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Candidate Number: 23802

MSc in Development Management 2023
(Applied Development Economics Specialism)

Dissertation submitted in partial fulfilment of the requirements of the
degree.

**Building and Stumbling Blocks: An Empirical Analysis of the
Heterogenous Effects of Trade Agreements Between North and
South Countries**

Word Count: 9310

Abstract

Extensions to the Gravity Model of Trade are used to empirically estimate across regions the heterogeneous partial effects of Trade Agreements (TAs) signed between 2000 and 2010 on trade volumes and value per unit of manufacturing products exported, as well as the effects on North-North, North-South and South-South bilateral trade relationships. We find that the average “total” partial effects of TAs in the period studied are similar to the estimates of the relevant literature, but there are heterogeneous effects of specific agreements within regions both on trade volume and value per unit. We also find heterogeneous effects of TAs on the different categories of bilateral trade relationships. We conclude that TAs can have positive and negative effects on both North-South and South-South trade, and we explore potential mechanisms driving this heterogeneity.

Keywords: “Trade Agreements”; “South-South”; “North-South”; “International Trade”; “Exports”; “Export Product Unit Value”; “Gravity Model”.

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Abbreviations

CMs	Common Markets
COMTRADE	UN Commodity Trade Statistics Database
CU	Customs Union
DESTA	The Design of International Trade Agreements Database
EPUV	Export Product Unit Value
EUs	Economic Unions
FTA	Free Trade Agreements
HS	Harmonysed System
INDSTAT	UNIDO Industrial Statistics database
NRPTAs	Non-reciprocal Preferential Trade Agreements
PTAs	Preferential Trade Agreements
TAs	Trade Agreements
TradeProd	The Trade and Production Database

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1 Introduction

The proliferation of Trade Agreements (TAs) since the early 1990s has been well documented in the international trade academic literature ([15] Dahi & Demir, 2013; [38] Mayda & Steinberg, 2007). This trend has slowed down since the 1990s but is has not stopped. Figure 1 shows the historical evolution of TAs, showing the dramatic increase in the 1990s.

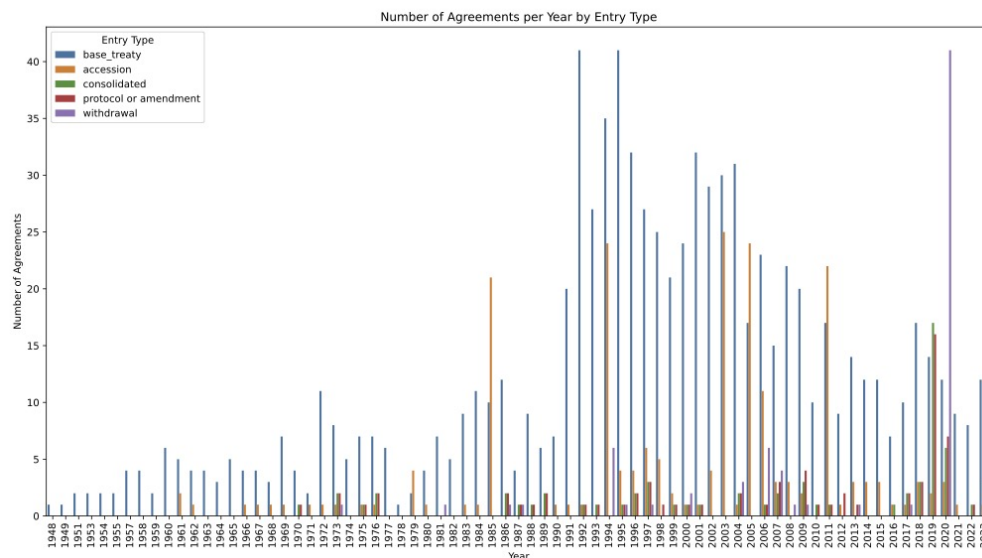


Figure 1: Trade Agreements Per Year

Source: Visualisation made by author. Data by The Design of International Trade Agreements Database (DESTA).

