

# The Impact of Trade Liberalization on Gross Exports and Domestic Value Added

Mid-Course Assignment in Trade Policy Analysis

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**Abstract.** We study the trade effects of different trade agreement regimes by adopting a set of seven trade agreement regime dummies. Instead of only targeting gross bilateral trade flows (GTRADE), we add another measure for trade flows: trade in domestic value added (DVA), to capture countries' increasing participation in global value chains. Based on the `icio` STATA command, we extract gross bilateral trade flows and trade flows in DVA for 43 countries from 2002 to 2014, with an interval of three years. In general, we find significant and positive trade effects of Custom Unions (CU), Free Trade Agreements (FTA), and Economic Integration Agreements (EIA) for both measures and that the absolute magnitude of effects is larger for GTRADE as compared to DVA.

# Chapter 1

## Introduction

Over the last decades, the speed of global economic interlinkages has been increasing as fast as never before. The increase of regional trade agreements (RTAs) notified to the WTO from 28 in 1990 to 355 in 2021, as well as the resulting increase in global trade volume from welfare gains from trade document this trend. While the gross global export value has increased fourfold, a growth rate of around 100% over the same time, the ratio of goods trade over GDP has not seen such large increase. Is trade making us poorer?

Recently, a debate on trade liberalization, global value chains and implications for national welfare has emerged. It has been stimulated by breakthrough methods of decomposing aggregate trade into subcategories. One of these subcategories is domestic value added (DVA). The DVA measure captures the value in total exports of a country which are generated purely domestically. Adopting the `icio` command in STATA, which closely links statistical software to the data, we make use of the recent advances to answer the following empirical question: is the effect of trade liberalization policies stronger on gross exports than on domestic value added in gross exports?

Section 2 gives an overview of the literature on the effects of trade liberalization on trade flows, introducing the reader to a canon of empirical findings to which our study adds novel insights. Section 3 introduces the data we use to answer our research question. To the extent to which our explanatory variables contain heterogeneity, we dig deeper into the question of which countries they cover. Section 4 examines our model specifications, including the estimation challenges which we intend to tackle. Section 5 presents our results. Following a discussion of our findings in Section 6, we conclude our study in Section 6.

## Chapter 2

# Literature Review

The complexity of RTAs has been deeply analyzed in the literature, with a great focus on the trade creation and trade diversion aspects. [Baier and Bergstrand \(2007\)](#) offer an in-depth analysis of the effects of FTAs on trade flows, showing that, on average, an FTA doubles two members' bilateral trade after 10 years. In more complex agreements, however, not all member countries equally benefit from the increase in trade, both because of their size and the sectors in which they specialize ([Felbermayr et al. \(2018\)](#)). [Felbermayr et al. \(2022b\)](#) show that the implementation of Brexit has had significant negative consequences on small EU27 countries. Some of the latter present even higher welfare losses than the UK itself. Generally speaking, dismantling well-consolidated trade agreements negatively influences member countries' welfare, whilst the effects are vastly heterogeneous ([Felbermayr et al. \(2022a\)](#)).

In a similar vein, [Mayer et al. \(2019\)](#) estimate trade creation deriving from the EU by creating counterfactuals in which the level of integration is lower or totally absent. They predict that, on average, the costs of non-Europe (weighted by country size) vary between 3.8% and 5.5%, depending on the considered counterfactual. Similar results have been obtained by [Baier et al. \(2019\)](#), who study the economic impact of the elimination of the North American FTA (NAFTA) for the member countries. It appears that Canada is the member with most negative consequences.

What the studies mentioned above however do not look at is the question if reshoring which follows economic disintegration is linked to increased domestic value added. If trade was drawing value added away to other shores, would Brexit imply that Britain's domestic industry won economic power? Would Canada gain a higher share of domestic value added if NAFTA was dismantled? To answer such questions, we must acknowledge that apart from looking at only gross trade, a more comprehensive way to measure the impact of trade agreements is to investigate the variation in countries' domestic value added (DVA) linked to trade agreements.

In our era coined by the growing complexity of global value chains (GVCs), a relevant issue in international trade becomes the proper accounting of trade flows (see the survey of [Antras and Chor \(2021\)](#)). As [Aslam et al. \(2017\)](#) state, the currently used production fragmentation implies that intermediate goods cross borders several times along the chain, often passing through many countries more than once. Consequently, the commonly adopted trade statistics of gross trade flows may not be accurate and call for a change in the used method. Significant developments on this frontier have been triggered by [Koopman et al. \(2014\)](#). Providing a rich decomposition of gross trade, [Koopman et al. \(2014\)](#) lay the ground for studies which seek to exploit a deeper disaggregation of the value added generated by trade by including all measures of vertical specialization and value-added trade in the literature, adjusting for the trade of intermediates across multiple borders. The aim of our contribution is to provide a comparison between of the effects of trade liberalization on gross exports and domestic value added (DVA), one of the key measures [Koopman et al. \(2014\)](#) propose. For a schematic intuition, please see Figure 7.2 in our Appendix.

