Centro de Estudios Europeos Luis Ortega Álvarez

UCLM

Cofinanciado por la Unión Europea

Pre-Print Series in Industrial Strategy and International Trade

01/24

TITULO: Countries don´t trade, firms do: a firm-level assessment of CETA

Autores: Lucian Cernat, Carmen Díaz-Mora, Salvador Gil-Pareja and Silvio Esteve

COUNTRIES DON'T TRADE, FIRMS DO: A FIRM-LEVEL ASSESSMENT OF CETA[1].

Authors:

Lucian Cernat, DG Trade, European Commission
Carmen Díaz-Mora, Universidad de Castilla-La Mancha
Salvador Gil-Pareja, Universidad de Valencia
Silvio Esteve, Universidad de Valencia

Cita sugerida: Cernat, L., Díaz-Mora, C., Gil-Pareja, S. and Esteve, S. (2024). "*Countries don't trade, firms do: A firm-level assessment of CETA*", 1/24 Preprints Series in Industrial Strategy and International Trade, Center for European Studies "Luis Ortega Álvarez"- Jean Monnet Center of Excellence, 2024.

Acknowledgements: This research was conducted as part of the Project PID2021-122133NB-I00 financed by MCIN/AEI/10.13039/501100011033/FEDER, EU. It is also part of the project 2023-GRIN-34135, co-funded by Universidad de Castilla-La Mancha and the European Regional Development Fund EDRF and the Project CIPROM/2022/50 (Prometeo).

[1] Funded by the European Union. Views and opinions expressed are however those of the author only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsable for them.

Centro de Estudios Europeos Luis Ortega Álvarez 30 años
UCLM
Cofinanciado por la Unión Europea

Abstract
The impact of free trade agreements (FTAs) has been analysed by numerous empirical studies that focus on their effect on trade values. But what about the number of trading firms? Do FTAs lead to new firms becoming exporters or importers? Using data from the OECD-Eurostat Trade by Enterprise Characteristics dataset and estimating a structural gravity model, this paper examines the effect of the EU-Canada Comprehensive Economic and Trade Agreement (CETA) on the number of EU exporting and importing firms. When debating its future effects during the negotiations, the CETA agreement had been the subject of both hope and criticism, including its potential negative effect on small firms. We explore the heterogeneous response of firms to CETA by sector, firm size and EU country. We find a positive but diverse response from EU firms to the opportunities offered by the CETA agreement. On average, CETA increased the number of EU exporting firms by around 11%. The largest increases were found in Spain and Lithuania (over 30%), while the lowest increases were in Italy (8.7%). The increase in the number of trading firms has been higher for small than for large firms. These findings underscore the importance of considering firm-level impacts in trade policy assessments.

Keywords: Free trade agreements, CETA, EU exporting and importing firms, firm size, gravity model.

Resumen
El impacto de los acuerdos de libre comercio (ALC) ha sido analizado en numerosos estudios empíricos que se centran en investigar su efecto sobre el valor de los intercambios comerciales. Pero ¿qué ocurre con el número de empresas comerciales? ¿Los ALC promueven que nuevas empresas se conviertan en exportadoras o importadoras? Utilizando datos del conjunto de datos de la OCDE-Eurostat *Trade by Enterprise Characteristics* y estimando un modelo de gravedad estructural, examinamos el efecto del Acuerdo Económico y Comercial Global entre la UE y Canadá (CETA) sobre el número de empresas exportadoras e importadoras de la UE. Al debatir durante las negociaciones sus efectos futuros, este acuerdo había sido objeto tanto de esperanza como de críticas, incluido su posible efecto negativo sobre las pequeñas empresas. Exploramos la respuesta heterogénea de las empresas al CETA encontrando un efecto positivo pero dispar por sector de actividad de la empresa, tamaño de empresa y país de la UE. En promedio, el CETA aumentó el número de empresas exportadoras de la UE en alrededor del 11%, encontrándose los mayores impactos estimados para España y Lituania (más del 30%) y los menores para Italia (8,7%) y siendo asimismo mayores para las pequeñas y medianas empresas que para las grandes. Estos resultados subrayan la importancia de tener en cuenta el impactos a nivel de empresa en las evaluaciones de la política comercial.

Palabras clave: Acuerdos de Libre Comercio, CETA, Empresas exportadoras e importadoras, tamaño empresarial, modelo de gravedad.

1. INTRODUCCIÓN

Since Viner (1950) introduced the concepts of trade creation and trade diversion as effects of adopting a customs union, many studies have analysed the effects of signing trade agreements between countries on trade, particularly on the value of bilateral exchanges (Breinlich, 2018; Larch and Yotov, 2024). The interest in accurately measuring the positive impact of trade agreements on trade flows has grown as trade agreements between countries proliferated over time, encouraging the development of new methodologies for their analysis. This is the case of the gravity equation of international trade which, since its first application by Tinbergen (1962), has been improved in its theoretical background and micro-foundations, as well as the model estimation tools, to become a very powerful tool of inferring the response of bilateral trade flows to factors affecting trade costs (Yotov et al., 2016; Larch and Yotov, 2024).

Previous empirical literature shows that free trade agreements (FTAs) often lead to an increase in trade values between the participating countries by reducing or eliminating tariffs, quotas, and other trade restrictions. This positive effect on trade values, in turn, can stimulate economic growth, create jobs, and lead to a wider range of goods and services for consumers. Over the last two decades, along with the development of new theories of international trade with heterogeneous firms, the idea that these gains from trade liberalization are uneven across firms has been gaining momentum.

In the development of gravity modelling, several papers (Helpman et al., 2008; Chaney, 2008; Crozet and Koenig, 2010; Lawless, 2010) have pointed out that the interpretation of parameters that link trade flows to trade barriers has changed according to trade models with heterogeneous firms (Melitz, 2003; Chaney, 2008; Melitz and Ottaviano, 2008). In these models, only a certain subset of heterogeneous firms will export given a specific level of trade costs. As these trade costs decrease following the entry into force of an FTA, two processes are set in motion: an increase in the number of firms exporting to the partner country (the extensive margin), as new and less productive firms enter the export market, and an increase in the volume each firm exports to that market (the intensive margin). Both increases would indicate a trade creation effect and an improvement of competitiveness in the partner's market. The extensive margin depends on the distribution of productivity among firms due to the existence of a productivity threshold for each country that firms must exceed if they are to export to that country. The limited availability of firm-level data over time has constrained research in this area. Previous works using firm-level data (Bernard et al. 2007; Crozet and Koening, 2010; Lawless, 2010) find that factors decreasing (increasing) trade costs between economies increase (decrease) both the intensive and the extensive margins, with a greater effect on the

former than on the latter. Those papers use firm-level data for a single country and, consequently, they cannot control for the exporter and importer multilateral resistances, leading to upwards-biased estimates of the trade costs (Anderson and van Wincoop, 2003). Moreover, none of these studies include FTAs in their estimates[2].

In this context, it is interesting to analyse the effect of FTAs not on aggregate trade flows, but on the number of trading firms, in order to find out to what extent the positive effects of FTAs on trade flows documented in the literature also occurs with regard the number of firms. Since this aspect have rarely been investigated, the aim of the paper is to explore the impact of FTAs on the number of firms engaged in exporting to/importing from FTA partners. We focus not only on exporting but also on importing firms due to the benefits from importing (access to a broader variety of products, cheaper inputs and high-quality inputs) and the positive association between imports and productivity at both the firm and aggregate level (Elliot et al., 2016; Halpern et al., 2015; Newman et al., 2023). Additionally, we want to explore whether or not the effect of FTAs is homogeneous across trading firms with different characteristics, such as the main sector of economic activity of the firm and its size, deepening our knowledge about what type of firms have been able to benefit from reducing trade barriers within the free trade area.

The reason we are interested in firm size is that, although small and medium firms (SMEs) are the majority of businesses in each economy, they usually participate relatively less than large firms in international trade, as SMEs tend to be less productive and are relatively less able to absorb the additional costs associated with entering foreign markets (Bernard et al., 2007; Mayer and Ottaviano, 2008). In the case of EU, exporting SMEs account for almost 90% of total EU exporting enterprises and 28% of the total value of extra-EU exports, supporting over 13 million jobs in Europe (37% of total EU jobs supported by exports) (Cernat et al., 2020). Given the relevance of SMEs, it is important to pay attention to new trade flows arising from new SMEs exporters. However, as Neri et al. (2021) point out, the question of whether FTAs favour relatively large or small firms is ultimately empirical. On the one hand, if small firms are not productive enough to export regardless of the presence of a FTA, only larger and more productive firms would benefit from FTAs. On the other hand, if small and less-productive firms are not far from the productivity threshold for exporting, then an FTA may favour relatively more less productive firms and an increase in the number of small firms exporting to the FTA

[2] A different approach is adopted by Minondo and Requena (2013) who estimate the impact of trade costs on the value of bilateral trade flows adding the number of exporting firms in the gravity equation. Using data for 2005 from OECD-Eurostat Trade by Enterprise Characteristics Database that reports both the value of exports and the number of exporting firms, the authors find that estimates on the impact of regional trade agreements are biased when the number of exporting firms is not controlled for.

partners could be expected. There are only a few works that address this issue, and their results are mixed. Using the Exporters' Dynamics Database for Georgia for the period 2000-2020, Neri et al. (2021) find that large firms are the ones that benefit from deep trade agreements, showing an increase in the value of their exports and a positive effect on the probability of entry into the export market[3]. Chowdhry and Felbermayr (2023) focus on the impact of the EU-South Korea FTA with French customs data from 2000 to 2016 using a triple-difference framework. They find that this FTA benefits larger firms more than smaller ones in terms of sales of incumbent exporters (intensive margin) and it only increases the likelihood of export participation by medium-sized firms (extensive margin). Using data from Korean firms for the period 2004-2015, Park and Park (2023) find that FTAs attract new SMEs to enter the trade bloc, which does not happen in the case of large firms, when they estimate the impacts of FTAs on the several metrics: the number of exporting firms, the export value per firm, and the total export value.

Despite the unclear effects of the FTAs on the number of trading firms by size, FTAs often face criticism for being seen as favouring the interests of major corporations. This suspicion has fuelled public opposition towards extensive mega-regional FTAs such as the EU-Canada Comprehensive Economic and Trade Agreement (CETA). In response, recent FTAs have incorporated sections specifically designed to aid small businesses[4]. Nonetheless, for these measures to be truly effective, the distributional impact of deep FTAs needs to be better understood (Chowdhry and Felbermayr, 2023).

In this paper we focus on CETA as a case study for examining the implications of trade liberalization on the number of trading firms. We believe that CETA is an excellent case study because it is the first trade agreement the EU completed with another major established OECD economy, and it is also the most ambitious agreement either the EU or Canada had concluded at the time. The EU-Canada agreement has been provisionally applied since 21 September 2017. However, some important provisions, in particular those relating to investment protection, have still not been applied pending ratification of the agreement by some Member States (Belgium, Bulgaria, Cyprus, France, Greece, Hungary, Ireland, Italy, Poland, and Slovenia).