Moreover, the vast majority of TAs have been signed between developing countries, what is referred to as “South-South” trade cooperation, covering an increasingly important share of global trade across industries. Figure 2 shows the historical evolution of South-South TAs, Figure 3 shows the historical evolution of North-South TAs, and Figure 4 shows the historical evolution of North-North TAs, showcasing the significant difference in the number of agreements and countries belonging to each group.

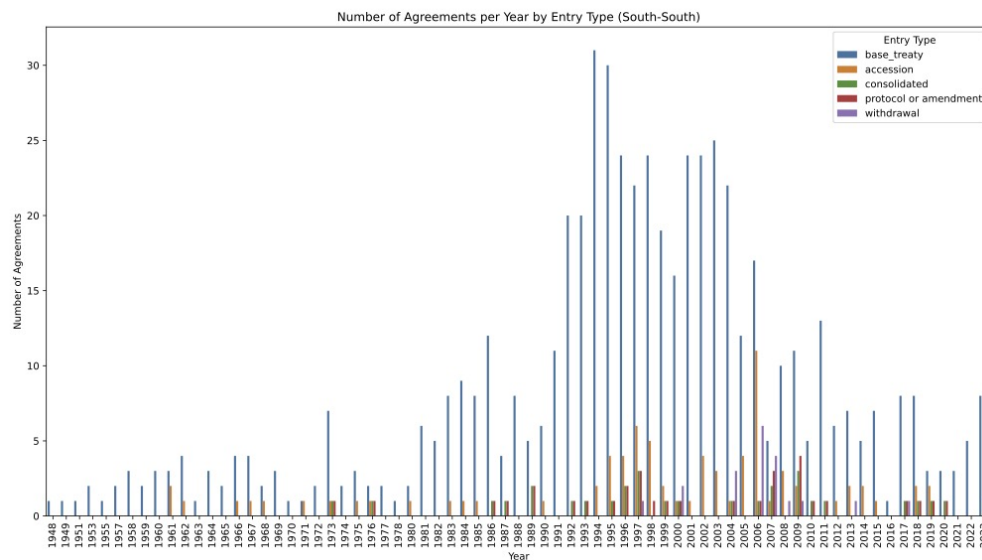


Figure 2: Trade Agreements Per Year (South-South).

Source: Visualisation made by author. Data by The Design of International Trade Agreements Database (DESTA).

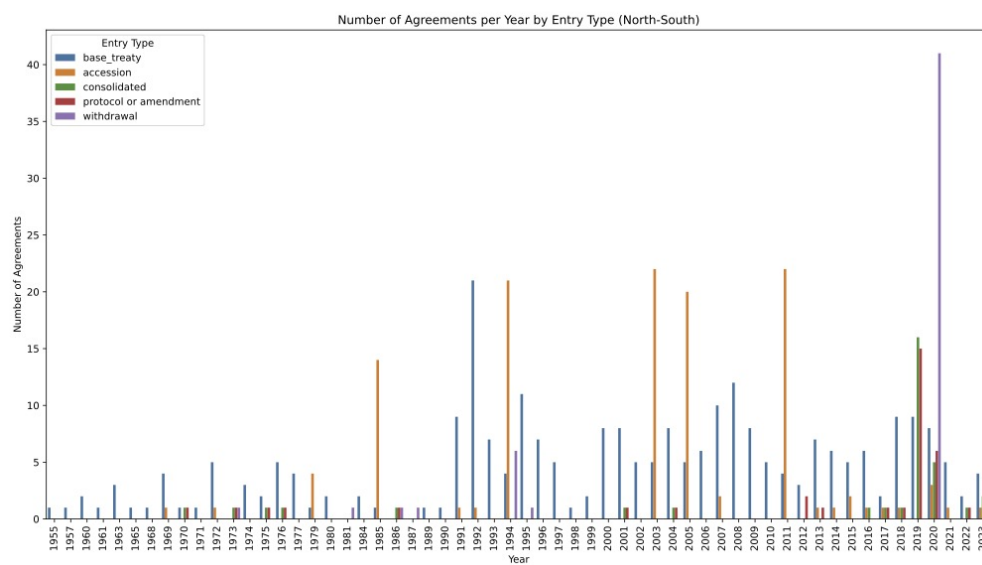


Figure 3: Trade Agreements Per Year (North-South).

