HOW DEEP IS THE IMPACT OF DEEP TRADE AGREEMENTS? AN EMPIRICAL ANALYSIS ON A LARGE SAMPLE

Elisa Borghi, Rodolfo Helg, Lucia Tajoli

Abstract. The actual impact on trade flows of preferential trade agreements (PTAs) has been debated for a long time. In light of the "deepening" occurring in PTAs, increasingly including beyond-the-border measures and non-economic goals, we reassess their effects by estimating a gravity model of trade including a large set of countries, and specifically treating the EU as a unique entity. We control for the depth of the agreements using different sets of measures. Our results confirm the positive impact of PTAs on bilateral trade flows, but also show that the larger and more complex the included provisions, the weaker is the marginal effect on trade.

1. Introduction

Since their diffusion after World War II, Preferential Trade Agreements (PTAs) among countries stirred a debate on their effectiveness and their actual impact on international trade, and whether they are "building blocs or stumbling blocs" for trade liberalization (Bhagwati, 1991; Baldwin and Seghezza, 2010). While most of the empirical evidence suggests that PTAs increase trade among partner countries, a renewed assessment of their effects is appropriate in light of the changing nature of PTAs over time. Initially, these were agreements mainly based on the elimination of border trade barriers, first of all tariffs, but more recently they developed into agreements that seek a "deep integration" and include a large set of behind-the-border policies, and often include also non-economic objectives.

The aim of this paper is to assess the impact of PTAs including deep provisions on bilateral trade flows. In order to do so, we introduce variables that capture different depths of the agreements and group provisions together on the basis of their characteristics. Even if these deals include provisions of different kinds, aimed for example at protecting the environment or the safety of consumers, in principle, they should still be aimed at liberalizing trade. Therefore, we want to test the impact they have on the main variable that should be affected: trade flows.

PTAs, and especially "deep" agreements, have proliferated during the last ten years, also because of the growing skepticism toward globalization and toward the multilateral system built by the WTO. In a world economy formed by an expanding group of relevant different players, reaching consensus on complex policies affecting trade in a multilateral setting has proven to be very difficult. Therefore, countries

preferred to resort to agreements within smaller groups of (often like-minded) countries. This interest in PTAs as means to spread their own rules and a given view on the functioning of world markets was displayed also by the largest world economies. The EU signed a very large number of such agreements with many countries around the world, and from 2013 to 2016 the EU and the US negotiated the Transatlantic Trade and Investment Partnership (TTIP), potentially one of the most important bilateral trade initiatives ever negotiated. This agreement would have been relevant also because of its potential global reach in setting an example for future agreements and setting new (much needed) standards for international trade.

Differently from the literature, we consider the EU as a single country to fully include the potential scale effects of its deep trade agreements, and to ensure that the high degree of EU internal integration is not affecting the overall results. Our analysis suggests, in line with the literature, that PTAs enhance international trade among countries. However, when we consider the depth of PTAs, we find that there is a non-linear relationship between PTAs' depth and international trade: beyond a certain complexity, the agreement reduces international trade. Similarly, when we split the policy areas covered by PTAs in terms of their economic relevance, we find that non-core policy areas (related mainly to non-trade objectives) don't have any positive impact on trade flows.

2. The empirical analysis of the role of PTAs

Starting with Tinbergen (1962) the gravity model has been a workhorse for empirical analysis in international trade generating results that fit the data remarkably well. Tinbergen's gravity equation has some analogy with Newton's law of gravitation:

$$Trade_{ij} = constant \times GDP_i^{a1} \times GDP_j^{a2} \times Distance_{ij}^{-1} \quad (1)$$

Using logarithmic transformation and with some additional covariates controlling for barriers - "resistances"- to bilateral trade flows, the equation's coefficients can be easily estimated with OLS and generated a large empirical literature (for surveys: Yotov, 2022; De Benedictis and Taglioni, 2011).