## Chapter 3

# Data

We restrict our analysis to a time frame consisting of twelve years (2002-2014). Extracting data on gross exports and DVA in 3-year-intervals, we regress both trade measures on our set of explanatory variables. We obtain ample heterogeneity on trade liberalization during our period of interest from the RTA database. Lastly, we employ a set of additional controls used frequently in gravity analyses of trade flows.

### 3.1 Gross Exports and Domestic Value Added (DVA)

We rely on [Belotti et al. \(2021\)](#) who introduce the `icio` STATA command. This command computes the most relevant measures of trade in value-added of countries and sectors by exploiting Inter-Country Input-Output (ICIO) tables. Their approach rests on the feature that the measures of value-added trade are additive at any level of aggregation of trade flows ([Borin and Mancini \(2019\)](#)). We opt for “wiodn”, which gives out data for 44 countries, including the rest of the world (“ROW”) from the WIOD 2016 release ([Timmer et al. \(2015\)](#)). Running the STATA commands, we obtain **gross exports** as well as a **DVA** component on a bilateral country-pair level for five three-year intervals between 2002 and 2014. As we do not have policy dummies for the “ROW”, we decide to drop it. Please find a map with the countries included in Figure 7.1 of our Appendix.

### 3.2 Trade Policy Dummies

We opt for country-level data on various RTA variables from Mario Larch’s RTA Database ([Egger and Larch \(2008\)](#)). The database contains all multilateral and bilateral regional trade agreements as notified to the WTO from 1950 to 2019.

We first collect data on CU, FTA and PSA as policy variables. When running the regressions with the data on gross exports and DVA, we find that coefficients for this set of policy dummies are not significant and partly negative. Hence, we decide to extend our analysis to the full set of seven dummies (CU, FTA, PSA, EIA, CUEIA, FTAEIA and PSAEIA).

The stacked bars in Figure 3.1 present all bilateral trade policy ties over time, grouped by the seven dummy variables we use.

The evolution shows that there is substantial increase in EIA and CUEIA between 2002 and 2005. Interested in knowing more about the exact country-pair relationships behind these dummies, we consult the official WTO RTA database (<http://rtais.wto.org/UI/PublicAllRTAList.aspx>), which Mario Larch also uses as the source of his RTA database (see “Readme.pdf” file of [Egger and Larch \(2008\)](#)). Figure 3.2 shows the variation in trade liberalization policies we exploit over countries and time. The table intends to link the coefficients

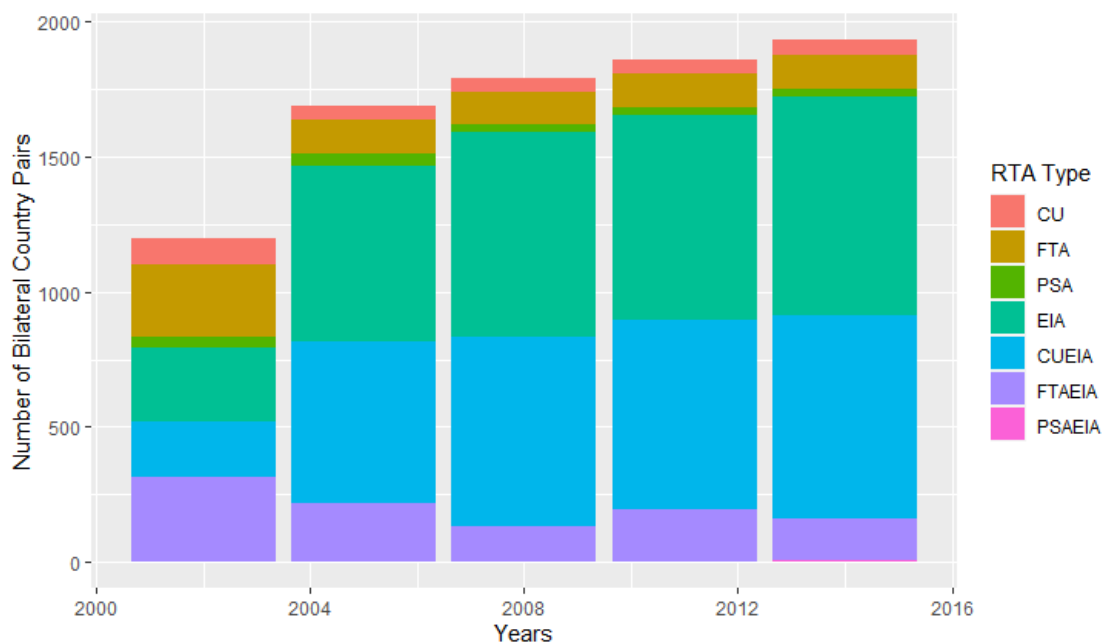


Figure 3.1: Trade liberalisation dummy variables for the WIOD countries (2002-2014). Data source: RTA Database by Egger and Larch (2008).