Source: Visualisation made by author. Data by The Design of International Trade Agreements Database (DESTA).

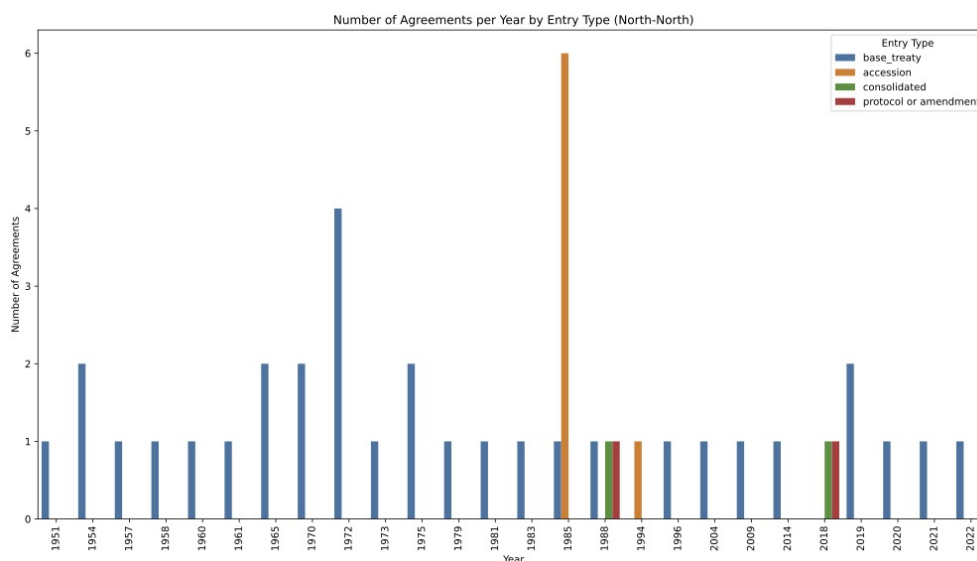


Figure 4: Trade Agreements Per Year (North-North).

Source: Visualisation made by author. Data by The Design of International Trade Agreements Database (DESTA).

Despite their apparent importance for the governments of developing countries, a common view in the academic literature is that South-South TAs are not as effective as North-South TAs, or even that they do not achieve significant effects, making them largely symbolic ([21] Gamso & Postnikov, 2022). North-South agreements, signed between developed and developing countries, are presented as a superior alternative, more effectively leading to increased trade for its members, and quality upgrading through learning-by-exporting dynamics and better access to intermediate goods for developing countries. At the same time, other strands of the international trade literature present South-South TAs as a more effective platform for developing countries to grow, at least to a level where they can take advantage of North-South cooperation without being undermined by more influential powers. This debate is often presented as a dichotomy, where South-South TAs are either building or stumbling blocks for developing countries. Solving it will go a long way in better informing developing countries into which agreements they should enter, with what types of partners, and how should the agreement be designed.

In this paper, we venture to analyse this dichotomy empirically through the use of a gravity model of trade, and subsequent extensions, in order to get estimates for the effects

of specific TAs, as well as estimates on the effects of TAs on South-South, North-South and North-North bilateral trade relationships, relative to non-TA-members. We also explore the use of the export product unit value (EPUV) as an alternative to trade volume, in order to capture the effects of TAs on the value per unit exported of manufacturing goods. As such, we aim to answer two specific research questions: do South-South TAs act as building blocks or stumbling blocks to developing countries? Are they preferable to North-South agreements?