For a long period, the gravity equation remained without solid theoretical foundation. However, in the last 20 years, it has been shown (Anderson and van Wincoop, 2003; Arkolakis *et al.*, 2012) that a slightly modified version of equation 1 is consistent with a wide range of canonical trade models: the gravity equation is a reduced form for many theories. Nonetheless these theories impose some constraints on the correct specification.

The gravity model has been adopted to analyse various topics. The largest number of contributions has concentrated on quantifying the impact on trade of

various determinants and policies: distance, international economic integration and PTAs (the focus of this paper), currency unions, tariffs and non-tariffs measures, colonial ties, common language and others.

The large empirical literature on the economic effects of PTAs has commonly found that trade agreements have a positive effect on international trade flows (*e.g.* Baier *et al.*, 2019; Larch and Yotov, 2014). However, the estimates of the PTAs impact on trade flows have changed across authors and over time. This can be explained by two facts. First, the increasing availability of panel data samples has allowed the adoption of important methodological contributions (see next section) that generate more precise estimates of the coefficients of interest. Second, the nature of PTAs has changed over time, with a considerable increase of their depth (Hofmann *et al.*, 2017).

3. Methodology and data

3.1 Empirical specification

In this paper a structural gravity model is adopted to quantify the impact of trade agreements and their depth on international trade flows. We rely on the latest developments on the theoretical side and follow the most recent contributions on the estimation and data fronts (*e.g.*, Larch and Yotov, 2024). Our econometric model has the following baseline specification:

$$X_{ij,t} = exp\left\{\beta_1 PTA_{ij,t} + \beta_2 WTO_{ij,t} + \gamma_{ij} + \varphi_{it} + \theta_{jt}\right\} + \epsilon_{ij,t} \quad (2)$$

Our sample is a panel with i=exporter country, j=importer country and t=year. It covers 156 countries from 1980 to 2018.

$X_{ij,t}$ is the nominal value of good exports from country i to country j at time t. It includes both international and intra-national trade flows (domestic sales). All theoretical micro-foundations of the gravity equation require market clearing and these conditions include domestic sales. This inclusion is not only theory consistent but allows the identification of non-discriminatory trade policies (otherwise wiped out by the inclusion of country-time fixed effects as in equation (2)) (Yotov, 2022).

$PTA_{ij,t}$ is our variable of interest. It is a dummy variable with value 1 if i and j have a preferential trade agreement in force. In some of our specifications we will substitute $PTA_{ij,t}$ with a vector of variables including PTA and other measures of the agreement depth.

$WTO_{ij,t}$ is a dummy variable with value 1 if both countries are World Trade Organization (WTO) members.

Exporter-year ($\varphi_{i,t}$) and importer-year ($\theta_{j,t}$) fixed effects are utilized to eliminate the omitted variable bias due to not properly accounting for multilateral resistance terms (MRT) (which are country specific and vary overtime). Anderson and van

Wincoop (2003) have shown that equation 1 is misspecified because it accounts only for bilateral resistance terms (distance and other covariates) and not for MRT (barriers to trade that a country has with all partners, capturing the general equilibrium effects associated with barriers to trade that each country faces with all its trading partners). The inclusion of these directional country-time fixed effect wipes out also the two GDP variables that appear in equation (1).

Asymmetric (or directional) country-pair fixed effects ($\gamma_{i,j}$) are included to control for bilateral time invariant variables. Some of these might be measured (for example, distance, common language, common border), but many others not. This allows us to control for omitted variable bias generated by observable and unobservable bilateral time invariant determinants of international trade. Moreover, including country-pair fixed effects allow us to handle the endogeneity bias linked to the fact the probability of signing a trade agreement is influenced by the same determinants of trade flows. The identifying assumption is that this problem is generated by time-invariant non measured variables (Larch and Yotov, 2024). This has been the leading approach in the literature to handle the endogeneity problem. As an additional control for endogeneity, we will also include leads of the PTA variable to measure the anticipation effects of future agreements. The asymmetricity of the fixed effects allows for the possibility that a PTA might not affect trade of a given pair of country in the same way (Baier *et al*., 2019).