---

[3] In a subsequent study (Neri et al., 2023), the authors extend the study to 31 developing countries and their results confirm that the impact of deep trade agreements is positive for large firms (and negative for small firms). This study focusses only on the value of exports, and it does not analyze the impact of the agreements on the likelihood of starting to export. In both studies, the authors measure RTA depth by the number of areas covered by the agreement.

[4] To promote a more inclusive international trade for all sized firms, FTAs are increasingly including provisions related to strengthen SMEs trade-capacity and avoid discrimination. In 2021, 56% of active FTAs encompass at least one provision related to SMEs (WTO, 2022).

The EU and Canada exhibit strong trade ties. Canada ranks 14th among the EU's trading partners for 2022, accounting for almost 1.4% of the EU's total foreign trade in goods. After the United States and China, the EU is Canada's third largest merchandise trading partner, accounting for 8.2% of its foreign trade in goods in 2022. According to European Parliament (2023), trade in goods between the EU and Canada increased by 53% between 2017 and 2022 and trade in services increased by 46%, outperforming other extra-EU trade. In particular, EU's exports to Canada increased by 47% in goods and by 19% in services.

However, conventional international trade statistics do not provide information on the number of firms that are actually engaged in cross-border trade. Consequently, we do not have information on the impact of CETA on the number of firms that trade between the EU and Canada, which remains unexplored. The aim of this paper is to fill this gap by estimating a gravity model to examine this effect using data on the number of exporting and importing firms from the OECD-Eurostat Trade by Enterprise Characteristics (TEC) database[5]. As TEC provides information on trading firms by sector (e.g. industry and wholesale services) and by firm size, the impact of CETA on the number of EU trading firms can be analysed for different types of firms. Furthermore, we explore the heterogeneity across EU countries in the impact of CETA on the number of trading firms.

The rest of the paper is structured as follows. Section 2 provides the necessary background information on the OECD-Eurostat TEC database and describes how the number of trading firms between the EU and Canada has evolved since the entry into force of CETA. This descriptive analysis is provided by the total exporting and importing firms, and by sector and firm size. Section 3 sets out the methodology underpinning our empirical gravity model for examining the impact of the agreement on the number of exporting and importing firms and presents the baseline results. A number of robustness checks are also reported in Section 3. Finally, concluding remarks and policy implications are presented in Section 4.

2. DATA AND DESCRIPTIVE ANALYSIS

The OECD-Eurostat TEC database allows firm-level analysis to be carried out since it contains international annual trade in goods data broken down by different categories of enterprises. Specifically, the TEC database contains data on the number of exporting and

[5] According to TEC data, the merchandise export of the EU to Canada recorded an exceptional growth since CETA came into force. The expansion from 2016 to 2019 reached a record from $29.2 billion to $37.7 billion, an increase of $8.6 billion (29.3%). This rate of increase has been notably higher than that experienced by EU26 exports to all non-EU countries for the same period (16.0%). Additionally, the Canadian merchandise exports to the EU has shown a significant increase at 22.5%, also higher than that of Canadian exports of goods to the rest of the world (17.4%).

importing firms and the value of exports and imports, which are collected in cooperation with Eurostat and directly from National Statistical Authorities. The TEC database is organized in ten different datasets, each one focusing on a specific aspect. Specifically, we use data from two of them: (TEC III) - Trade by partner countries and economic sector, and (TEC X) - Trade by partner countries and size-class.

For the first dataset, data are available for the period 2008-2021; for 27 EU member states, 11 OECD countries (Canada, Costa Rica, Iceland, Israel, Korea, Mexico, Norway, Switzerland, Türkiye, the United Kingdom, and the United States) and 3 non-OCDE countries (Bosnia and Herzegovina, North Macedonia and Serbia) as reporters; and for 49 countries as partners (34 OECD countries plus BRIICS countries, Argentina, Bulgaria, Cyprus, Lithuania, Latvia, Malta, Romania and Saudi Arabia). According to the sector of main economic activity of the trading firm, five categories are distinguished: Total economy, industry, wholesale, retail trade and repair, other sectors, and unspecified sector. Regarding sectoral data, it is important to clarify that the number of EU trading firms resulting from the sum of firms in the different sectors is lower than the number of trading firms in the total EU economy (around 70% for exporting firms and around 55% for importing firms, for the period from the entry in force of CETA). Moreover, bilateral data on trading firms of other sectors is not available since 2011 for all countries and the number of trading firms of unspecified sector decreases over time so that its weight in the sample is residual in the last five years. For these reasons, we focus on firms of both industry and wholesale, retail trade and repair sectors. In recent years, the share of industrial firms is around 28% of total firms in the sample of EU importing firms by economic sector whereas the share of services firms is around 72%. In the case of EU exporting firms, the share of industrial firms rises to the 36% and the share of services firms drops to 64%.

Trade data by partner countries and size-class is available for a shorter period (from 2012 to 2021) and for a fewer number of reporters (22 countries: 15 EU member states and 7 non-EU OECD countries). Firms are classified in six categories according to their size. These categories are the following: 0-9 (micro), 10-49 (small), 50-249 (medium), 0-249 (small and medium firms-SMEs), 250+ employees (large-sized firms) and unknown size. The latter category represents a decreasing share over time, and it is around 3% of total firms categorized by size in recent years. We omit them from the analysis, and we focus on two groups (SMEs and large firms). For EU trading firms, SMEs are around 95% of extra-EU trading firms and large firms are the remaining 5%.

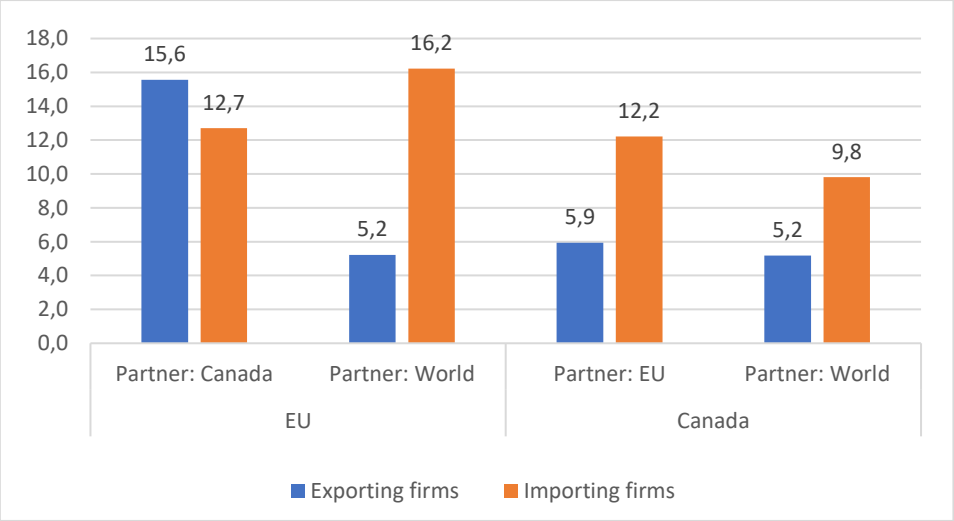
Data from the year 2020 is excluded due to potential confounding effects of the COVID-19 pandemic and because 2021 data is unavailable for several countries. In both datasets,

for some countries, observations for some years are missing, resulting in unbalanced panel datasets. Luxemburg and Denmark as reporters are excluded from the analysis due to data limitations in the panel dataset of trade by partner countries and economic sector. In the case of Luxemburg, data is missing for most partners (including Canada). In the case of Denmark, there is an inconsistency in the data of firms trading with other EU member countries that from 2016 onwards show disproportionately higher values than the values prior to that year. An anomaly in the data of Danish firms trading with the EU aggregate between one time period and another is also found. We observe another anomaly in the data of Irish firms trading with EU member countries for 2017 and 2018, when the number doubles and quadruples, respectively, to return to values similar to those of 2017 in 2019. However, this anomaly is not found in the data for the EU aggregate as a trading partner, so we decided to keep Ireland in the analysis although the results of the empirical model for this country should be taken with caution. Moreover, in the panel dataset of trade by firm's size classes, detailed information for the study period is only available for 13 of the 27 EU countries and for Canada as partner, that is, data for Canada as reporter is missing. These 13 EU countries are the following: Austria, Belgium, Cyprus, Czechia, Denmark, Germany, Lithuania, the Netherlands, Poland, Portugal, Romania, Slovenia, and Spain. For coherence with the prior analysis for the total economy and by sectors, Denmark is omitted from the analysis by firm size.

According to the TEC data, the number of EU firms trading with Canada recorded an increase since CETA came into force (Figure 1). From 2016 to 2019, EU firms that engaged in exports of goods to Canada rose from 60,868 to 70,345. This implies a growth of 15.6% in that period, which is more than 10 percentage points higher than the increase of the total number of exporting firms (5.2%) and of the number of firms exporting to non-EU countries (4.9%). The number of EU firms importing from Canada has increased by 12.7% to reach 72.351 firms in 2019. This growth is higher than that of firms importing from non-EU countries (11.1%), although this gap is much smaller than for exporting firms.

From the Canadian perspective, CETA also appears to have stimulated the number of companies importing from the EU which has grown by 12.2% between 2016 and 2019 (more than two percentage points higher than the increase of the number of Canadian importing firms from the rest of the World). However, the positive effect on exporting firms is less clear since the increase in the number of Canadian firms exporting to the EU (5.9%) is only slightly higher than that of firms exporting to the World (5.2%).

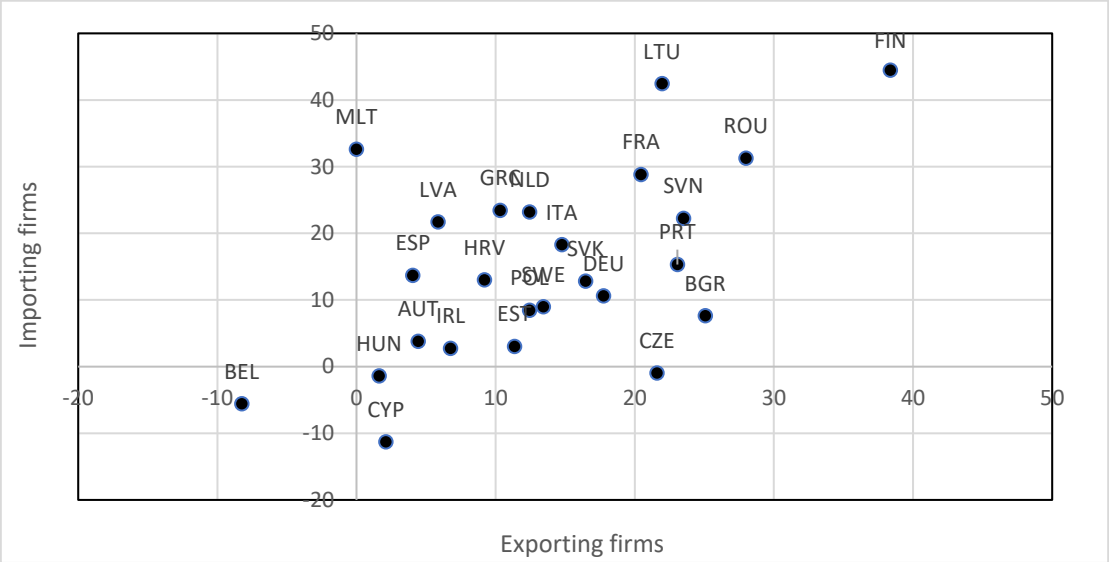
Figure 1: Evolution of the number of EU and Canadian trading firms 2016-2019 (growth in %)



Source: own elaboration from OECD-Eurostat TEC database.