This research is related to literature from traditional trade theory on comparative advantage, to new trade theory and classical development theory on the potential dynamic and scale effects of TAs, and to more recent literature on the relevance of the structure of the product space exported and the extensive margin of trade.

The paper proceeds in section 2 with a review of the relevant theoretical and empirical literature on the effects of TAs on North-South and South-South trade and potential development implications. Section 3 introduces our empirical methodology and data. Section 4 presents and describes our main findings, and Section 5 analyses and discusses their potential implications and how they fit within the relevant literature. Finally, Section 6 concludes.

2 Literature Review

This section reviews the literature on the theoretical and empirical potential effects of TAs on exports and welfare and situates the analysis in the relevant field of research.

2.1 Theoretical Framework

The relevant theoretical framework in the literature is often described as a dichotomy, where TAs are either stumbling or building blocks in the development path of developing countries.

2.1.1 Comparative Advantage and Trade Creation and Diversion

Traditional trade theory emphasizes trade creation (allowing cheaper products from TA members to substitute for more expensive domestic products) and trade diversion (substituting products from non-TA members that were cheaper before the TA with products from

TA members that are cheaper now due to the TA reducing tariffs) ([46] Schiff, Winters and Schiff, 2003) and argues that the impact of TAs depends on the comparative advantage of member countries. In particular, it argues that TAs magnify the impacts of a country's comparative advantage, relative to the world and to other member countries signatories of a common TA. If member countries of a TA have a comparative advantage on a factor endowment relative to the world, but one country also has a comparative advantage on the same factor endowment relative to the other member countries, the country with the "extreme" advantage will be more vulnerable to trade diversion effects, while countries with "intermediate" advantages will gain from trade creation effects, predicting divergence of trade outcomes, and winners and losers among member countries. ([51] Venables, 2003). This emphasis on the trade creation and trade diversion effects among member countries with significant differences in the comparative advantage of their factor endowments relative to the world and to each other, suggests that, when the country with the "extreme" comparative advantage is a high-income country, relative to a lower-income country with an "intermediate" comparative advantage, the lower-income country should seek a TA with the other high-income country as it will gain more. On the contrary, if both members are lower-income countries, the country with the "extreme" comparative advantage, should not seek a TA with the other low-income member country as it will be vulnerable. ([43] Sanguinetti, Siedschlag and Martincus, 2010). This logic can be easily extended to the North-South and South-South types of TAs, as "North" countries will reasonably have an "extreme" comparative advantage in skill-intensive goods relative to "South" countries, while "South" countries will reasonably have an "extreme" comparative advantage in labour-intensive goods relative to "North" countries. Furthermore, it is also argued in the literature that benefiting from economies of scale through South-South economic integration is more difficult because member countries do not have complementary production and trade structures, nor high interpenetration of each other's markets on intra-industry trade. ([46] Schiff, Winters and Schiff, 2003). Also, South countries can benefit from greater technological diffusion from North-South TAs as the "North" countries have higher industrial development as well as investment in research ([45] Schiff and Wang, 2008). Finally, as the trend in manufacturing has been in favour of vertical specialization or value chain fragmentation ([34] Krugman, 1995), North-South TAs

are preferable as developing countries strive to capture a greater portion of the value added. Based on these arguments, developing countries should therefore be better off entering into North-South rather than South-South agreements.

