp origin country	0.004 (0.49)	-0.000 (0.07)	0.004 (0.80)
ln gdp destination country	-0.006 (0.40)	-0.006 (0.49)	0.000 (0.01)
ln distance	-2.008** (31.28)	-0.541** (13.14)	-1.467** (39.64)
language	0.577** (5.64)	0.172* (2.33)	0.404** (7.40)
colony	0.374** (3.81)	0.319** (4.74)	0.055 (0.95)
religion	0.856** (6.95)	0.414** (4.44)	0.443** (6.93)
WTO-member	0.049 (0.58)	0.087 (1.61)	-0.038 (0.71)
Composite indicator	0.102 (0.86)	0.123 (1.48)	-0.021 (0.30)
$R^2$	0.87	0.62	0.91
$N$	3320	3320	3320
Importer FE	yes	yes	yes
Exporter FE	yes	yes	yes
Year FE	yes	yes	yes

\*  $p < 0.05$ ; \*\*  $p < 0.01$ **Table 8** Impact of the intensity of trade liberalization on total exports and the margins of trade

EU-member	lnTotal Exports	lnIM	lnEM
Austria	-0.012 (0.08)	0.154 (1.40)	-0.166** (2.71)
Belgium- Luxemburg	-0.606 (1.27)	0.033 (0.13)	-0.639* (2.57)
Bulgaria	-2.250** (3.23)	-1.358** (4.42)	-0.892 (1.86)
Cyprus	0.256 (1.13)	0.227 (0.98)	0.029 (0.50)
Czech Republic	0.420* (2.51)	0.803** (5.04)	-0.383** (6.48)
Germany	0.166 (0.57)	0.185 (0.95)	-0.019 (0.12)

**Table 8** (continued)

EU-member	lnTotal Exports	lnIM	lnEM
Denmark	0.829 (0.85)	-0.029 (0.04)	0.858* (2.55)
Estonia	0.179 (0.71)	0.087 (0.60)	0.093 (0.64)
Spain	0.054 (0.15)	-0.037 (0.23)	0.091 (0.40)
Finland	0.660* (2.44)	0.587** (3.15)	0.073 (0.73)
France	0.107 (0.96)	0.273* (2.47)	-0.166* (2.10)
United Kingdom	-1.492** (2.79)	-0.505* (2.22)	-0.986** (2.97)
Greece	-1.545* (2.42)	-0.363 (1.42)	-1.181** (2.62)
Hungary	0.231 (1.33)	0.330* (1.99)	-0.099 (1.27)
Ireland	0.092 (0.41)	0.133 (0.82)	-0.041 (0.39)
Italy	0.025 (0.08)	0.255 (1.15)	-0.230 (1.63)
Lithuania	1.114 (1.60)	-0.165 (0.18)	1.278** (2.85)
Latvia	0.910 (1.17)	0.320 (0.46)	0.590 (1.44)
Malta	2.934** (4.09)	2.117** (4.28)	0.817 (1.79)
Netherlands	0.278 (1.28)	0.276 (1.86)	0.002 (0.02)
Poland	-0.043 (0.25)	-0.163 (0.93)	0.120 (1.32)
Portugal	0.530 (1.75)	0.045 (0.20)	0.485** (3.67)
Romania	0.262 (0.79)	-0.004 (0.01)	0.266 (1.12)
Sweden	0.369 (1.15)	0.358 (1.96)	0.011 (0.07)
Slovenia	-1.563* (2.54)	-0.570* (2.42)	-0.992* (2.57)
Slovakia	0.579** (2.58)	0.042 (0.20)	0.538** (4.63)
Origin country FE	yes	yes	yes
Destination country FE	yes	yes	yes
Time FE	yes	yes	yes

\*  $p < 0.05$ ; \*\*  $p < 0.01$

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