The inclusion of all these fixed effects wipes out some of the variables that traditionally entered the gravity equation: country pairs GDP and distance. These are not variables of interest in this paper. However, we control for their effect, but we do not identify their specific impact on trade flows.

Equation (2) is estimated using the Poisson pseudo maximum likelihood (PPML) estimator proposed and discussed by Santos Silva and Tenreyro (2006). This estimator solves two weaknesses of the OLS estimator utilized with a logarithmic transformation of eq 2: inconsistency of the estimates due to heteroscedasticity and the problem of dealing with the many zero trade flows due to the logarithmic transformation. PPML estimator does not require any logarithmic transformation and the gravity equation is estimated in multiplicative form.

Equation (2) contains dummy variables whose number depends on how many countries are included in the sample. This might generate an incidental parameter problem: in general, it is not possible to obtain consistent estimates when the number of parameters depends on sample size (Santos Silva and Tenreyro, 2022). Weiner and Zylkin (2021) have shown that in a three-way panel gravity equation like ours, the PPML estimator is still consistent, but asymptotically biased and propose an analytical bias correction. We follow their suggested procedure.

We exploit all the information contained in our panel data set using consecutive years rather than time-averaged or time-interval data as done by part of the empirical

literature. Egger *et al.* (2022) have convincingly argued against the use of time-interval data based on the fact that this practice might lead to biased estimates of both short and long-run effects of PTA on trade flows, that selection of the interval length is arbitrary and that discarding data generates less efficient estimates. To capture the dynamic adjustments (phase-in and phase-out) of trade flows to PTA we will introduce leads and lags in the PTA variable.

3.2 Data sources

To estimate the model in equation (2) we consider a panel of 156 exporters and importers from 1980 to 2018. As mentioned, the European Union (EU) is treated as a single country due to its common trade policy, implying that PTAs are negotiated and signed by the EU and not by individual member countries, and the significance of the Single Market as a deeply integrated area. The EU is built dynamically, with individual countries appearing in our dataset as such prior to access and then incorporated in the Union.

Export flows from origin to destination are sourced from the CEPII Trade and Production database (TradeProd). This database combines data on international and domestic trade flows at the bilateral level combining trade data from Comtrade and production data from UNIDO (Mayer *et al.*, 2023).

Gravity variables, including information on the existence and the type of regional trade agreements (PTAs) and WTO membership are sourced from the CEPII Gravity Database (Conte *et al.*, 2022). The database reports information not only on the participation of countries in PTAs, but also on the type of PTA, distinguishing Partial Scope Agreements (PSA), Free Trade Agreements (FTA), Customs Union (CU) and Economic Integration Agreements (EIA).

Finally, to introduce a more refined measure of the depth of regional trade agreements, we take advantage of the World Bank's Deep Trade Agreements database (Hofmann *et al.*, 2017). This dataset maps the coverage of 52 policy areas in the PTAs notified at WTO signed between 1958 and 2023, including information not only on the policy areas included but also on their legal enforceability, providing a measure of the extensive margin of the content of deep trade agreements.

4. Results

4.1 Baseline results

Our baseline specification considers the (simultaneous and lagged) impact of PTAs on bilateral trade flows, taking into account the type of agreement. Estimates for our baseline specification in equation (2), are presented in Table 1.

Table 1 – *Trade effects of PTAs.*

	(1)	(2)	(3)	(4)
PTA	0.250***	0.200***	-0.007	
	(0.088)	(0.059)	(0.025)	
WTO	0.240***	0.255***	0.226**	0.144
	(0.095)	(0.067)	(0.096)	(0.123)
PTA_{+4}			0.132***	
			(0.041)	
PTA_{+2}			0.042*	
			(0.022)	
PTA_{-2}			0.068***	
			(0.020)	
PTA_{-4}			0.049**	
			(0.025)	
PTA_{-6}			0.0300	
			(0.028)	
PTA_{-8}			-0.002	
			(0.030)	
PTA_{-10}			0.085*	
			(0.045)	
FTA				0.404***
				(0.071)
CU				0.296*
				(0.177)
EIA				-0.557***
				(0.144)
PSA				0.382***
				(0.138)
Tot. PTA			0.376***	
			(0.096)	
F.E. ($\varphi_{it}\,\theta_{j,t}\,\gamma_{i,j}$)	Yes	Yes	Yes	Yes
Pseudo R^2	0.998	0.998	0.998	0.998
Observations	615742	615742	615742	615742