2.1.2 Economies of Scale, Input-Output linkages and Products Exported

In contrast, classical development theory and new trade literature go beyond the static welfare gains from trade creation and diversion effects when analysing the effect of TAs. Developing countries can use TAs to overcome limitations of their domestic market size in the industrialisation process ([15] Dahi and Demir, 2013). Such potential increases in the effective market size could help industries in developing countries achieve economies of scale and increase the skill content of production and exports, which in turn could improve the market penetration of exports of developing countries in developed markets in industrial products ([20] Fugazza and Robert-Nicoud, 2006). Also, due to similarities in production patterns and resource base among developing countries, incentivising trade by lowering barriers could facilitate appropriate technology transfer, according to the needs of developing countries ([50] UNIDO, 2006). Of particular relevance for developing countries, it is argued that the products that countries export matter for long-term economic performance. If a country exports products from industries that are more technology-intensive, these are likely to create input-output linkages and spillover effects in human and physical capital accumulation and innovation ([25] Hausmann, Hwang and Rodrik, 2007). Furthermore, by allowing for factor accumulation, TAs can reduce intra-block trade barriers and increase competition and access to cheaper intermediate goods, triggering changes in industrial production in member countries. As such, TAs among “South” countries can reduce intra-South barriers and lead to industrialization of the region ([41] Puga and Venables, 1998). In this context, what matters are not static gains from TAs, but dynamic gains in industrial development. If South-South TAs truly promote industrial development of member countries, they might be desirable even if there are short-term losses due to trade diversion ([15] Dahi and Demir, 2013). Other arguments in the development literature emphasize the asymmetries in bargaining power between “North” and “South” countries, which could lead to worse outcomes for developing countries if their policy space gets restricted ([49] Thrasher and Gallagher, 2008). To the

extent that these arguments hold true, developing countries could be better off entering into South-South rather than North-South agreements, or at least should pursue both kinds of agreements.

2.2 Relevance of the Structure of Product Space

As a compliment to trade theory, new trade theory and classical development theory, there is a recent strand of the academic literature that emphasises the importance of the structure of the product space exported by each country in the structural transformation process. Beyond factor endowments of physical, human and institutional capital, and their subsequent evolution through accumulation processes, as the basis for the comparative advantage of countries, this literature proposes and finds evidence of patterns of path dependence depending on the current capabilities of countries, and the relatedness of current capabilities to the capabilities required to produce new products in the future ([26] Hausmann and Klinger, 2007). As it is observed that human capital for one product is imperfectly substitutable for other products, and the degree of substitutability determines the relatedness of products, the implication is that, as countries experience a strong tendency to move into related products that require the capabilities that a country already has or that are similar, the opportunities for future transformation are dictated by the current product space and its proximity to related products. Moreover, it also implies that there is a positive exponential relationship between the returns to the accumulation of new capabilities and the capabilities present in a country. ([24] Hausmann and Hidalgo, 2010). The more diverse the product structure of a country, the higher the returns to accumulate new capabilities. Inversely, we can find a “trap of economic stasis”, in which countries with few capabilities have little incentives to accumulate new capabilities as they will have negligible or no returns, predicting a world of divergence in industrial development. Furthermore, this literature suggests that countries converge to the level of income determined by their productive structures and how complex they are ([29] Hidalgo and Hausmann, 2009). An underlying assumption of this literature is that what a country exports matter and signals valuable information about a country’s comparative advantage and productive structure, not only on its current industries and capabilities, but also on a component of the evolution of its comparative advantage based on

the relatedness to other industries and capabilities ([27] Hausmann *et al.*, 2014). The implications of this literature to the effects of TAs appears to be relevant to the extent that TAs can help countries acquire new capabilities and diversify their structure of product space. Logically, although North-South trade has the largest potential to allow South countries to acquire new capabilities, we expect that the highest returns should be made by acquiring capabilities in industries and products related to the current capabilities of countries, which in the context of our research should occur between countries with related productive structures. As such, South-South trade could function as a building block for developing countries to acquire new capabilities and diversify the structure of their product space, before they can take advantage of acquiring new capabilities through North-South trade.