The increase in the number of EU firms exporting to/importing from Canada since CETA adoption takes place in most EU countries (Figure 2). Only one country (Belgium) shows a decrease in both exporting and importing firms. Cyprus, Hungary, and Czechia exhibit a drop only in importing firms. Five countries (Finland, Romania, Lithuania, France, and Slovenia) are the main drivers of the growth in the number of trading firms, with increases above 20% in both exporting and importing firms between 2016 and 2019. Among the most dynamic countries in exporting firms to Canada are also Portugal, Bulgaria, and Czechia whereas Malta, Greece, the Netherlands, and Latvia among those most dynamic in importing firms. In absolute terms, the four largest countries (Germany, France, Italy, and Spain) have both the largest number of exporting firms to Canada in 2019 and the largest increase in that number since 2016. In absolute numbers of importing companies, the top countries are Germany, France, and the Netherlands.

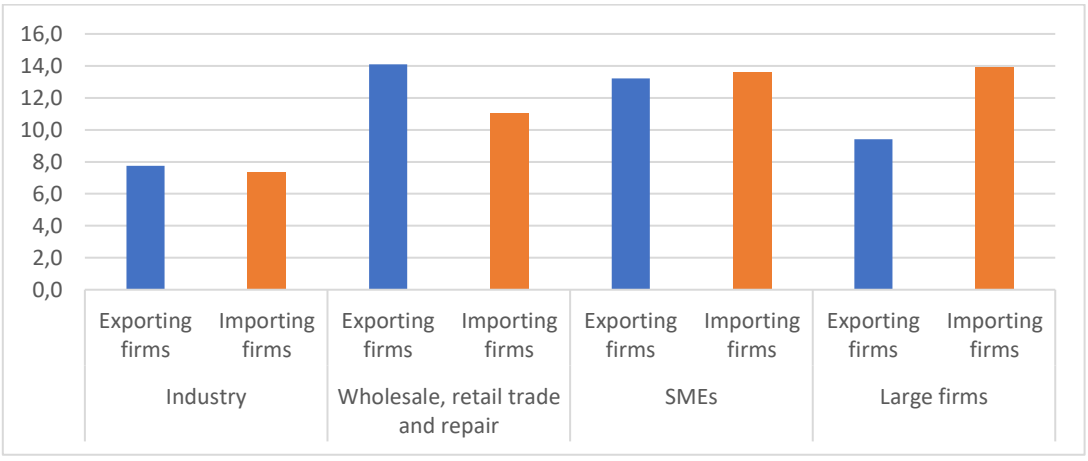
Figure 2: Evolution of the EU trading firms with Canada 2016-2019 (growth in %)



Source: own elaboration from OECD-Eurostat TEC database.

When data is broken down by sector of main economic activity of the trading firm and by size-class, we observe several differences in the evolution of the number of trading firms across sectors and firm-size classes after CETA emerge (Figure 3). The data show that the number of EU firms engaged in cross-border trade with Canada has experienced a higher growth rate between 2016 and 2019 for those firms operating in the wholesale, retail trade and repair sector than those in the industry sector. This happens for both exporting and importing firms. We also find that, in the case of EU exporting firms, the increase in the number of SMEs has been higher than that of large firms, while in the case of EU importing firms, both size classes show a similar growth rate.

Figure 3: Evolution of the EU trading firms with Canada by sector of main economic activity and by size-class 2016-2019 (growth in %)



Source: own elaboration from OECD-Eurostat TEC database.

3. EMPIRICAL MODEL

3.1. Model specification.

Given its solid theoretical foundations and remarkable empirical success to study and quantify the effects of various determinants of international trade and, in particular, the effect of economic integration agreements, we propose to estimate a gravity equation to quantify the impact of CETA entry in force on the number of EU firms exporting to and importing from Canada. The estimating equations, which are in multiplicative form, are given by the following expressions:

$$X_{ij,t} = \exp\left(\beta_0 CETA_{ij,t} + \beta_1 Other\_PTAs_{ij,t} + \sum_t \beta_t EU\_trend_{ij,t} + \eta_{ij} + \chi_{i,t} + \lambda_{j,t}\right) \times \epsilon_{ij,t} \quad (1)$$

$$X_{ijs,t} = \exp\left(\beta_0 CETA_{ij,t} * D_s + \beta_1 Other\_PTAs_{ij,t} + \sum_t \beta_t EU\_trend_{ij,t} + \eta_{ijs} + \chi_{is,t} + \lambda_{js,t}\right) \times \epsilon_{ijs,t} \quad (2)$$

$$X_{ijz,t} = \exp\left(\beta_0 CETA_{ij,t} * D_z + \beta_1 Other\_PTAs_{ij,t} + \sum_t \beta_t EU\_trend_{ij,t} + \eta_{ijz} + \chi_{iz,t} + \lambda_{jz,t}\right) \times \epsilon_{ijz,t} \quad (3)$$

In all equations, we estimate the model twice, once with each type of trading firms as dependent variable ($X_{ij,t}$): (a) the number of firms from country *i* exporting to country *j* at time *t* and (b) the number of firms from country *i* importing from country *j* at time *t*. The estimating equation (1) is for trading firms for total economy, whereas (2) is for trading firms by sector of the main economic activity (subscript *s*) and (3) is for trading firms by size class (subscript *z*). Estimating equations (2) and (3) allow to disentangle the impact of CETA on the number of trading firms for different sectors (captured by a sectoral dummy, *D*s) and different firm sizes (captured by a size dummy, D_z). We pool together the data across the two main sectors for estimating equation (2) and across the two main firm sizes for estimating equation (3). To explore heterogeneity in the CETA coefficient across sectors and firm sizes, we follow French and Zylkin (2024) who suggest using pooled PPML estimates instead of product-by-product estimates when they estimate a gravity model for quantifying the effects of FTAs on least-traded products using pooled product-level bilateral trade data.

EU firms exporting to/importing from other EU countries (intra-EU trade) are included. Data come from OECD-Eurostat TEC database. The period of analysis is 2008-2019 when data is for total economy and by sector of main economic activity. When data is by firms' size-class, the period of analysis is 2012-2019. All are unbalanced panel datasets.

Our policy variable of interest is $CETA_{ij,t}$, which is a binary variable that takes value one if country *i* is any EU country and country *j* is Canada or vice versa in the year of CETA

entry in force (2017) and subsequent years, and zero otherwise. In addition, we include other bilateral indicator covariates to control for any other trade agreement between any country pair *ij* included in the sample that has entered into force in the period 2013-2020 ($Other\_PTA_{ij,t}$). These agreements are the following: EU enlargement (Croatia, 2013), Korea - Türkiye (2013), Australia - Korea (2014), China - Korea (2015), Canada - Korea (2017) and EU - Japan (2019).

As the number of EU firms trading with other EU countries are included in the dependent variable, we add an EU-specific trend in the gravity equations ($EU\_trend_{ij,t}$) to take into account for long-term trends in European trading firms as a result of the ongoing economic integration among EU countries (Esteve-Pérez et al., 2020).

Moreover, different types of fixed effects are included. Country-pair fixed effects (η_{ij}) allow both to control for the impact of observed and unobserved time-invariant determining factors of bilateral trade that may be correlated with our policy variable of interest (the adoption of CETA) and alleviate endogeneity concerns regarding that policy variable (Baier and Bergstrand, 2007). To control for unobservable multilateral resistances (Anderson and van Wincoop, 2003), and, potentially, for any other observable or unobservable characteristics that vary over time for each exporter and importer country, we include time-varying country-specific fixed effects (Baier and Bergstrand, 2007; Baldwin and Taglioni, 2007; Olivero and Yotov, 2012). In particular, $\pi_{i,t}$ is a vector of exporter-time fixed effects and $\chi_{j,t}$ is a vector of importer-time fixed-effects. Finally, $\epsilon_{ij,t}$ denotes the error term. All the above applies to estimating equation (1). For estimating equation (2) and (3), we add an additional dimension (the sector indexed by subscript *s* and the firm size indexed by the subscript *z*, respectively) to the different set of fixed effects and to the error term.

As Yotov et al. (2016) suggest for estimating gravity equations, we use panel data techniques to account for unobserved bilateral heterogeneity and endogeneity and Poisson Pseudo Maximum Likelihood (PPML) estimator to deal with econometric problems resulting from heteroskedastic residuals and the prevalence of zeros in bilateral trade flows. We follow the estimation strategy proposed by Correia, Guimaraes, and Zylkin (2020) that allows estimating the gravity equation using PPML with the three sets of high-dimensional fixed effects, which is the workhorse method for empirical trade policy analysis (Weidner and Zylkin, 2021).

3.2. Econometric results: baseline specifications.

The estimation results are displayed in Table 1. The CETA entry into force has a positive and statistically significant effect on the number of exporting firms (column 1). The

coefficient value of CETA variable is 0.106 for the exporting firms, which involves a positive effect on the number of exporting firms of 11.2% ([exp(0.106)-1]*100=11.2%). However, our estimates do not find that CETA boosts the number of importing firms since the estimated coefficient is not statistically significant (column 2). Regarding the other trade agreements, their impact on the number of trading firms is also not statistically significant. The coefficient for EU trend suggests that the process of deepening European integration positively affects the number of trading firms and, consequently, it is important to take it into account in the estimates.

Table 1. The impact of CETA and other preferential trade agreements on the number of trading firms. Total Economy. PPML estimates.

	Exporting firms (1)	Importing firms (2)
CETA	0.106	0.038
	(0.037)***	(0.042)
Other_PTAs	0.015	0.016
	(0.027)	(0.036)
EU_trend	0.029	0.022
	(0.005)***	(0.009)**
Constant	9.069	9.355
	(0.022)***	(0.031)***
Observations	20,432	20,335

Notes: The regressand is the number of exporting firms in column (1) and the number of importing firms in column (2), measured by dyad-year. Robust standard errors, clustered by dyad, are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All regressions include country-pair, exporter-time, and importer time-fixed effects but their estimates are not reported for brevity. The sample includes annual data for consecutive years over the period 2008-2019.