Table note: in column 2 we use the Stata code ppmlhdfe developed by Correia et al (2020) that improves on the routine proposed by Santos and Tenreyro (2006) by finding solutions for those cases in which the pseudo loglikelihood function does not have a maximum. In the remaining columns we use the Stata code ppml_fe_bias created by Weidner and Zylkin (2021) that corrects for asymptotic bias.

In column 1 and 2 are reported the estimates for our baseline specification (equation 2) with and without correction for asymptotic bias. PTA has a positive and significant effect on trade flows in both cases and the two estimated coefficients have similar dimension. An estimated coefficient of 0,25 implies that an international trade agreement between two countries increases trade flows by 28,4%. This result is in line with the most recent literature (Larch and Yotov, 2024). This is only the direct or partial equilibrium effect on trade. It doesn't consider indirect effects induced by third countries adjustments that could be computed in a general

equilibrium framework. As expected, also WTO participation has a positive and significant effect on trade flows. Also in this case the estimated point estimate has a dimension in line with the recent empirical literature (Larch and Yotov, 2024)[1].

International trade reacts slowly to changes in trade barriers; therefore it is appropriate to allow for anticipation and phasing-in effects of an international agreement. Anticipation effects are due to firms that start adjusting their internationalization strategies when the agreement is announced or to some trade costs that start falling before the agreement is signed. Phasing-in effects are motivated by stepwise reduction in trade barriers designed by the PTA. To allow for these dynamic effects, we introduce in the baseline equation leads of the PTA variable for anticipation effects and lags of PTA for phase-in effects.

We follow the empirical literature (for example, Egger *et al.*, 2022) in assuming that anticipation effects are spread over a shorter number of years than phase in effects: for the former we go back four years and for the latter we have leads up to the tenth year. In Table 1 column 2, we add 2-year lags and leads of PTA variable[2]. With the introduction of leads and lags the contemporaneous effect of PTA disappears. However, various leads and lags are positively significant, a signal of the relevance of anticipation and phase-in effects and the importance of including them into the specification. The cumulative effect of PTA (calculated as the sum of the significantly different from zero leads and lags coefficients) is 0,376 (significantly different from zero), implying a 45,6% increase in trade flows.

The WTO distinguishes different types of PTAs. In column 4 of Table 1, the PTA variable has been substituted by indicator variables for four types of agreements. The most common type is the Foreign Trade Agreement (FTA) in which member countries eliminate completely all tariffs among them. Our results show that it has the largest impact on trade flows (it increases international trade by 49,8%). Custom Unions (CU) are a form of agreement deeper than FTA: in addition to complete good trade liberalization, members of a CU adopt a common trade policy. CU has a positive and significant impact on trade flows, even if lower that FTA. Partial Scope Agreements (PSA), which covers only certain products, have a positively significant impact on trade flows stronger than FTA. This result has also been obtained by Larch and Yotov (2024). One possible explanation is that these agreements being narrowly focused on specific products are very effective in liberalizing and increasing trade flows. Finally, the result for Economic Integration Agreements (EIA), which liberalize trade in services, is puzzling: the estimated coefficient is significantly negative, suggesting a negative correlation between better access to service markets

[1] As a goodness-of-fit measure we use the Pseudo R^2 generated as the squared simple correlation between observed and predicted values of the dependent variable.