2.3 Empirical Evidence

The preference of a type of partner in a TAs then becomes an empirical question. Do South-South TAs promote trade and industrial development among their members? The empirical literature overall reports positive effects of TAs on the trade of member countries, but with considerable heterogeneity on the estimation coefficients. For example, a meta-analysis of research papers on the effects of TAs on member trade, encompassing 85 papers and 1827 estimates, finds an average of 0.59 (an 80% increase in trade), with a median of 0.38 (a 46% increase in trade), a wide range of coefficient estimates (-9.01 to 15.41), and only 312 out of 1827 estimates reported as negative ([14] Cipollina and Salvatici, 2010). Furthermore, a survey of the empirical research on the effect of economic integration agreements on international trade flows, as well as using the most modern econometric techniques to address biases, found an increase of 50% on international trade, but with significant variation in the effects of specific agreements ([32] Kohl, 2014). However, much of the empirical research is focused on the effects of TAs on or including the most advanced economies. Empirical research focused exclusively on the effects of South-South TAs or comparing them to the effects of North-North or North-South TAs, is much less prevalent in the literature. Although, several research papers do control for the type of agreement (North-South or South-South) and have found positive and significant effects of South-South TAs ([39] Medvedev, 2006; [38] Mayda and Steinberg, 2007; [15] Dahi and Demir, 2013; [18] Deme and Ndrianasy, 2017),

these articles tend to be limited in their scope, sample size or only focus on trade volumes. Using firm-level data, empirical literature studying trade outcomes using unit values of exports reports evidence of the value per unit increasing as the income level of the importing nation increases ([23] Hallak, 2006; [11] Bastos and Silva, 2010). Relevant to our analysis, one article finds evidence that the same firms export their products at a higher value per unit the higher the income level of the importing nation ([37] Manova and Zhang, 2012). Beyond providing evidence that the direction of trade has immediate repercussions, this could also provide evidence in favour of North-South TAs, as they can generate more revenue and promote quality upgrading ([16] Dahi and Demir, 2017). At the same time, other strands of the empirical research literature emphasise the importance of similarities in trade structure and preferences and provide evidence that countries of similar levels of income, technology and endowments have higher levels of trade, and importantly, more potential for convergence and spillovers ([22] Hallak, 2010). Important for our discussion of the structure of product space, empirical research finds that trade between similarly endowed countries have more diversified exports between them, relative to trade with countries with different endowments ([42] Regolo, 2013), and that countries with neighbours with shared or similar comparative advantages will experience an increase in the export of similar products to the neighbouring country ([6] Bahar, Hausmann and Hidalgo, 2014). If similarity between countries is highly relevant for knowledge transfer, South-South TAs can potentially be more beneficial for developing countries.

3 Methodology

3.1 Empirical Strategy

3.1.1 The Gravity Model of Trade

Often referred as the “workhorse” of international trade, the gravity model is prominent in the empirical literature of applied international trade analysis. Among the arguments that could support the use of the gravity model, there are four that are particularly relevant for our purposes. First, the gravity model of trade is intuitive to understand. Following

the metaphor of Newton's Law of Universal Gravitation, it predicts that international trade between two countries is directly proportional to the product of their economic size, and inversely proportional to trade frictions between them. In simpler words, the bigger (smaller) the economies of two countries, and the easier (harder) it is for them to trade with each other, the more (less) we expect them to trade. Second, it is referred to as a structural model with solid theoretical foundations, which makes it appropriate for counterfactual analysis, such as measuring the effects of trade policies as we aim to do with the effects of North-South versus South-South agreements. Third, the model has a flexible structure, which will allow us to construct a specification tailored to our research. Finally, fourth, it holds consistent and remarkable predictive power, both with aggregate and sectoral data ([53] Yotov et al. 2016).