Next, we explore the CETA effect on the number of exporting and importing firms by EU country. This impact may be different across European countries depending on firm demographics across sector and firm-size since the removal or reduction of trade barriers is not the same for all sectors and the opportunities offered by the CETA agreement may be different across sector and across firms-size. Therefore, our previous estimates of the average impact of CETA may be masking heterogeneous effects. Estimation results for each EU country and the remaining EU countries as a whole (EUwoAUT, EUwoBEL…) are reported in Table 2. Our estimation results confirm that there are heterogeneous effects by EU country of CETA entry in force on the number of exporting and importing firms to/from Canada.

Table 2. The impact of CETA on the number of EU trading firms with Canada by EU country. Total economy. PPML estimates.

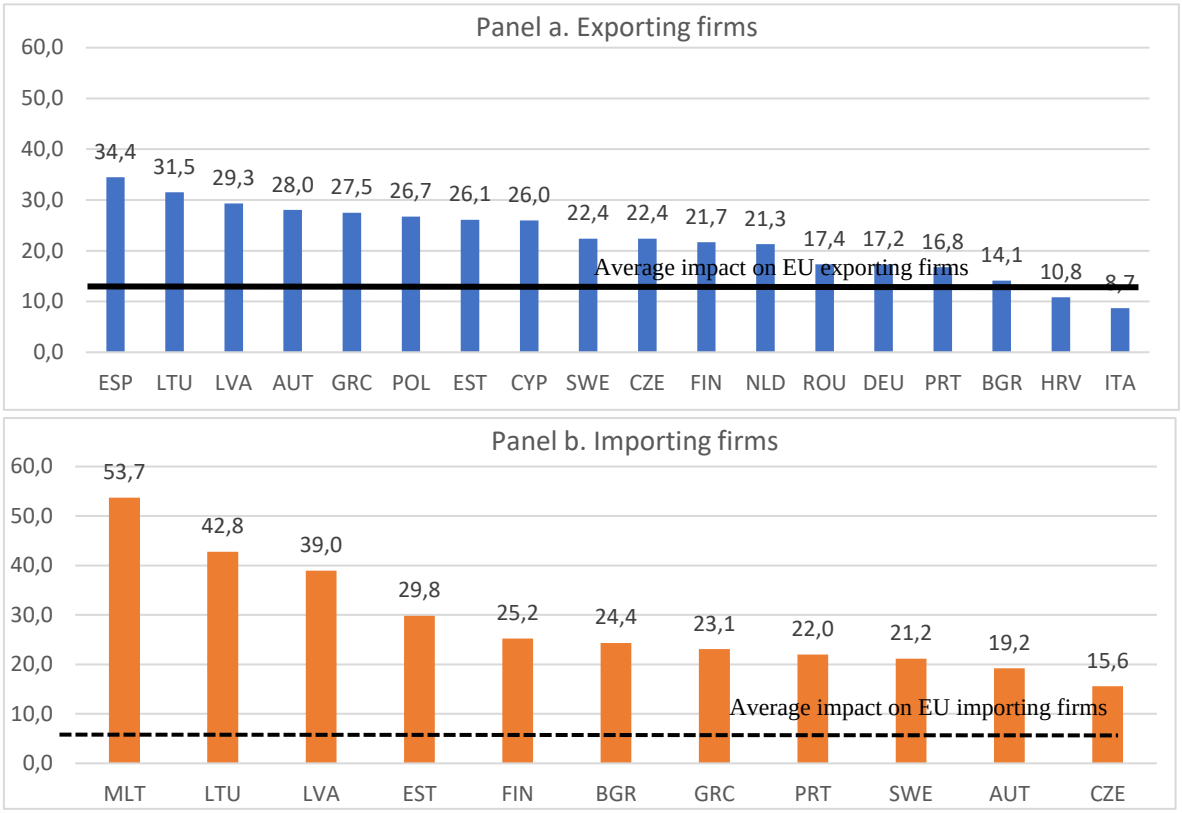
No. of exporting firms				No. of importing firms			
AUT	0.247	HUN	-0.283	AUT	0.176	HUN	-0.161
	(0.044)***		(0.222)		(0.052)***		(0.296)
EUwoAUT	0.103	EUwoHUN	0.109	EUwoAUT	0.033	EUwoHUN	0.042
	(0.037)***		(0.037)***		(0.042)		(0.042)
BEL	-0.182	IRL	-0.730	BEL	-0.328	IRL	-0.717
	(0.146)		(0.460)		(0.352)		(0.702)
EUwoBEL	0.116	EUwoIRL	0.117	EUwoBEL	0.052	EUwoIRL	0.048
	(0.037)***		(0.036)***		(0.042)		(0.042)
BGR	0.132	ITA	0.083	BGR	0.218	ITA	0.056
	(0.035)***		(0.027)***		(0.070)***		(0.089)
EUwoBGR	0.106	EUwoITA	0.111	EUwoBGR	0.036	EUwoITA	0.035
	(0.037)***		(0.042)***		(0.042)		(0.044)
CYP	0.231	LTU	0.274	CYP	0.098	LTU	0.356
	(0.039)***		(0.052)***		(0.071)		(0.065)***
EUwoCYP	0.106	EUwoLTU	0.105	EUwoCYP	0.038	EUwoLTU	0.036
	(0.037)***		(0.037)***		(0.042)		(0.042)
DEU	0.159	LVA	0.257	DEU	0.028	LVA	0.329
	(0.031)***		(0.057)***		(0.093)		(0.079)***
EUwoDEU	0.097	EUwoLVA	0.105	EUwoDEU	0.040	EUwoLVA	0.037
	(0.040)**		(0.037)***		(0.044)		(0.042)
CZE	0.202	MLT	0.031	CZE	0.145	MLT	0.430
	(0.032)***		(0.145)		(0.059)**		(0.176)**
EUwoCZE	0.104	EUwoMLT	0.106	EUwoCZE	0.035	EUwoMLT	0.037
	(0.037)***		(0.037)***		(0.042)		(0.042)
ESP	0.296	NLD	0.193	ESP	0.059	NLD	0.022
	(0.047)***		(0.068)***		(0.074)		(0.108)
EUwoESP	0.089	EUwoNLD	0.100	EUwoESP	0.036	EUwoNLD	0.039
	(0.035)**		(0.038)***		(0.043)		(0.043)
EST	0.232	POL	0.237	EST	0.261	POL	0.083
	(0.065)***		(0.034)***		(0.096)***		(0.106)
EUwoEST	0.105	EUwoPOL	0.101	EUwoEST	0.037	EUwoPOL	0.036
	(0.037)***		(0.037)***		(0.042)		(0.043)
FIN	0.196	PRT	0.155	FIN	0.225	PRT	0.199
	(0.048)***		(0.035)***		(0.057)***		(0.070)***
EUwoFIN	0.104	EUwoPRT	0.105	EUwoFIN	0.034	EUwoPRT	0.034
	(0.037)***		(0.037)***		(0.042)		(0.042)
FRA	-0.006	ROU	0.160	FRA	0.027	ROU	-0.008
	(0.049)		(0.035)***		(0.067)		(0.135)
EUwoFRA	0.123	EUwoROU	0.105	EUwoFRA	0.039	EUwoROU	0.038
	(0.036)***		(0.037)***		(0.044)		(0.042)
GRC	0.243	SVN	-0.053	GRC	0.208	SVN	0.127
	(0.061)***		(0.095)		(0.076)***		(0.150)
EUwoGRC	0.104	EUwoSVN	0.106	EUwoGRC	0.036	EUwoSVN	0.037
	(0.037)***		(0.037)***		(0.042)		(0.042)
HRV	0.103	SVK	-0.111	HRV	0.073	SVK	0.015
	(0.033)***		(0.134)		(0.087)		(0.160)
EUwoHRV	0.106	EUwoSVK	0.107	EUwoHRV	0.038	EUwoSVK	0.038
	(0.037)***		(0.037)***		(0.042)		(0.042)
		SWE	0.202			SWE	0.192
			(0.037)***				(0.061)***
		EUwoSWE	0.102			EUwoSWE	0.031
			(0.038)***				(0.043)

Notes: The regressand is the number of exporting and importing firms, measured by dyad-year. Robust standard errors, clustered by dyad, are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All regressions include country-pair, exporter-time, and importer time-fixed effects. The estimates of all fixed effects and other covariates are not reported for brevity. The sample includes annual data for consecutive years over the period 2008-2019.

In the case of exporting firms, most EU countries (18 of the 25 EU countries) exhibit positive and significant coefficients. Their magnitudes range from 0.296 (Spain) and Lithuania (0.274) to 0.083 (Italy) and Croatia (0.103). That is, the CETA's entry in force increases the number of exporting firms by 34.4% in Spain and 31.5% in Lithuania (highest increases), and by 10.8% in Croatia and 8,7% in Italy (lowest increases) (Figure 4, panel a). For seven EU countries (Malta, France, Slovenia, Slovakia, Belgium, Hungary, and Ireland), CETA has not a statistically significant effect on the number of exporting firms.

In the case of importing firms (Figure 4, panel b), less than half of EU countries (10 of the 25) exhibit statistically significant coefficients and all of them with a positive sign. The magnitudes of these positive coefficients suggest that the increase in the number of importing companies after the entry into force of CETA has ranged from 54% in Malta to 12% in Czechia. Other countries with positive impact are recent EU member states such as Lithuania, Latvia, Estonia, and Bulgaria. Finland, Greece Portugal, and Austria are added to them. Therefore, CETA appears to have stimulated the number of companies exporting to Canada in most EU countries while encouraging more companies to import from Canada in only a few countries. Eastern European countries such as Lithuania, Latvia and Estonia are among the countries with the largest increase in both exporting and importing firms.

Figure 4: Impact of CETA on number of EU firms exporting to/importing from Canada, by EU country (estimated increase)



Notes: The estimated increase of each country is calculated from Table 2 results. Only those countries with statistically significant coefficients are included. The line represents the estimated average impact of CETA on EU trading firms which is calculated from Table 1. The dashed line indicates that the estimated average coefficient is not statistically significant.

3.3 Heterogeneity by sector of main economic activity and by size-class.

The disaggregation of trading firms' data by sector of main economic activity and by size-class from TEC allow us to explore heterogeneity in the impact of CETA for, on the one hand, industrial and services firms and, on the other, SMEs and large firms. We re-estimate the model twice: (i) by separating the trading firms between industrial and services firms, (ii) by separating the trading firms between SMEs and large firms. At this point, it is important to emphasize that the sample size of the latter is smaller than that of the former and that of the total economy. Results using the pooled sample by sector are displayed in Table 3 whereas results using the pooled sample by size are reported in Table 4. In both tables, columns (1) and (2) show the average estimates and columns (3) and (4) the disaggregated estimates by sector and by size classes.

The estimated average impacts of CETA on the number of exporting and importing firms using the pooled sample by sector are similar to those from the sample for the total economy. We find evidence of heterogeneity in pooled estimates by sector (Table 3). Our estimates suggests that the entry into force of CETA has encouraged a greater number of industrial companies to trade between the EU and Canada. The positive impact has been higher for exporting firms (with an estimated increase of 15.3%) than for importing firms (11.2%). However, the impact on services companies is only statistically significant for exporting firms but not for importing firms. The estimated increase for exporting firms is lower in the case of services firms (8.4%) than in the case of industrial firms. The other trade agreements only seem to have stimulated the number of importing companies, although the estimated coefficient is only statistically significant at the 10% level. As in previous estimates, the process of deepening European integration positively affects the number of trading firms.