[2] We have also estimated a specification with year-on-year responses to the creation of an PTA obtaining similar results.

and trade in goods. Certainly, crossed effects of economic agreements between countries on different types of flows do exist and the sign is not always positive (see for example, Heid and Vozzo, 2020). Therefore, it is possible that a sort of crowding-out effect occurs also between services and goods.

4.2 The depth of trade agreements

The baseline estimates confirm that PTAs' trade effects differ by type of agreement, as expected. Here we focus on how the depth of an agreement impacts international trade flows. Since the early '90s there has been a large increase in the number of PTAs. These new agreements are considered "deep", in contrast to old PTAs considered as "shallow". Shallow agreements were mainly concerned with reducing tariffs on industrial and agricultural goods (border policies). The new wave of agreements has extended the commitments to non-tariff border measures and a large set of behind the border measures (for example, intellectual property rights and standards). Hofmann et al (2017) show that deep integration has gained momentum since the '90s: PTA signed between 1990 and 1994 covered around 15 policy areas and between 2010 and 2015 on average 23.

According to many authors (for example, Mattoo *et al*., 2020) deep trade agreements (DTA) are expected to increase trade flows among member countries more than a comparable shallow agreement. One argument is based on the larger reduction in trade costs due to the increased number of policy areas included in DTAs. However, it is reasonable to expect that some provisions included in DTAs might have a negative effect on trade flows between members. Some of the new policy areas covered by DTAs aim to improve various non-trade objectives (NTOs) such as labour and environmental standards (these two policy areas are covered by around 20% of all PTAs, Mattoo *et al*., 2020). In this case, recent DTAs that include trade-restrictive environmental provisions might allow countries to promote "green protectionism" and therefore reduce international trade (Brandi and Morin, 2023). There is also empirical evidence at the level of single policy area showing that some provisions have a negative impact on international trade (Winters, 2023).

In this section we keep our focus on the aggregate trade effects of PTAs and try to explicitly allow for their heterogeneity in the depth dimension. We generate various measures of PTAs' depth exploiting the number of policy areas included in the trade agreement available in The World Bank's Deep Trade Agreements database (Hofmann *et al.*, 2017). The total number of policy areas is 52 and we create count variables differentiating by type of provisions.

The first two variables are *totac* (the number of policy areas included in the PTA) and *totle* (the number of policy areas included with legally enforceable provisions). The latter is our baseline measure for PTAs' depth. A provision is defined legally enforceable if the language used is sufficiently precise and binding (our variable

aggregates what in the WB database is defined as weakly and strong legally enforceable). Estimation method and specification are the same as for results in Table 1 and the PTA dummy is replaced with the relevant depth variables.

Results in column (1) and (3) of Table 2a show that PTA's depth increases international trade: estimated coefficients for depth variables are positively significant and very similar in dimension (a new legally enforceable policy area included in the PTA increases trade by 7,6%). WTO membership is also positively significant. In column (2) and (4) we introduce also the squared term for the relevant depth variable. The non-linear term is negatively significant for the specification including only legally enforceable provisions. This is an important result, suggesting that PTA depth has a positive impact on international trade up to a certain level of complexity (i.e. number of policy areas covered), beyond which any additional policy area covered with legally enforceable provisions generates negative effect on international trade.

Table 2a – *Trade effects of PTAs' depth: total and legally enforceable.*

Variable	(1)	(2)	(3)	(4)
totac	0.012***	0.026**		
	(0.003)	(0.011)		
totac^2		-0.001		
		(0.000)		
totle			0.013***	0.033***
			(0.005)	(0.011)
totle^2				-0.001**
				(0.0004)
wto	0.251***	0.238**	0.251***	0.251***
	(0.096)	(0.099)	(0.094)	(0.094)
F. E. (φ_{it} $\theta_{j,t}$ $\gamma_{i,j}$)	Yes	Yes	Yes	Yes
Pseudo R^2	0.998	0.998	0.998	0.998
Observations	615742	615742	615742	615742

Table note: we use the Stata code ppml_fe_bias by Weidner and Zylkin (2021).