Through the decades, the gravity equation has been regularly upgraded in the theoretical and empirical literature. Of relevance, the simple intuition of the gravity model was theoretically extended by Anderson to note that, after controlling for size, the increase or decrease is *relative* to the average barriers of the two countries with all their partners, which are referred as "multilateral resistance" ([1] Anderson 1979). The more trade barriers or resistance to trade exists with other countries relative to a given partner, the more a country is pushed to trade with said partner. Anderson also introduced the assumptions of product differentiation by place of origin, and Constant Elasticity of Substitution (CES) expenditures, or the Armington-CES assumption ([53] Yotov et al. 2016; [13] Chatzilarzou and Dadakas 2023), which led us to today's generalized form of the gravity equation, as developed and popularised by Anderson and van Wincoop ([2] Anderson and van Wincoop 2003).

Equally important, several empirical developments have strengthened the gravity model and inform our choice of methodology: Exporter-time and importer-time fixed effects are used to account for the multilateral resistance terms in a gravity estimation with panel data ([40] Olivero and Yotov 2012). As the gravity model is often estimated with an OSL estimator, zero-trade flows were dropped from the sample when trade was transformed into a logarithmic form. Also, trade data is recognized to suffer from heteroscedasticity ([53] Yotov et al. 2016). To solve for zero-trade flows and heteroscedasticity, the Poisson Pseudo Maximum Likelihood (PPML) estimator has been proposed to estimate the gravity model,

avoiding potential biases ([47] Silva and Tenreyro 2006; [44] Santos Silva and Tenreyro 2011). Country-pair fixed effects have been proposed to account for the unobserved endogeneity of trade policy ([7] Baier and Bergstrand 2007). It is worth noting that the inclusion of exporter-time and importer-time fixed effects will absorb all observable and unobservable time-varying country-specific characteristics that could affect the dependent variable, while the country-pair fixed effects will absorb observable and unobservable bilateral time-invariant characteristics that could affect trade costs between the country pair. The inclusion of intra-trade flows as well as international trade flows is proposed to correctly estimate the effects of non-discriminatory trade policy, allowing for consumers to choose products from both international and domestic sources ([17] Dai, Yotov, and Zylkin 2014; [28] Heid, Larch, and Yotov 2017). Year-intervals instead of data pooled over consecutive years should be used to allow for adjustment of trade flows to policies that might not have immediate effects, as we expect TAs effects to behave ([8] Baier and Bergstrand 2007; [3] Anderson and Yotov 2016). And finally, to account for the effects of globalisation forces that may biased the estimates of trade policies, a set of globalisation dummies are recommended to control for the effects of globalisation in the gravity model ([52] Yotov 2012; [12] Bergstrand, Larch, and Yotov 2015).

3.1.2 Benchmark Model

Based on the theoretical and empirical best-practices found in the relevant literature, we employ the following gravity equation using a PPML estimator and a balanced panel data approach with multiple exporters, multiple importers and time as our benchmark model:

$$X_{ij,t} = \exp(\eta_{i,t} + \psi_{j,t} + \gamma_{i,j} + \beta_1 TA_{ij,t} + \beta_2 TA_{ij,t-5} + \sum_t b_t) + \epsilon_{ij,t} \quad (1)$$

Where $X_{ij,t}$ denotes the value of exports from an origin country i to a destination country j ; $\eta_{i,t}$ and $\psi_{j,t}$ are, respectively, exporter-time and importer-time fixed-effects; $\gamma_{i,j}$ is a country-pair fixed-effect; $TA_{ij,t}$ and $TA_{ij,t-5}$ are our main variables of interest, which, respectively indicate if i and j are members of a TA at time t and, to account for potential

“phase-in” effects over time of the TA, at time $t - 5$; $\sum_t b_t$ is a set of dummies that equal 1 for international trade and 0 for domestic trade observations at each time t ; and $\epsilon_{ij,t}$ is an error term.