Table 3. The impact of CETA and other preferential trade agreements on the number of trading firms by sector. PPML estimates.

	Exporting firms (1)	Importing firms (2)	Exporting firms (3)	Importing firms (4)
CETA	0.118	0.048		
	(0.026)***	(0.029)		
CETA_Industry	-	-	0.142	0.106
			(0.027)***	(0.041)***
CETA_Services	-	-	0.081	0.013
			(0.046)*	(0.034)
Other_PTAs	0.023	0.072	0.023	0.072
	(0.030)	(0.029)**	(0.030)	(0.029)**
EU_trend	0.026	0.016	0.027	0.016
	(0.004)***	(0.006)***	(0.004)***	(0.006)***
Constant	8.266	8.350	8.266	8.350
	(0.021)***	(0.022)***	(0.021)***	(0.022)***
Observations	39,179	39,077	39,179	39,077

Notes: The regressand is the number of exporting and importing firms, measured by dyad-sector-year. Robust standard errors, in parenthesis, are clustered by dyad and sectors. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All regressions include country-pair sector, exporter-sector-time, and importer-sector-time fixed effects but their estimates are not reported for brevity. The sample includes annual data for consecutive years over the period 2008-2019.

When the pooled sample by size is used (Table 4), which is a smaller sample both in terms of the included EU countries and the time period, the coefficient of CETA is again only statistically significant for exporting firms and its estimated average effect is lower (with an increase of 8.3%) than that found from the sample for the total economy (11.2%). We also observe heterogeneity in pooled estimates by size. The estimates show a positive impact of CETA on exporting companies regardless of their size. The magnitude of the

impact is higher for SMEs (with an increase of 8.5%) than for large firms (7.0%). The coefficients for importing firms are not statistically significant for either of the two size-classes. Here, the effect of other trade agreements is positive and statistically significant only for exporting firms. The same happens for the EU trend variable.

Table 4. The impact of CETA and other preferential trade agreements on the number of trading firms by size. PPML estimates.

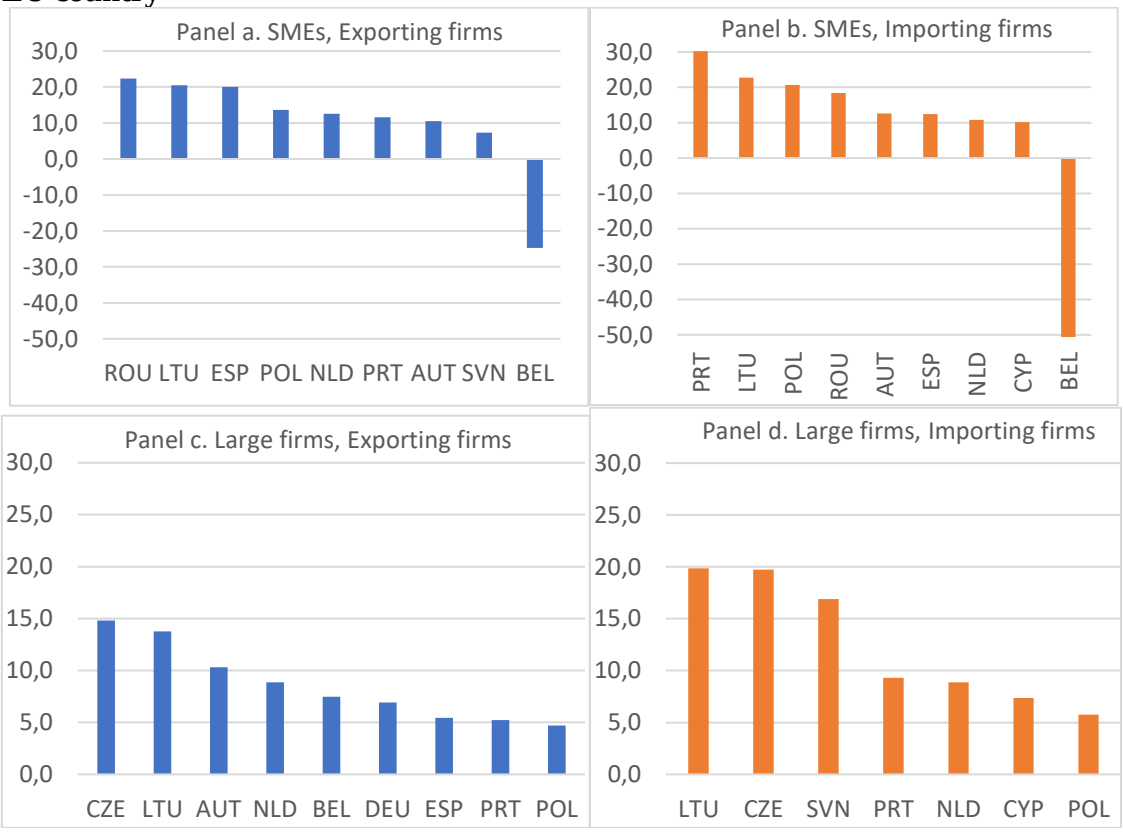
	Exporting firms (1)	Importing firms (2)	Exporting firms (3)	Importing firms (4)
CETA	0.080	0.030		
	(0.023)***	(0.057)		
CETA_SMEs	-	-	0.082	0.030
			(0.025)***	(0.065)
CETA_Large	-	-	0.068	0.034
			(0.016)***	(0.033)
Other_PTAs	0.091	-0.075	0.091	-0.075
	(0.025)***	(0.056)	(0.025)***	(0.056)
EU_trend	0.019	0.005	0.019	0.005
	(0.007)***	(0.012)	(0.007)***	(0.012)
Constant	8.330	8.952	8.330	8.952
	(0.039)***	(0.058)***	(0.039)***	(0.058)***
Observations	11,873	11,900	11,873	11,900

Notes: The regressand is the number of exporting and importing firms, measured by dyad-size-year. Robust standard errors, in parenthesis, are clustered by dyad and size-classes. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All regressions include country-pair size, exporter-size-time, and importer-size-time fixed effects but their estimates are not reported for brevity. The sample includes annual data for consecutive years over the period 2012-2019.

Next, we go one step further and investigate what the impact has been on trading firms by sector and size for each EU country. The estimation results by sector of main economic activity are reported in Table A1 of the appendix. Using the coefficients from Table A1, we calculate the estimated impact of CETA on the number of exporting and importing firms by sector for each EU member state which are shown in Figure 5. In most EU countries (19 of 25), CETA has had a positive and statistically significant impact on the number of industrial firms exporting to Canada (Figure 5, panel a). The highest increase is found in Cyprus, Estonia, and Spain (higher than 30%). The estimated increase is between 20% and 30% in eight countries (Poland, Lithuania, Greece, Latvia, Czechia, Finland, Austria, and the Netherlands) and between 10% and 20% in the remaining eight. Only in six countries there is not a significant effect (Belgium, France, Ireland, Malta, Hungary, and Slovakia). When the impact on exporting firms operating in the services sector is estimated, the results are more heterogeneous (Figure 5, panel c). Sixteen EU countries exhibit positive and statistically significant effects with increases higher than 30% in six countries (Spain, Lithuania, Austria, Latvia, Estonia, and Poland) and around 25% in other three countries (Greece, the Netherlands and Sweden). Hence, countries

such as Spain, Estonia, Greece, Austria, Latvia, Poland, and the Netherlands seems to be those with the largest new trade flows in terms of more exporting firms in both sectors. In six countries, CETA does not significantly affect the exporting firms operating in the services sector. This is again the case in France, Malta, and Slovakia, where there was no effect on industrial exporting companies either, and in Italy, Cyprus, and Slovenia. In four countries (Belgium, Ireland, Hungary, and Croatia), negative and statistically significant effects are found. The anomaly in the data for Ireland explained in Section II may be behind the large negative coefficient for Irish exporting firms in the service sector as this data anomaly is particularly high for these firms.

Figure 5: Impact of CETA on the number of EU exporting to Canada, by sector and EU country



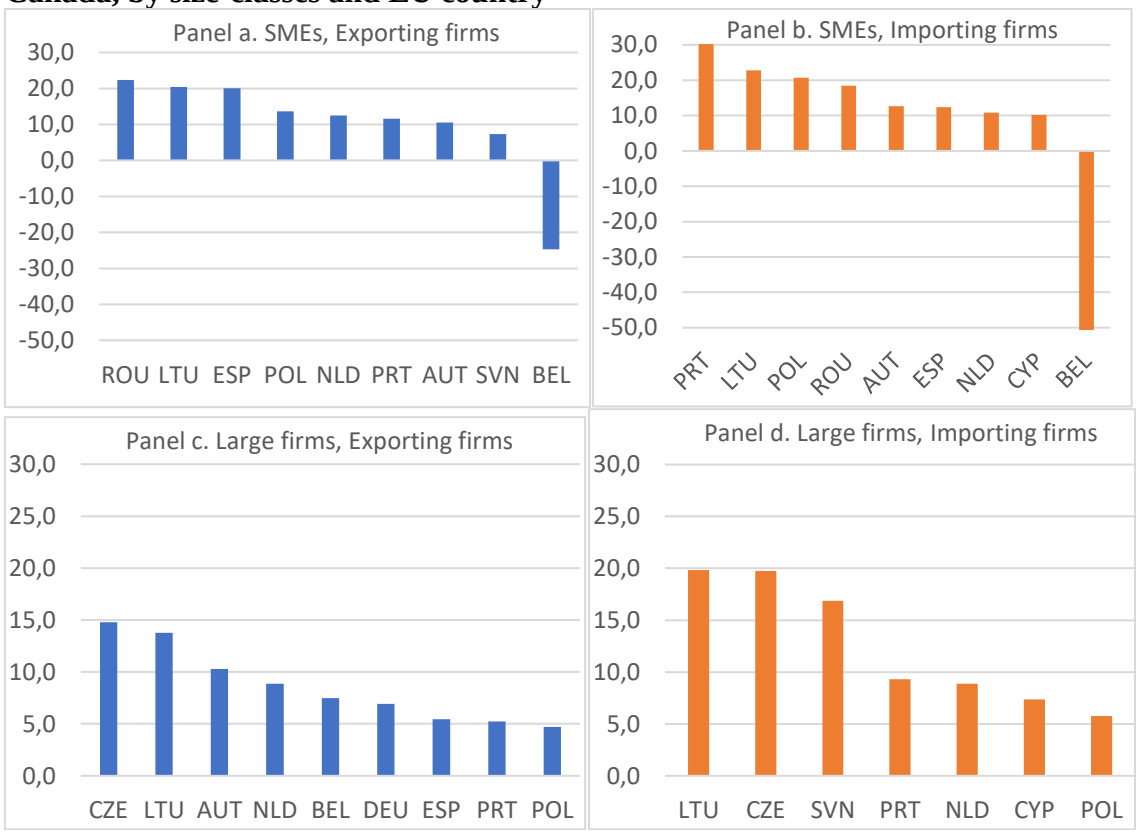
Notes: The estimated increase of each country is calculated from Table A1 of the Appendix. Only those countries with statistically significant coefficients are included.