reported in our results to specific episodes of trade liberalization policies. For example, we see that the CU contains customs union agreements between the EU and accession candidates as well as the EU-Türkiye CU (1995). FTA contains minor important bilateral economic agreements. However, the CUEIA dummy captures the EU. NAFTA, for instance, along with many other trade agreements for the set of WIOD countries is counted in the FTAEIA dummy. Looking at the bilateral country pairs behind the EIA dummy, we see that much of the increase in the bars between 2002 and 2005 comes from the EU accession countries in 2004 (see Figure 3.1).

### 3.3 Control variables

We include a set of standard gravity variables as controls for potentially endogenous drivers of bilateral trade flows from the CEPII Gravity database (Conte et al. (2022)).

Trade Policy Dummy	Regional Trade Agreement Type	RTAs in our dataset
CU	Customs Union	Between EU countries and EU accession countries (accession in 2004 or later), EU-TUR (1995)
FTA	Free Trade Agreement	Among EU accession countries (accession in 2004 or later), EU-CHE (1973), EU-NOR (1973), CHE-TUR, NOR-TUR (part of EFTA-TUR 1992), CHE-CAN, NOR-CAN (part of EFTA-CAN 2009), BEL-HRV (in 2002), BEL-SVN (in 2002)
PSA	Partial Scope Agreement	1. Global System of Trade Preferences among Developing Countries (GSTP 1989): BRA, IDN, IND, KOR, MEX, 2. Bilateral PSAs between BRA-MEX (2003), CHN-IND, ROU-BRA, ROU-IDN, ROU-IND, ROU-KOR, ROU-MEX, ROU-TUR (2002-2005), TUR-BRA, TUR-KOR, TUR-MEX
EIA	Economic Integration Agreement	<b>EU</b> , EU-NOR (1973)
CUEIA	Customs Union & Economic Integration Agreement	<b>EU</b>
FTAEIA	Free Trade & Economic Integration Agreement	CHE-NOR (EFTA 1960), CHE-KOR and NOR-KOR (part of EFTA-KOR 2006), NOR-MEX and CHE-MEX (part of EFTA-MEX 2001), <b>EU-KOR (2011)</b> , <b>EU-MEX (2000)</b> , CHN-IDN (part of ASEAN 2005), JPN-CHE (2009), JPN-IDN (part of ASEAN-JPN 2008), JPN-IND (2011), JPN-MEX (2005), KOR-AUS (2014), KOR-IDN (part of ASEAN-KOR), KOR-IND (2010), NAFTA (CAN, MEX, USA 1993), USA-AUS (2005), USA-KOR (2007)
PSAEIA	Partial Scope & Economic Integration Agreement	CHN-IND, CHN-KOR, IND-KOR (2014)

Figure 3.2: Variation across different trade policies as in the RTA dataset by Egger and Larch (2008) we use. We retrieve information on the involvement of the WIOD countries in bilateral trade agreements (2002-2014) from <http://rtais.wto.org/UI/PublicAllRTAList.aspx>.



## Chapter 4

# Specifications

In outlining our specifications, we follow the “Challenges and solutions for estimating structural gravity models” as presented in [Yotov et al. \(2016\)](#) p. 18 ff.

Figure 4.1 presents the challenges when estimating our structural gravity models together with the econometric techniques we apply to tackle them.

Challenges	Specification 1	Specification 2	Specification 3	Specification 4
1: Multilateral resistances	X	X	X	X
2: Zero trade flows (not applicable)				
3: Heteroskedasticity		X	X	X
4: Bilateral trade costs	X	X	X	
5: Endogeneity of trade policy				X
6: Non-discriminatory trade policy			X	
7: Adjustment to trade policy changes	X	X	X	X
8: Gravity with disaggregated data				

Figure 4.1: Estimation challenges of structural gravity models as in Yotov et al. (2016) p. 18 ff. tackled by our model specifications.

### Challenge 1: Multilateral resistances (MRs)

In our first three specifications we capture outward MRs and inward MRs by creating exporter-time and importer-time fixed effects (FEs). In our last specification (iv), we use fixed effects for each exporter, importer and year, separately.

We interpret the FEs as absorbers of average trade barriers ([Anderson and Van Wincoop \(2003\)](#)) relative to which the effect of bilateral trade barriers should be evaluated. By definition, both FEs absorb, respectively, the exporter value of output and importer expenditure, as well as all other observable and unobservable exporter- and importer-specific characteristics that may influence bilateral trade ([Yotov et al. \(2016\)](#)).