The 52 policy areas of the WB database can be divided into two groups: 14 areas covered by the current mandate of WTO (WTO+ areas) and 38 areas not currently regulated by the WTO (WTO-X areas). WTO-X areas include many policies with NTOs (for example, environmental laws, labour market regulations, health laws – for a detailed description Hofmann *et al.*, 2017). Descriptive evidence in Hofmann *et al.* 2017, shows that only a few WTO-X policy areas are both included and legally enforceable in a relevant number of PTAs. We distinguish between the two provision groups, as the cost of implementing them might be quite different. When provisions become complex and not standard for exporting firms, as it might happen

especially with WTO-X provisions, access to a given market can become more costly, even if border barriers are removed.

We create two count variables: wtoplus_ac and wtox_ac. We also measure those policy areas which are legally enforceable: wtoplus_le and wtox_le. Results are presented in Table 2b. The results in column 1 and 2, show that on average only WTO+ areas (legally enforceable or not) have a positive and significant effect on trade flows. Areas that are beyond the current WTO mandate included in PTAs don't have on average a significant effect.

Table 2b – *Trade effects of PTAs' depth: other dimensions.*

Variable	(1)	(2)	(3)	(4)
wtoplus_ac	0.034***			
	(0.012)			
wtox_ac	-0.009			
	(0.009)			
wtoplus_le		0.037***		
		(0.011)		
wtox_le		-0.017		
		(0.011)		
core_ac			0.020**	
			(0.009)	
noncore_ac			-0.002	
			(0.010)	
core_le				0.024***
				(0.007)
noncore_le				-0.015
				(0.013)
wto	0.234**	0.250**	0.246**	0.266***
	(0.098)	(0.099)	(0.098)	(0.098)
F. E. ($\varphi_{it}\,\theta_{j,t}\,\gamma_{i,j}$)	Yes	Yes	Yes	Yes
Pseudo R^2	0.998	0.998	0.998	0.998
Obs.	615742	615742	615742	615742

Table note: we use the Stata code ppml_fe_bias by Weidner and Zylkin (2021).

Similar results are obtained classifying the policy area covered by PTAs in terms of their economic relevance. Core policy areas are those considered by the literature as more important from an economic point of view. In the WB database core policy areas are the 14 WTO+ areas and four additional WTO-X areas: competition policy, investment, movement of capital and intellectual property rights protection. Non-core policies areas are the remaining WTO-X areas. For each PTA we create four additional count variables on the basis of relevant policy areas covered: core_ac (core areas), noncore_ac (non-core areas), core_le (legally enforceable areas) and noncore_le (legally enforceable non-core areas).

5. Conclusions

In this paper we use the gravity equation to estimate the effects of PTAs and their depth on trade flows for a panel of 156 countries during the period 1980-2018. EU is considered as a single country due to its common trade policy and high level of domestic economic integration. Our baseline results show that signing a PTA has an average cumulative impact on international trade flows of 45,6% after allowing for phase-in and anticipation effects. We have also shown that PTAs have heterogenous effects on trade flows both in terms of type of institutional agreement and of their depth. A novel result is that the depth of PTAs has a nonlinear impact on trade flows: up to a certain number of policy areas containing legally enforceable provisions trade increases with the depth of the agreement and beyond that level trade starts declining. Measuring PTAs depth in terms of policy areas included in the WTO mandate or in terms of core economic policy areas covered by the agreement increases trade. However, the deepening of agreements in the direction of covering more non-core policy areas (having mainly NTOs) doesn't have a positive impact on trade.

These results suggest that policymakers proposing deep trade agreements, as well as firms and consumers affected by it, should take into account that the boost in trade flows can be limited or even negative, as the agreements' provisions often have different targets than trade, and indeed might introduce new costs.

References

ANDERSON J., VAN WINCOOP E. 2003. Gravity with Gravitas: A Solution to the Border Puzzle, *American Economic Review*, Vol. 93, No.1, pp. 170-192.