When we focus on importing firms, we find more statistically significant coefficients for industrial firms (Figure 5, panel b) than for services firms (Figure 5, panel d). All these significant coefficients exhibit a positive sign. For industrial firms, the estimation results suggest an increase in the number of importing firms for sixteen EU countries. The

highest increases are found in countries for Malta and some Eastern European economies such as Lithuania, Latvia, Poland, Estonia, Czechia, and Bulgaria. Belgium, Germany, Italy, the Netherlands, Ireland, Cyprus, Hungary, Slovenia, and Slovakia are the economies with no significant impact. For services firms, significant increases in the number of importing firms are found only for eight countries (Lithuania, Latvia, Finland, Austria, Bulgaria, Estonia, Portugal, and Sweden). Overall, we highlight Lithuania and Latvia as countries with largest increases of trading firms from both perspectives, export and import, and for both sectors, industry and services.

In order to explore if there are differences in the impact of CETA on the number of exporting and importing firms by firm-size, we run regressions to allow decompositions of the impact for both SMEs and large firms. The estimation results are reported in Table A2 of the Appendix. It must be taken into account that the sample of EU countries for these estimates is not the same than that used for previous estimates because for some countries there are not data disaggregated by firm size for the period of study. Using the coefficients from Table A2, we calculate the estimated impact on the number of exporting and importing firms by size-classes for each EU member state which are shown in Figure 6. From the export perspective (panel a and panel c of Figure 6), we find a positive and statistically coefficient in most EU countries for both SMEs (8 of 13 countries) and large firms (9 of 13 countries). That is, the trade agreement between the EU and Canada boosts the number of SMEs and large firms exporting to Canada. The estimated increases are the highest for Romania, Lithuania, and Spain in the case of SMEs (around 20%) and in Czech Republic, Lithuania, and Demark in the case of large firms (over 10%). Only one country (Belgium) exhibits a negative and statistically significant coefficient for the effect of CETA on the number of SMEs exporting to Canada. In both sizes, three countries have non-statistically significant coefficients: Cyprus, Germany and Czechia in SMEs and Cyprus, Romania, and Slovenia in large firms. From the import perspective, the list of countries with an estimated increase of large firms are almost identical to that of SMEs but the order varies (panel b and d of Figure 6). Cyprus is added to the list of countries with positive and statistically significant coefficient and Slovenia is dropped. Portugal, Lithuania, and Poland exhibit the larger estimated increases (over 20%). According to our estimates, there are a significant and positive effect of CETA on the number of large firms importing from Canada for a fewer number of countries (panel d of Figure 6). Of the seven countries, Lithuania and Czechia show the highest estimated increases (around 20%). As in the case of the sector analysis, Lithuania stands out among the countries with the largest increase of more trading firms for both perspectives, exporting and importing, and for both sizes, SMEs and large firms.

Figure 6: Impact of CETA on the number of EU exporting to/importing from Canada, by size-classes and EU country



Notes: The estimated increase of each country is calculated from Table A2 of the Appendix. Only those countries with statistically significant coefficients are included.

3.4. Sensitivity analysis.

In previous estimates, EU firms exporting to/importing from other EU countries are included, considering these EU member states like any other trading partner. However, it would be interesting to account for the fact that the EU is a common market and, consequently, intra-EU trade costs are lower than extra-EU trade costs. For that reason, we re-estimate the model treating intra-EU flows as domestic trade. To do that, for each EU country, we replace the number of trading firms with each of the other EU member states by the number of firms that export to/import from the EU common market. TEC provides aggregate data for the EU as trade partner. Again, we add to the model an EU-specific trend ($EU\_trend_{ij,t}$) which is constructed by interacting the EU dummy with a time trend dummy. This variable would be similar to add a set of time-varying bilateral border indicators ($INTER_{ij,t}$) which takes the value of one for extra-EU trade flows and the value of zero for intra-EU trade flows. By this way, we follow Bergstrand et al. (2015), Yotov et al. (2016) and Yotov (2022) who suggest including both international and intra-national trade flows in the dependent variable to avoid bias due to the globalization in the

estimation of the effect of trade policies. Here it is important to note that domestic trade is only available for the EU. Estimation results are displayed in Table 5.

The estimation results for the total economy are similar to those including intra-EU trade. The impact of CETA is almost identical. The only difference is that the impact of other PTAs becomes positive and statistically significant for both exporting and importing firms. When pooled estimates are run for the two sectors, the sign and statistical significance of the coefficients of CETA dummy variable are also similar to those including intra-EU trade, although the magnitude of the impact is lower for industrial companies (around four percentage points for both exporters and importers) and higher for service companies (where it remains statistically significant only for exporting companies). When pooled estimates are run for SME and large firms, the impact of CETA is almost equal for SMEs exporting and importing to Canada to that including intra-EU trade but it is higher for large exporting firms (with an increase of 9,1%) and becomes statistically significant for large importing firms with an increase similar to that of exporting firms.

Table 5. The impact of CETA and other preferential trade agreements on the number of trading firms by Total Economy, Sector and by Size-classes. EU as internal market. PPML estimates.

By Total Economy			By sector			By size		
	Exporting firms (1)	Importing firms (2)		Exporting firms (3)	Importing firms (4)		Exporting firms (5)	Importing firms (6)
CETA	0.098	0.044	CETA_Industry	0.108	0.067	CETA_SMEs	0.084	0.056
	(0.027)***	(0.044)		(0.023)***	(0.041)*		(0.027)***	(0.052)
			CETA_Services	0.108	0.042	CETA_Large	0.087	0.082
				(0.024)***	(0.037)		(0.022)***	(0.029)***
Other_PTAS	0.046	0.047	Other_PTAs	0.065	0.075	Other_PTAs	0.097	-0.043
	(0.023)**	(0.018)***		(0.017)***	(0.024)***		(0.022)***	(0.025)*
EU_trend	0.001	0.002	EU_trend	0.002	-0.001	EU_trend	0.026	0.046
	(0.007)	(0.007)		(0.005)	(0.005)		(0.013)*	(0.020)**
Constant	9.694	10.459	Constant	8.762	9.292	Constant	9.239	10.412
	(0.015)***	(0.024)***		(0.010)***	(0.017)***		(0.046)***	(0.098)***
Observations	12,757	12,636	Observations	24,167	23,921	Observations	7,025	6,991

Notes: The regressand is the number of exporting and importing firms, measured by dyad-year in columns (1) and (2), by dyad-sector-year in columns (3) and (4) and by dyad-size-year in columns (5) and (6). Robust standard errors, in parenthesis, are clustered by dyad in (1) and (2), by dyad and sectors in (3) and (4) and by dyad and size-classes in (5) and (6). ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. Regressions (1) and (2) include country-pair sector fixed effects, exporter-sector-time, and importer-sector-time fixed effects. Regressions (3) and (4) include country-pair size fixed effects, exporter-size-time, and importer-size-time fixed effects. The estimates of all fixed effects and other covariates are not reported for brevity. The sample includes annual data for consecutive years over the period 2008-2019 for regressions by sector and over the period 2012-2019 for regressions by firm size.

Again, these are average effects for EU countries, but it is interesting to study if there are differences in the heterogeneous effects by EU country between the two samples. Our estimation results show that these differences exist. Estimation results for each EU country are omitted for brevity but are available under request. For total economy estimates, a higher number of EU countries exhibit positive and statistically significant coefficients when we treat intra-EU flows as domestic trade. Four countries (France, Hungary, Slovakia, and Slovenia) are added to those with significant increase in the number of exporting firms to Canada after CETA entry in force although two countries (Finland and Sweden) lose its statistical significance. From the import perspective, six countries (France, the Netherlands, Poland, Romania, Slovenia, and Croatia) are added while five countries (Spain, Finland, Sweden, Cyprus, and Estonia) are removed. When the effect of CETA is estimated separately in industrial and services firms, the differences in the heterogeneity by EU countries in industrial firms is similar to those in total economy. For services firms, the main difference is that those countries with negative coefficients lose their statistical significance and new countries are added to those with estimated significant increases in the case of exporting firms and the number of countries with estimated significant increases almost double in the case of importing firms. When the effect of CETA is estimated separately for SMEs and large firms, we find two remarkable differences: (i) the only country (Belgium) with negative and statistically significant coefficients for both exporting and importing SMEs becomes not statistically significant; (ii) positive and statistically significant increases in the number of importing companies are found in fewer countries (only three countries) for small companies and in more countries (10 countries) for large companies, which explains why the average impact for EU large companies is now significant.

4. CONCLUDING REMARKS.

Using a gravity regression model with firm-level panel data to quantitatively investigate the impact of CETA on the number of trading firms, we find that the EU-Canada agreement has significantly boosted the number of EU firms engaged in trading goods with Canada, with notable growth in most EU countries, specifically for exporting firms. These findings suggest that the agreement has facilitated new trade flows by reducing trade barriers, thereby increasing the number of firms participating in cross-border trade. The impact of CETA vary across different EU countries, with some countries, such as Lithuania, Latvia and Estonia exhibiting substantial increases in the number of trading firms, while others show more modest gains. The study identifies a few countries where the impact of CETA on the number of trading firms is not statistically significant,

suggesting that the "extensive margin" benefits of the agreement are not evenly distributed across all EU member states.

According to the related literature, the impact of FTAs is not uniform across all firms; large firms would tend to benefit more due to their higher productivity and ability to absorb trade costs, but SMEs also would experience significant gains, especially when they are close to the productivity threshold required for exporting. The use of firm-level data on trade in goods from the TEC database allows for a detailed analysis of the effects of CETA across different sectors and firm sizes, providing a comprehensive understanding of the impact of the agreement. The estimated increase in the number of SMEs exporting to Canada has been higher than that of large firms, while the impact of CETA on the number of importing firms is not statistically significant for either size class. Furthermore, our study reveals that the number of EU firms engaged in cross-border trade with Canada has grown more significantly in industrial sector compared to the wholesale, retail trade, and repair sectors with a larger effect for exporting than for importing firms. Looking at the sectoral and size dimensions, we also observe a high degree of heterogeneity in firms' responses to CETA across EU countries.

These findings underscore the importance of considering firm-level impacts in trade policy assessments. Our approach places the trading firms at the centre of those trade policy assessments because firms, not countries, are the entities that trade. Consequently, it is the competitiveness of these firms that determines a country's overall competitiveness (Cernat and Guinea, 2023). Policymakers should recognize that FTAs can have differential effects on firms of different sizes and sectors and pay more attention to these distributional impacts of trade agreements across firms. To promote inclusive international trade, recent FTAs have increasingly incorporated provisions that specifically support SMEs but the effectiveness of such provisions is best evaluated via ex-post analyses. The inclusion of SME-specific provisions in FTAs is crucial for promoting a more inclusive and equitable international trade environment. In summary, our findings emphasize two important points: (i) the need for trade policies to consider the heterogeneous effects on different types of firms and sectors and (ii) the need to consider the heterogeneous effects of FTAs across EU countries, ensuring that the benefits of trade liberalization are widely shared.