### Challenge 3: Heteroskedasticity of trade data

Heteroskedasticity of trade data implies biased and inconsistent estimates when adopting OLS. We tackle heteroskedasticity with the use of the Poisson Pseudo Maximum Likelihood (PPML) estimator, following [Silva and Tenreyro \(2006\)](#) in our specifications (ii), (iii), and (iv).

### Challenges 4 and 5: Bilateral trade costs and Endogeneity of trade policy

One of the biggest challenges in obtaining reliable estimates of the effects of trade policy within the gravity model is that trade policy variables and trade cost components are endogenous, because it is possible that trade policy may be correlated with unobservable cross-sectional trade costs. We are interested in the neat

separation of the effect of the seven different trade liberalization policies. To proxy for sources of implicit bilateral trade costs appearing in the structural gravity specifications (i), (ii), and (iii), we exploit four dummies from the GRAVITY database by CEPII compiled by [Conte et al. \(2022\)](#). Our choice falls on the *Distance* ( $\ln\_dist$ ) *Contiguity* (*contig*) *Language* (*comlang\_off*) dummies as well as the *Colony* (*col45*) dummy.

In specification (iv) we tackle the challenges by accounting for any unobservable time invariant trade cost components with exporter-time, importer-time and country-pair fixed effects. [Egger and Nigai \(2015\)](#) and [Agnosteva et al. \(2014\)](#) show that the pair-fixed effects are a better measure of bilateral trade costs than the standard set of gravity variables.

#### Challenge 6: Non-discriminatory trade policy

We are aware that we perform our analysis for a world which is, despite the surge in RTAs (see Figure 3.1) is still heavily influenced by WTO-style non-discriminatory unilateral trade policy such as most-favoured-nation (MFN) tariffs. The issue with non-discriminatory trade policy covariates is that they are exporter- and/or importer-specific, and therefore they will be absorbed, respectively, by the exporter-time and by the importer-time fixed effects ([Yotov et al. \(2016\)](#)). [Heid et al. \(2021\)](#) propose including intra-national trade flows, capitalizing on the fact that while non-discriminatory trade policies are country-specific, they do not apply to intra-national trade.

In our specification (iii), we include intra-national export data to our gravity estimations. Hence, we account for not only trade between Australia and partner countries, but also for trade within Australia. An additional merit of the intra-trade dummy is to control for a home bias between inter- vs intra-national trade ([Borchert and Yotov \(2017\)](#)).

#### Challenge 7: Adjustment to trade policy changes

Adjustment of trade flows in response to trade policy changes are not instantaneous. This might threaten the validity of our estimations if pooled over consecutive years ([Trefler \(2004\)](#) and [Egger et al. \(2020\)](#)).

In order to account for the potential lags in the effectiveness of the trade policies, we measure trade flows between 2002 and 2014 in five three-year intervals in all specifications.

#### Challenge 8: Gravity with disaggregated data

Many trade policies are negotiated and applied at the sectoral level, such as tariffs. Hence, results can be driven or distorted by only a few sectors. For the sake of detailed and insightful results, it is desirable to perform analyses of trade liberalization policies at a highly disaggregated level.

Due to the long running time of the code, we chose not to take sectoral data into account. This adds a potential limitation to our study.

## 4.1 Benchmark Gravity Estimation with OLS

## 4.2 Gravity Estimation with PPML

Using STATA, we estimate both specifications (i) and (ii) with

(1) and (3) GTRADE as the dependent variable

$$X_t^{ij} = \alpha + GTRADE_t^{ij} + \beta GRAVITY^i + \gamma_1 CU + \gamma_2 FTA + \gamma_3 PSA + \gamma_4 EIA + \gamma_5 CUEIA + \gamma_6 FTA EIA + \gamma_7 PSA EIA + \mu_t^i + \eta_t^j + \epsilon_t^{ij}$$

and

(2) and (4) DVA as the dependent variable

$$X_t^{ij} = \alpha + DV A_t^{ij} + \beta GRAVITY^i + \gamma_1 CU + \gamma_2 FTA + \gamma_3 PSA + \gamma_4 EIA + \gamma_5 CUEIA + \gamma_6 FTAEIA + \gamma_7 PSAEIA + \mu_t^i + \eta_t^j + \epsilon_t^{ij}$$

where

- $GRAVITY^i$  captures additional potential drivers behind the effects of the dependent variable along with the explanatory variables, namely:
  - $Distance^{ij}$ : the bilateral distance between countries i and j (originally named `ln_dist`)
  - $Contiguity^{ij}$ : an indicator variable that takes the value 1 if country i and country j share a common border (originally named `contig`)
  - $Language^{ij}$ : an indicator variable that takes the value 1 if country i and country j share a common language (originally named `comlang_off`) and j
  - $Colony^{ij}$ : an indicator variable that takes the value 1 if country i and country j had a colonial relationship in 1945 (originally named `col45`)
- $\mu_t^i$  is the exporter-time fixed effect,  $\eta_t^j$  is the importer-time fixed effect and  $\epsilon_t^{ij}$  expresses the error term.