ARKOLAKIS C., COSTINOT A., RODRIGUEZ-CLARE A. 2012. New Trade Models, Same Old Gains?, *American Economic Review*, Vol. 102, No. 1, pp.94-130.

BHAGWATI J. 1991. *The World Trading System at Risk*. Princeton, NJ: Princeton University Press.

BAIER, S.L., YOTOV, Y.V., ZYLKIN, T. 2019. On the Widely Differing Effects of Free Trade Agreements: Lessons from Twenty Years of Trade Integration, *Journal of International Economics*, Vol. 116, pp.206–226.

BALDWIN, R. E., SEGHEZZA E. 2010. Are Trade Blocs Building or Stumbling Blocs?, *Journal of Economic Integration*, Vol. 25, No. 2, pp. 276–97.

BRANDI C., MORIN J.F. 2023. *Trade and the Environment*. Elements in Earth System Governance, Cambridge University Press.

CONTE M., COTTERLAZ P., MAYER T. 2022. "The CEPII Gravity Database". *CEPII Working Paper N°2022-05*, July 2022.

CORREIA S., GUIMARÃES P., ZYLKIN T. 2020. Fast Poisson Estimation with High-dimensional Fixed Effects, *Stata Journal*, Vol. 20, No. 1, pp. 95–115.

DE BENEDICTIS L., TAGLIONI D. 2011. The Gravity Model in International Trade. In DE BENEDICTIS L. and SALVATICI L. (Eds.), *The Trade Impact of European Union Preferential Policies*, 2011, Springer.

EGGER P., LARCH M., YOTOV Y. V. 2022. Gravity Estimations with Interval Data: Revisiting the Impact of Free Trade Agreements, *Economica*, Vol. 89, No. 353, pp. 44-61.

HEID, B., VOZZO, I. 2020. The International Trade Effects of Bilateral Investment Treaties, *Economics Letters*, Vol. 196:109569.

HOFMANN C., OSNAGO A., RUTA M. 2017. Horizontal Depth: A New Database on the Content of Preferential Trade Agreements. *Policy Research Working Paper*; *no. 7981*. Washington, D.C: World Bank Group.

LARCH M., YOTOV Y.V. 2024. Estimating the Effects of Trade Agreements: Lessons from 60 Years of Methods and Data, *The World Economy*, Vol. 47, pp. 1771-1799.

MATTOO A., ROCHA N., RUTA M. 2020. The Evolution of Deep Trade Agreements. *Policy Research Working Paper; no. 9283*. Washington, D.C: WB.

MAYER T., SANTONI G., VICARD, V. 2023. The CEPII Trade and Production Database, *CEPII Working Paper 2023- 01*, January 2023, CEPII.

SANTOS SILVA J. M. C., TENREYRO S. 2006. The Log of Gravity, *The Review of Economics and Statistics*, Vol. 88, No. 4, pp. 641–658.

SANTOS SILVA J. M. C., TENREYRO S. 2022. The Log of Gravity at 15, *Portuguese Economic Journal*, Vol. 21, No. 3, pp. 423–437.

TINBERGEN J. 1962. *Shaping the World Economy*. New York: The Twentieth Century Fund.

WEIDNER M., ZYLKIN T. 2021. Bias and Consistency in Three-way Gravity Models, *Journal of International Economics*, Vol. 132: 103513.

WINTERS, L. A. 2023. Trade Agreements and Non-Trade Objectives: a Cautionary Note. In FERNANDES, A, ROCHA N., RUTA M. (Eds.), *Beyond Trade: How Deep Trade Agreements Shape Non-Trade Outcomes*, CEPR Press.

YOTOV Y.V. 2022. On the Role of Domestic Trade Flows for Estimating the Gravity Model of Trade, *Contemporary Economic Policy*, Vol. 40, pp. 526-540.

Elisa BORGHI, Università Bocconi, elisa-borghi@unibocconi.it
Rodolfo HELG, Università C. Cattaneo-LIUC, rhelg@liuc.it
Lucia TAJOLI, Politecnico di Milano, lucia.tajoli@polimi.it