References:

Anderson, J. E. & van Wincoop, E. (2003). Gravity with gravitas: a solution to the border puzzle. American Economic Review, 93 (1), 170-192.

Baldwin, R. & Taglioni, D. (2007). Trade effects of the euro: A comparison of estimators. Journal of Economic Integration, *22*(4), 780–818.

Baier, S. L. & Bergstrand, J. H. (2007). Do free trade agreements actually increase members' international trade? Journal of International Economics, 71(1), 72-95.

Bergstrand, J. H., Larch, M., & Yotov, Y. V. (2015). Economic integration agreements, border effects, and distance elasticities in the gravity equation. European Economic Review, 78, 307-327. https://doi.org/10.1016/j.euroecorev.2015.06.003

Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. (2007). Firms in international trade. Journal of Economic Perspectives, 21(3), 105–30.

Breinlich, H. (2018). The economic effects of FTAs. In Looney, R. E. (Ed.), Handbook of International Trade Agreements: Country, regional and global approaches (1st ed.). Routledge. https://doi.org/10.4324/9781351046954

Cernat, L., Jakubiak, M., & Preillon, N. (2020). The Role of SMEs in extra-EU Exports: Key performance indicators. Chief Economist Note, Issue 1, DG TRADE, European Commission.

Cernat, L. & Guinea, O. (2023). Trade and Competitiveness: Putting the Firm at the Centre of the Analysis. ECIPE Policy Briefs, no. 06-2023.

Chaney, T. (2008). Distorted gravity: the intensive and extensive margins of international trade. American Economic Review, 98 (4), 1707–21.

Chowdhry, S. & Felbermayr, G. (2023). Trade liberalization along the firm size distribution: The case of the EU-South Korea FTA. Review of International Economics, 31(5), 1751-1792.

Correia, S., Guimarães, P. & Zylkin, T. (2020). Fast Poisson estimation with high dimensional fixed effects. STATA Journal, 20 (1), 90-115.

Crozet, M. & Koenig, P. (2010). Structural gravity equations with intensive and extensive margins. Canadian Journal of Economics/Revue canadienne d'économique, 43(1), 41-62.

Elliott, R. J., Jabbour, L., & Zhang, L. (2016). Firm productivity and importing: Evidence from Chinese manufacturing firms. Canadian Journal of Economics/Revue canadienne d'économique, 49(3), 1086-1124.

Esteve-Pérez, S., Gil-Pareja, S., Llorca-Vivero, R., & Martínez-Serrano, J.A. (2020). EMU and trade: A PPML re-assessment with intra-national trade flows. The World Economy, 43(10), 2574-2599.

European Parliament (2023). Draft Report on the implementation of the EU-Canada Comprehensive Economic and Trade Agreement (CETA), (2023/2001(INI)), Committee on International Trade.

French, S., & Zylkin, T. (2024). The effects of free trade agreements on product-level trade. European Economic Review, 162, 104673.

Halpern, L., Koren, M. & Szeidl, A. (2015). Imported Inputs and Productivity. American Economic Review, 105 (12), 3660–3703.

Helpman, E., Melitz, M., & Rubinstein, Y. (2008). Estimating Trade Flows: Trading Partners and Trading Volumes. Quarterly Journal of Economics, 123 (2), 441-487.

Larch, M. & Yotov, Y. V. (2024). Estimating the effects of trade agreements: Lessons from 60 years of methods and data. The World Economy, 47(5), 1771-1799.

Lawless, M. (2010). Deconstructing gravity: trade costs and extensive and intensive margins. Canadian Journal of Economics/Revue canadienne d'économique, 43(4), 1149-1172.

Mayer, T., & Ottaviano, G. I. (2008). The happy few: the internationalisation of European firms: new facts based on firm-level evidence. Intereconomics, 43(3), 135-148.

Melitz, M. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica 71 (6), 1695–725.

Melitz, M. J. & Ottaviano, G. I. (2008). Market size, trade, and productivity. The Review of Economic Studies, 75(1), 295-316.

Minondo, A. & Requena, F. (2013). Estimating the gravity equation with the actual number of exporting firms. Estudios de Economía, 40(1), 5-19.

Neri, M., Orefice, G., & Ruta, M. (2021). The Impact of Regional Trade Agreements on Georgia's Exporters. Policy Research Working Paper 9768. The World Bank Group.

Neri, M., Orefice, L. G., & Ruta, M. (2023). Deep Trade Agreements and Heterogeneous Firms Exports. Policy Research Working Paper 10277. The World Bank Group.

Newman, C., Rand, J., & Tarp, F. (2023). Imports, supply chains and firm productivity. World Development, 172, 106371.

Olivero, M. P. & Yotov, Y. V. (2012). Dynamic Gravity: Endogenous Country Size and Asset Accumulation. Canadian Journal of Economics/Revue canadienne d'economique, 45(1), 64-92. https://doi.org/10.1111/j.1540-5982.2011.01687.x

Park, S. & Park, I. (2023). Firm size-specific trade effects of regional trade agreements: Estimating extensive and intensive margins of trade. Asian Economic Journal, 37(1), 82-112.

Tinbergen, J. (1962). Shaping the World Economy: Suggestions for an International Economic Policy. The Twentieth Century Fund.

Viner, J. (2014). The customs union issue. Oxford University Press, USA.

Weidner, M. & Zylkin, T. (2021). Bias and consistency in three-way gravity models, Journal of International Economics, 132, 103513. https://doi.org/10.1016/j.jinteco.2021.103513.

WTO (2022). MSMEs-Related Language in Regional Trade Agreements. Informal Working Group on MSMEs, NF/MSMEs/W/6/Rev.3.

Yotov, Y. V. (2022). On the role of domestic trade flows for estimating the gravity model of trade. Contemporary Economic Policy, 40(3), 526-540. https://doi.org/10.1111/coep.12567

Yotov, Y. V., Piermartini, R., Monteiro, J.A., & Larch, M. (2016). An advanced guide to trade policy analysis: The structural gravity model. Geneva, Switzerland. United Nations and World Trade Organization. http://vi.unctad.org/tpa/index.html.

APPENDIX:

Table A1. The impact of CETA on the number of EU trading firms with Canada, by sector of main economic activity and EU country. PPML estimates.

No. of exporting firms				No. of importing firms			
AUT_ind	0.206	HUN_ind	-0.056	AUT_ind	0.154	HUN_ind	0.050
	(0.024)***		(0.110)		(0.042)***		(0.203)
EUwoAUT_ind	0.140	EUwoHUN_ind	0.144	EUwoAUT_ind	0.104	EUwoHUN_ind	0.107
	(0.027)***		(0.027)***		(0.041)**		(0.041)***
AUT_serv	0.283	HUN_serv	-0.482	AUT_serv	0.164	HUN_serv	-0.095
	(0.070)***		(0.191)**		(0.052)***		(0.172)
EUwoAUT_serv	0.077	EUwoHUN_serv	0.085	EUwoAUT_serv	0.009	EUwoHUN_serv	0.016
	(0.047)		(0.046)*		(0.035)		(0.035)
BEL_ind	0.011	IRL_ind	-0.285	BEL_ind	-0.068	IRL_ind	-0.554
	(0.085)		(0.263)		(0.186)		(0.447)
EUwoBEL_ind	0.146	EUwoIRL_ind	0.148	EUwoBEL_ind	0.112	EUwoIRL_ind	0.115
	(0.028)***		(0.027)***		(0.041)***		(0.041)***
BEL_serv	-0.273	IRL_serv	-1.046	BEL_serv	-0.256	IRL_serv	-0.566
	(0.138)**		(0.463)**		(0.273)		(0.624)
EUwoBEL_serv	0.095	EUwoIRL_serv	0.093	EUwoBEL_serv	0.024	EUwoIRL_serv	0.021
	(0.045)**		(0.046)**		(0.035)		(0.034)
BGR_ind	0.136	ITA_ind	0.111	BGR_ind	0.224	ITA_ind	0.102
	(0.044)***		(0.025)***		(0.050)***		(0.081)
EUwoBGR_ind	0.142	EUwoITA_ind	0.150	EUwoBGR_ind	0.105	EUwoITA_ind	0.107
	(0.027)***		(0.029)***		(0.041)**		(0.042)**
BGR_serv	0.119	ITA_serv	0.009	BGR_serv	0.164	ITA_serv	0.025
	(0.070)*		(0.024)		(0.079)**		(0.088)
EUwoBGR_serv	0.081	EUwoITA_serv	0.093	EUwoBGR_serv	0.011	EUwoITA_serv	0.012
	(0.047)*		(0.051)*		(0.035)		(0.036)
CYP_ind	0.294	LVA_ind	0.223	CYP_ind	-0.007	LVA_ind	0.356
	(0.031)***		(0.054)***		(0.067)		(0.073)***
EUwoCYP_ind	0.141	EUwoLVA_ind	0.141	EUwoCYP_ind	0.106	EUwoLVA_ind	0.105
	(0.027)***		(0.027)***		(0.041)***		(0.041)**
CYP_serv	0.125	LVA_serv	0.268	CYP_serv	-0.061	LVA_serv	0.293
	(0.133)		(0.110)**		(0.054)		(0.101)***
EUwoCYP_serv	0.081	EUwoLVA_serv	0.081	EUwoCYP_serv	0.013	EUwoLVA_serv	0.012
	(0.046)*		(0.046)*		(0.034)		(0.034)
CZE_ind	0.221	LTU_ind	0.235	CZE_ind	0.241	LTU_ind	0.381
	(0.027)***		(0.028)***		(0.044)***		(0.079)***
EUwoCZE_ind	0.140	EUwoLTU_ind	0.141	EUwoCZE_ind	0.102	EUwoLTU_ind	0.105
	(0.027)***		(0.027)***		(0.041)**		(0.041)**
CZE_serv	0.121	LTU_serv	0.285	CZE_serv	0.039	LTU_serv	0.416
	(0.036)***		(0.160)*		(0.055)		(0.068)***
EUwoCZE_serv	0.080	EUwoLTU_serv	0.080	EUwoCZE_serv	0.013	EUwoLTU_serv	0.010
	(0.047)*		(0.046)*		(0.035)		(0.034)
DEU_ind	0.169	MLT_ind	0.082	DEU_ind	0.099	MLT_ind	0.627
	(0.027)***		(0.133)		(0.060)		(0.163)***
EUwoDEU_ind	0.136	EUwoMLT_ind	0.142	EUwoDEU_ind	0.108	EUwoMLT_ind	0.105
	(0.029)***		(0.027)***		(0.042)**		(0.041)**
DEU_serv	0.156	MLT_serv	-0.074	DEU_serv	-0.020	MLT_serv	0.337
	(0.026)***		(0.193)		(0.079)		(0.205)
EUwoDEU_serv	0.069	EUwoMLT_serv	0.081	EUwoDEU_serv	0.019	EUwoMLT_serv	0.013
	(0.050)		(0.046)*		(0.034)		(0.034)
ESP_ind	0.288	NLD_ind	0.196	ESP_ind	0.125	NLD_ind	0.071
	(0.034)***		(0.046)***		(0.052)**		(0.068)
EUwoESP_ind	0.129	EUwoNLD_ind	0.139	EUwoESP_ind	0.105	EUwoNLD_ind	0.108
	(0.025)***		(0.028)***		(0.041)**		(0.041)***
ESP_serv	0.315	NLD_serv	0.222	ESP_serv	0.015	NLD_serv	0.040
	(0.051)***		(0.065)***		(0.068)		(0.066)
EUwoESP_serv	0.059	EUwoNLD_serv	0.070	EUwoESP_serv	0.013	EUwoNLD_serv	0.012
	(0.043)		(0.047)		(0.036)		(0.035)
EST_ind	0.290	POL_ind	0.249	EST_ind	0.242	POL_ind	0.280
	(0.059)***		(0.028)***		(0.081)***		(0.053)***
EUwoEST_ind	0.141	EUwoPOL_ind	0.137	EUwoEST_ind	0.105	EUwoPOL_ind	0.100
	(0.027)***		(0.027)***		(0.041)**		(0.041)**
EST_serv	0.268	POL_serv	0.264	EST_serv	0.161	POL_serv	0.084
	(0.129)**		(0.039)***		(0.054)***		(0.085)
EUwoEST_serv	0.081	EUwoPOL_serv	0.075	EUwoEST_serv	0.013	EUwoPOL_serv	0.010