### 4.3 Intra-National Trade Dummy

Using STATA, we estimate **specification (iii)** with

(5) GTRADE as the dependent variable

$$X_t^{ij} = \alpha + GTRADE_t^{ij} + \beta GRAVITY^i + \gamma_1 CU + \gamma_2 FTA + \gamma_3 PSA + \gamma_4 EIA + \gamma_5 CUEIA + \gamma_6 FTAEIA + \gamma_7 PSAEIA + \delta INTRA \mu_t^i + \eta_t^j + \epsilon_t^{ij}$$

and

(6) DVA as the dependent variable

$$X_t^{ij} = \alpha + DV A_t^{ij} + \beta GRAVITY^i + \gamma_1 CU + \gamma_2 FTA + \gamma_3 PSA + \gamma_4 EIA + \gamma_5 CUEIA + \gamma_6 FTAEIA + \gamma_7 PSAEIA + \delta INTRA \mu_t^i + \eta_t^j + \epsilon_t^{ij}$$

Using the `absorb` command in STATA, we generate exporter-year, importer-year, and symmetric exporter-importer fixed effects. The INTRA-dummy captures all relevant forces that discriminate between inter- and intra-national trade.

### 4.4 Country-Pair Fixed Effects Estimation

Using STATA, we estimate **specification (iv)** with

(7) GTRADE as the dependent variable

$$X_t^{ij} = \alpha + GTRADE_t^{ij} + \gamma_1 CU + \gamma_2 FTA + \gamma_3 PSA + \\ \gamma_4 EIA + \gamma_5 CUEIA + \gamma_6 FTA EIA + \gamma_7 PSA EIA + \\ \delta INTRA + \sigma_t^i + \theta_t^j + \psi^{ij} + \epsilon_t^{ij}$$

and

(8) DVA as the dependent variable

$$X_t^{ij} = \alpha + DVA_t^{ij} + \gamma_1 CU + \gamma_2 FTA + \gamma_3 PSA + \\ \gamma_4 EIA + \gamma_5 CUEIA + \gamma_6 FTA EIA + \gamma_7 PSA EIA + \\ \delta INTRA + \sigma_t^i + \theta_t^j + \psi^{ij} + \epsilon_t^{ij}$$

where  $\sigma_t^i$  is the exporter-time fixed-effect,  $\theta_t^j$  is the importer-time fixed-effect and  $\psi^{ij}$  is the exporter-importer fixed effect.

## Chapter 5

# Results

Variables	(1) OLS GTRADE	(2) OLS DVA	(3) PPML GTRADE	(4) PPML DVA	(5) INTRA GTRADE	(6) INTRA DVA	(7) PAIR_FE GTRADE	(8) PAIR_FE DVA
CU	7,351*** (2,340)	6,042*** (1,790)	0.748*** (0.152)	0.712*** (0.161)	0.748*** (0.152)	0.712*** (0.161)	-0.0470 (0.0910)	-0.0183 (0.0778)
FTA	5,753** (2,251)	5,054*** (1,696)	0.499*** (0.0979)	0.496*** (0.105)	0.498*** (0.0977)	0.495*** (0.104)	0.0158 (0.0489)	0.00726 (0.0518)
PSA	-4,565*** (1,841)	-3,530*** (1,311)	-0.126 (0.110)	-0.128 (0.110)	-0.126 (0.110)	-0.128 (0.110)	0.0278 (0.0444)	0.0226 (0.0416)
EIA	4,258*** (1,430)	3,387*** (1,083)	0.554*** (0.139)	0.565*** (0.148)	0.554*** (0.139)	0.565*** (0.148)	0.112 (0.0809)	0.113 (0.0942)
CUEIA	6,512*** (2,438)	5,411*** (1,845)	0.0899 (0.157)	0.0449 (0.167)	0.0891 (0.157)	0.0441 (0.166)	0.0346 (0.0742)	0.0459 (0.0865)
FTAEIA	9,061** (4,018)	7,511** (3,019)	0.150* (0.0822)	0.126 (0.0854)	0.150* (0.0820)	0.126 (0.0852)	-0.000342 (0.0245)	-0.00872 (0.0247)
PSAEIA	14,409 (17,013)	9,136 (11,019)	-0.325** (0.148)	-0.350** (0.149)	-0.323** (0.147)	-0.347** (0.147)	-0.0570 (0.0511)	-0.0635 (0.0567)
Distance	-5,163*** (937.0)	-3,636*** (694.3)	-0.462*** (0.0306)	-0.454*** (0.0314)	-0.462*** (0.0306)	-0.454*** (0.0314)		
Contiguity	6,850*** (2,564)	4,917*** (1,814)	0.380*** (0.0726)	0.387*** (0.0730)	0.380*** (0.0726)	0.387*** (0.0729)		
Language	1,320 (2,153)	855.3 (1,598)	0.133* (0.0791)	0.130 (0.0794)	0.133* (0.0791)	0.130 (0.0794)		
Colony	-4,455** (1,761)	-3,504** (1,370)	0.110 (0.165)	0.118 (0.174)	0.111 (0.165)	0.118 (0.174)		
Constant	40,483*** (7,361)	28,049*** (5,423)	13.27*** (0.277)	13.00*** (0.285)	13.27*** (0.274)	13.01*** (0.282)		
Observations	9,030	9,030	9,030	9,030	9,245	9,245	9,245	9,245
R-squared	0.467	0.460					0.986	0.986
Exporter-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Importer-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Pair FE	NO	NO	NO	NO	NO	NO	YES	YES

Notes: Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Figure 5.1: The estimated results.

Columns (1) and (2) of Figure 5.1 above report the estimated results for the **baseline gravity equation (i) by OLS**.

CU, FTA, EIA, CUEIA, and FTAEIA have significantly positive effects on bilateral trade flows, both measured by gross trade flows (GTRADE) and DVA.

For example, all else equal, CU membership increases bilateral gross trade by 7.3 billion US dollars and DVA by 6 billion US dollars. Surprisingly, PSA has significantly negative effects while we find no significant effects of PSAEIA.

Comparing the results for GTRADE and DVA, the former has a larger absolute magnitude in all coefficient estimates, suggesting the trade agreement variables have larger effects on GTRADE than DVA.

**Columns (3) and (4)** report the estimated results for the **baseline gravity equation (ii) by PPML**, where we find significantly positive effects of CU, FTA, and EIA. For example, all else equal, being in a CU increases gross bilateral trade between the two countries by 111.2% [ $\exp(0.748) - 1 \times 100$ ] and DVA by 103.8% [ $\exp(0.712) - 1 \times 100$ ]. But CUEIA and FTAEIA lose significance. PSEIA has significantly negative effects. Similar to columns (1) and (2), the absolute magnitude of effects is larger on GTRADE than DVA.

**Columns (5) and (6)** report the estimated results for the **gravity equation (iii) controlling for intra-national trade by PPML**. The results are similar to those estimated for equation (1), besides some slight decrease in absolute magnitude.

From columns (1) to (6), the estimated coefficients of the two control variables (distance, and border contiguity) have signs consistent with expectations and traditional gravity model literature. We find almost no significant effect of common language and inconsistent estimates of a colonial relationship.

Finally, **columns (7) and (8)** report the estimated results for the **gravity equation (iv) controlling for endogeneity by PPML**, where we find no significant results at all.

## Chapter 6

# Discussion

### 6.1 Trade liberalization and aggregate trade flows

We first mirror our results on GTRADE against studies on the effects of trade liberalization which are in a most similar vein.

Similar to [Mayer et al. \(2019\)](#), our PPML yields smaller estimates of the trade gains associated with the EU (EIA dummy) than OLS. For the 2002-2014 period, our PPML estimate suggests a smaller 51% increase ( $(\exp(0.554) - 1) * 100$ ). Using data from IMF DOTS from 1950 to 2012, their preferred estimate of the EU effects state that the single market version of the EU triples trade. In terms of methodology and data, [Felbermayr et al. \(2018\)](#) is similar to our study. Using the PPML estimator and WIOD trade flows for 40 countries from 1995 to 2011, they find that mutual EU membership increases bilateral exports by 122.6% (53.2% for the CU and 69.4% for the Single Market). Other RTAs established after 1995 boost goods trade by an additional 35.3%. Our estimate of 51% being smaller than theirs suggests that EU integration following the creation of the WTO in 1995 has been strong, as well.

Indeed, economic integration in the EU has been very strong since the 1990s. The European Single Market was already established in 1993, the Schengen Agreement that ended formal border controls between many European countries has entered into force in 1995, the Eurozone has been created in 1999 and in 2002, the Euro was adopted as a currency in many EIA countries. Furthermore, in the period of study, the EU extended to 28 countries: the Czech Republic, Cyprus, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia joined the EIA in 2004, followed by Bulgaria and Romania (2007) and Croatia (2013).