	(0.046)*		(0.047)		(0.034)		(0.035)
FIN_ind	0.211	PRT_ind	0.166	FIN_ind	0.149	PRT_ind	0.180
	(0.043)***		(0.028)***		(0.057)***		(0.051)***
EUwoFIN_ind	0.140	EUwoPRT_ind	0.141	EUwoFIN_ind	0.105	EUwoPRT_ind	0.105
	(0.027)***		(0.028)***		(0.041)**		(0.041)**
FIN_serv	0.169	PRT_serv	0.166	FIN_serv	0.194	PRT_serv	0.121
	(0.101)*		(0.039)***		(0.051)***		(0.047)***
EUwoFIN_serv	0.080	EUwoPRT_serv	0.080	EUwoFIN_serv	0.010	EUwoPRT_serv	0.010
	(0.047)*		(0.047)*		(0.035)		(0.035)
FRA_ind	0.070	ROU_ind	0.177	FRA_ind	0.110	ROU_ind	0.147
	(0.043)		(0.028)***		(0.051)**		(0.074)**
EUwoFRA_ind	0.150	EUwoROU_ind	0.141	EUwoFRA_ind	0.106	EUwoROU_ind	0.105
	(0.028)***		(0.027)***		(0.042)**		(0.041)**
FRA_serv	-0.047	ROU_serv	0.149	FRA_serv	0.007	ROU_serv	-0.028
	(0.043)		(0.034)***		(0.050)		(0.100)
EUwoFRA_serv	0.105	EUwoROU_serv	0.081	EUwoFRA_serv	0.014	EUwoROU_serv	0.014
	(0.045)**		(0.046)*		(0.036)		(0.035)
GRC_ind	0.229	SVN_ind	0.128	GRC_ind	0.163	SVN_ind	0.234
	(0.046)***		(0.060)**		(0.050)***		(0.163)
EUwoGRC_ind	0.140	EUwoSVN_ind	0.142	EUwoGRC_ind	0.105	EUwoSVN_ind	0.105
	(0.027)***		(0.027)***		(0.041)**		(0.041)**
GRC_serv	0.243	SVN_serv	-0.007	GRC_serv	0.110	SVN_serv	0.008
	(0.063)***		(0.048)		(0.078)		(0.065)
EUwoGRC_serv	0.079	EUwoSVN_serv	0.081	EUwoGRC_serv	0.012	EUwoSVN_serv	0.013
	(0.047)*		(0.046)*		(0.035)		(0.035)
HRV_ind	0.144	SVK_ind	-0.003	HRV_ind	0.163	SVK_ind	0.097
	(0.038)***		(0.094)		(0.060)***		(0.152)
EUwoHRV_ind	0.142	EUwoSVK_ind	0.142	EUwoHRV_ind	0.106	EUwoSVK_ind	0.106
	(0.027)***		(0.027)***		(0.041)***		(0.041)***
HRV_serv	-0.105	SVK_serv	-0.140	HRV_serv	-0.050	SVK_serv	-0.040
	(0.046)**		(0.119)		(0.061)		(0.116)
EUwoHRV_serv	0.081	EUwoSVK_serv	0.082	EUwoHRV_serv	0.014	EUwoSVK_serv	0.014
	(0.046)*		(0.046)*		(0.034)		(0.035)
		SWE_ind	0.175			SWE_ind	0.185
			(0.026)***				(0.049)***
		EUwoSWE_ind	0.140			EUwoSWE_ind	0.102
			(0.028)***				(0.041)**
		SWE_serv	0.215			SWE_serv	0.120
			(0.049)***				(0.070)*
		EUwoSWE_serv	0.075			EUwoSWE_serv	0.009
			(0.047)				(0.035)

Notes: The regressand is the number of exporting and importing firms, measured by dyad-year. Robust standard errors, clustered by dyad and sectors, are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All regressions include country-pair sector fixed effects, exporter-sector-time, and importer-sector-time fixed effects. The estimates of all fixed effects are not reported for brevity. The sample includes annual data for consecutive years over the period 2012-2019.

Table A2. The impact of CETA on the number of EU trading firms with Canada, by firm-size and EU country. PPML estimates.

No. of exporting firms				No. of importing firms			
AUT_SME	0.100	LTU_SME	0.186	AUT_SME	0.119	LTU_SME	0.205
	(0.030)***		(0.047)***		(0.055)**		(0.055)***
EUwoAUT_SME	0.081	EUwoLTU_SME	0.081	EUwoAUT_SME	0.025	EUwoLTU_SME	0.028
	(0.026)***		(0.025)***		(0.068)		(0.065)
AUT_Large	0.098	LTU_Large	0.129	AUT_Large	-0.039	LTU_Large	0.181
	(0.016)***		(0.021)***		(0.031)		(0.034)***
EUwoAUT_Large	0.066	EUwoLTU_Large	0.067	EUwoAUT_Large	0.039	EUwoLTU_Large	0.033
	(0.016)***		(0.016)***		(0.034)		(0.033)
BEL_SME	-0.284	NLD_SME	0.118	BEL_SME	-0.754	NLD_SME	0.103
	(0.049)***		(0.029)***		(0.113)***		(0.054)*
EUwoBEL_SME	0.104	EUwoNLD_SME	0.076	EUwoBEL_SME	0.115	EUwoNLD_SME	0.012
	(0.028)***		(0.028)***		(0.053)**		(0.082)
BEL_Large	0.072	NLD_Large	0.085	BEL_Large	-0.002	NLD_Large	0.085
	(0.017)***		(0.016)***		(0.035)		(0.032)***
EUwoBEL_Large	0.067	EUwoNLD_Large	0.067	EUwoBEL_Large	0.036	EUwoNLD_Large	0.029
	(0.016)***		(0.016)***		(0.034)		(0.033)
CYP_SME	0.003	PRT_SME	0.110	CYP_SME	0.097	PRT_SME	0.264
	(0.038)		(0.031)***		(0.052)*		(0.067)***
EUwoCYP_SME	0.082	EUwoPRT_SME	0.080	EUwoCYP_SME	0.029	EUwoPRT_SME	0.021
	(0.025)***		(0.026)***		(0.065)		(0.068)
CYP_Large	0.037	PRT_Large	0.051	CYP_Large	0.071	PRT_Large	0.089
	(0.045)		(0.017)***		(0.041)*		(0.032)***
EUwoCYP_Large	0.068	EUwoPRT_Large	0.068	EUwoCYP_Large	0.034	EUwoPRT_Large	0.033
	(0.016)***		(0.016)***		(0.033)		(0.033)
CZE_SME	0.036	POL_SME	0.128	CZE_SME	0.058	POL_SME	0.188
	(0.030)		(0.031)***		(0.051)		(0.068)***
EUwoCZE_SME	0.083	EUwoPOL_SME	0.078	EUwoCZE_SME	0.029	EUwoPOL_SME	0.020
	(0.025)***		(0.028)***		(0.067)		(0.070)
CZE_Large	0.138	POL_Large	0.046	CZE_Large	0.180	POL_Large	0.056
	(0.016)***		(0.016)***		(0.032)***		(0.031)*
EUwoCZE_Large	0.064	EUwoPOL_Large	0.070	EUwoCZE_Large	0.026	EUwoPOL_Large	0.032
	(0.016)***		(0.015)***		(0.032)		(0.033)
DEU_SME	0.036	ROU_SME	0.202	DEU_SME	0.068	ROU_SME	0.169
	(0.031)		(0.032)***		(0.048)		(0.056)***
EUwoDEU_SME	0.106	EUwoROU_SME	0.080	EUwoDEU_SME	0.012	EUwoROU_SME	0.026
	(0.036)***		(0.025)***		(0.092)		(0.066)
DEU_Large	0.067	ROU_Large	-0.022	DEU_Large	0.004	ROU_Large	0.042
	(0.015)***		(0.019)		(0.030)		(0.033)
EUwoDEU_Large	0.068	EUwoROU_Large	0.070	EUwoDEU_Large	0.059	EUwoROU_Large	0.034
	(0.018)***		(0.015)***		(0.034)*		(0.033)
ESP_SME	0.183	SVN_SME	0.071	ESP_SME	0.117	SVN_SME	0.067
	(0.031)***		(0.026)***		(0.060)*		(0.050)
EUwoESP_SME	0.052	EUwoSVN_SME	0.082	EUwoESP_SME	0.014	EUwoSVN_SME	0.029
	(0.029)*		(0.025)***		(0.077)		(0.065)
ESP_Large	0.053	SVN_Large	0.025	ESP_Large	0.053	SVN_Large	0.156
	(0.019)***		(0.015)		(0.036)		(0.032)***
EUwoESP_Large	0.070	EUwoSVN_Large	0.068	EUwoESP_Large	0.032	EUwoSVN_Large	0.033
	(0.015)***		(0.016)***		(0.033)		(0.033)

Notes: The regressand is the number of exporting firms, measured by dyad-year. Robust standard errors, clustered by dyad and size classes, are in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$. All regressions include country-pair-size fixed effects, exporter-size-time, and importer-size-time fixed effects. The estimates of all fixed effects are not reported for brevity. The sample includes annual data for consecutive years over the period 2012-2019.