Viewing our results on GTRADE in perspective with the trade agreement literature, we can state that for a subset of countries (WIOD) and our limited time frame (2002-2014), our results on GTRADE are plausible in magnitude for various dummies.

### 6.2 Trade liberalization and domestic value added (DVA)

[Antras and Chor \(2021\)](#) reckon that the literature on the desirability and effects of trade policy in a world of GVCs is still in its infancy. Our study can add to the debate on levels of DVA in the context of trade liberalisation, as well as provide evidence which might be provocative enough to stimulate a broader debate on GVC integration and a country's trade policy among researchers and policymakers.

First, we compare our results to a finding in the more standard quantitative trade literature. In their general equilibrium counterfactual analysis, based on the baseline year of 2014, [Felbermayr et al. \(2022a\)](#) back out counterfactual gross exports and VAX ratios in case of a dismantling of the EU-KOR and EU-MEX FTAs (part of our FTAEIA dummy). Their Table 2 shows that such scenario would have less exports to the EU from non-EU countries as a consequence. VAX-ratios would increase, suggesting that the reshoring might

entail a higher relative share of domestic value added for the splitting parties. Our results for the FTAEIA DVA in columns (4), (6) and (8) however are not significant. We conclude that we shall take the EU as another example.

Next, we look at the EU. To our question, it would be interesting to know whether there is a different effect of trade policies on DVA on either EU-15 or CEE-10 countries. As they capture heterogeneity between old EU and new EU countries before accession (CU), among new EU countries (FTA) and between old and new EU countries (EIA), our specifications shed light on this question. Drawing on the WIOD as well, [Vrh \(2018\)](#) documents a gradual decline of DVA in both old EU-15 and new 2004 accession countries (CEE-10) between 1995–2011. Our columns (4) and (6) confirm that the effect is strongest for CU, followed by EIA and then FTA. To the extent that the CEE-10 countries dominate the CU dummy, the decline in DVA for CEE-10 countries over time is reflected in our data, as well. As an explanation for the lower DVA of CEE-10 as compared to EU-15, [Vrh \(2018\)](#) claims that progress in GVC upgrading comes from a larger stock of knowledge-based capital and more sophisticated exports.

Against the backdrop of globalization it makes sense that our positive coefficients of GTRADE reflect positive trade effects due to economic integration. Also the finding that (with one exception, DVA in specification (ii) for the EU), the  $GTRADE > DVA$  results make sense. But it is questionable whether trade that involves the outsourcing of domestic production activities leads to welfare gains once the effect creates a gap between gross exports and domestic value added. A necessary condition for welfare gains to materialize would be that *net trade creation - loss in DVA*  $> 0$ . Such net trade creation would only hold if foreign countries could produce former DVA more efficiently.

There is much evidence for net trade creation. In a monopolistic framework, one potential channel of efficiency gains from trade liberalization could be that the de-fragmentation (market integration) leads to pro-competitive effects through reductions in mark-ups, which lead to industrial restructuring (e.g. M&A) and the exit of firms. The reallocation to more efficient firms would provide them a larger market share and translate into an increase in aggregate efficiency. Analyzing three major industry groups and 18 detailed industries in ten EU member states between 1981-1999, [Badinger \(2007\)](#) finds evidence for reductions in mark-ups for aggregate manufacturing and construction. In 1994, around introduction of the EU Single Market programme, markups go down significantly.

This discussion shows that there remains still much to explore in the field of trade policy and its effect on subcomponents of gross exports such as DVA. Also interesting to assess could be growth effects of GTRADE vs. DVA.



## Chapter 7

# Conclusion

In this paper, we study the trade effects of different trade agreement regimes by adopting a set of seven trade agreement regime dummies, which are CU, FTA, PSA, EIA, CUEIA, FTAEIA, and PSAEIA.

Instead of only targeting gross bilateral trade flows (GTRADE), we add another measure for trade flows: trade in domestic value added (DVA). Against the background of the international diffusion of production networks and countries' increasing participation in GVCs over the past decades, this is a fairly interesting endeavour.

Based on the `icio STATA` command, we extract gross bilateral trade flows and the DVA component of gross trade for 43 countries from 2002 to 2014, with an interval of three years. By and large, we find significant and positive trade effects of Custom Unions (CU), Free Trade Agreements (FTA), and Economic Integration Agreements (EIA) and that, with one exception, the absolute magnitude of effects is larger for GTRADE compared to DVA. Our results suggest we might need stronger evidence to evaluate the effects of trade agreements, more precisely. Overall, the inconsistency and instability of estimates is expected given our limited data coverage, as we only include five periods and 43 countries.

Having found smaller effects of various trade liberalization episodes on DVA than on GTRADE, our study joins the debate on trade creation versus trade diversion in the context of DVA as an additional important GVC measure. We reckon that a controversial and policy-relevant question in this context to be whether the higher volume in a country's gross exports relative to DVA as a consequence of trade liberalization is linked to welfare gains.

# Appendix

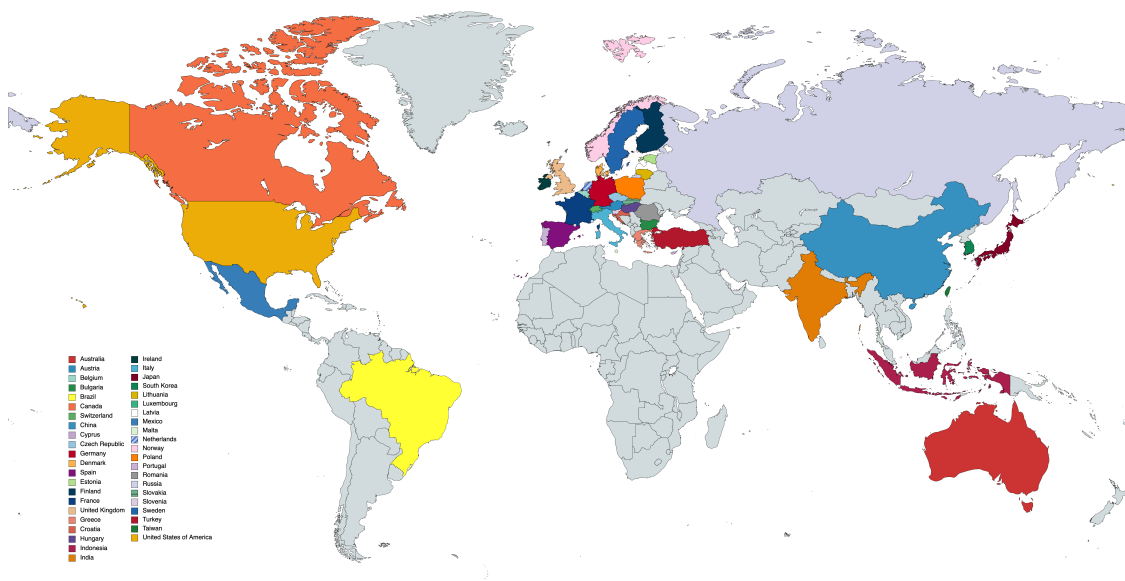


Figure 7.1: A world map showing the 43 countries of the WIOD 2016 we analyze.

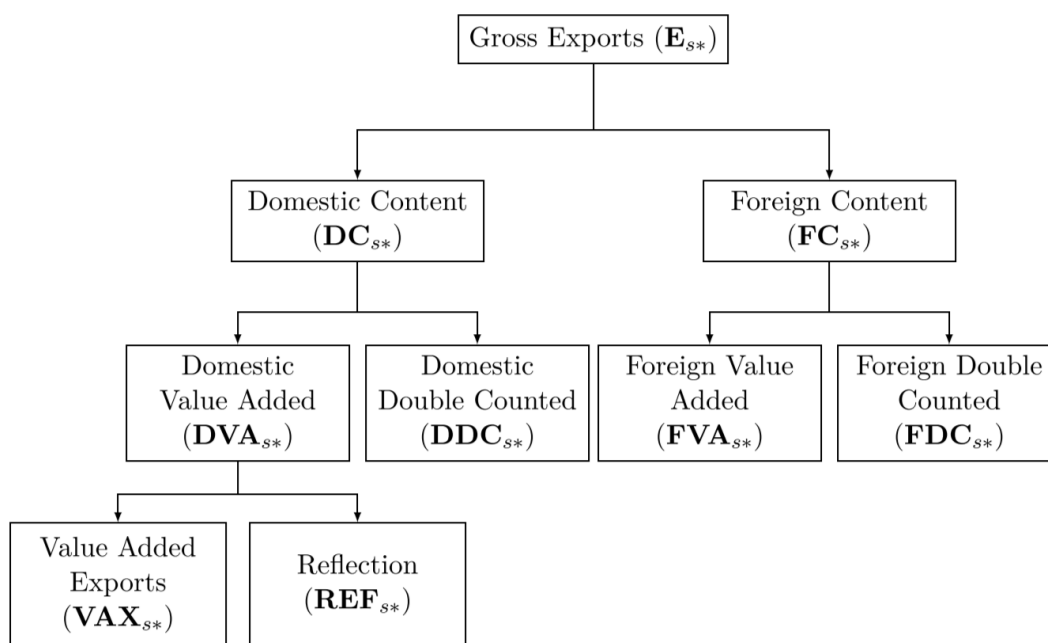


Figure 7.2: The disaggregation of gross exports according to Koopman et al. (2014) which Borin and Mancini (2019) use.

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