3.1.3 TA Heterogeneity Model

In contrast with our main interest of research, which are the potential heterogeneous effects of TAs on different members for different types of agreements, this benchmark model, specifically $\beta = \beta_1 + \beta_2$, would provide the average “total” partial effect of TAs on trade, relative to non-TA-members, after accounting for lagged effects, but it cannot provide the effects for a given agreement. As such, an expansion can be implemented to capture heterogeneity in TA effects as proposed by Baier *et al.* ([10] Baier, Yotov, and Zylkin 2019):

$$X_{ij,t} = \exp \left(\eta_{i,t} + \psi_{j,t} + \gamma_{i,j} + \sum_A \beta_{1,A} TA_{ij,t} + \sum_A \beta_{2,A} TA_{ij,t-5} + \sum_t b_t \right) + \epsilon_{ij,t} \quad (2)$$

Equation (2) can be implemented to account for heterogeneous effects of TAs at the level of the specific agreement, by allowing for distinct average partial effects for each individual agreement, using superscript A to index by agreement and also allowing for agreement-specific lags: $\beta_A = \beta_{1,A} + \beta_{2,A}$.

3.1.4 North-North, North-South and South-South TAs

In order to analyse the differentiated effects of North-North, North-South and South-South TAs, we extend both models to get estimates for each type of TA. Our benchmark model is extended as follows:

$$\begin{aligned} X_{ij,t} = \exp & \left(\eta_{i,t} + \psi_{j,t} + \gamma_{i,j} + \beta_{1NN} TA_NN_{ij,t} + \beta_{2NN} TA_NN_{ij,t-5} \right. \\ & + \beta_{1NS} TA_NS_{ij,t} + \beta_{2NS} TA_NS_{ij,t-5} + \beta_{1SS} TA_SS_{ij,t} + \beta_{2SS} TA_SS_{ij,t-5} \\ & \left. + \sum_t b_t \right) + \epsilon_{ij,t} \quad (3) \end{aligned}$$

Where $X_{ij,t}$ denotes the value of exports from country i to country j at time t ; $\eta_{i,t}$ and $\psi_{j,t}$ are exporter-time and importer-time fixed effects, respectively; $\gamma_{i,j}$ is a country-pair fixed effect; β_{1NN} and β_{2NN} are the coefficients for the immediate and lagged effects of a North-North TA (TA_NN); β_{1NS} and β_{2NS} are the coefficients for the immediate and lagged effects of a North-South TA (TA_SN); β_{1SS} and β_{2SS} are the coefficients for the immediate and lagged effects of a South-South TA (TA_SS); $\sum_t b_t$ is a set of time dummies accounting for international trade-specific effects at each time t ; and $\epsilon_{ij,t}$ is the error term.

Equation (2) also gets extended to capture the heterogeneous effects of the different types of TAs as follows:

$$X_{ij,t} = \exp \left(\eta_{i,t} + \psi_{j,t} + \gamma_{i,j} + \sum_A (\beta_{1,A,NN} TA_NN_{ij,t} + \beta_{2,A,NN} TA_NN_{ij,t-5}) \right. \\ \left. + \sum_A (\beta_{1,A,NS} TA_NS_{ij,t} + \beta_{2,A,NS} TA_NS_{ij,t-5}) + \sum_A (\beta_{1,A,SS} TA_SS_{ij,t} + \beta_{2,A,SS} TA_SS_{ij,t-5}) \right. \\ \left. + \sum_t b_t \right) + \epsilon_{ij,t} \quad (4)$$

Where $X_{ij,t}$ denotes the value of exports from country i to country j at time t ; $\eta_{i,t}$ and $\psi_{j,t}$ are exporter-time and importer-time fixed effects, respectively; $\gamma_{i,j}$ is a country-pair fixed effect; The summations $\sum A$ denote the sum over different agreements A for: $\beta_{1,A,NN}$ and $\beta_{2,A,NN}$: Coefficients for the immediate and lagged effects of North-North TAs (TA_NN); $\beta_{1,A,NS}$ and $\beta_{2,A,NS}$: Coefficients for the immediate and lagged effects of North-South TAs (TA_SN); $\beta_{1,A,SS}$ and $\beta_{2,A,SS}$: Coefficients for the immediate and lagged effects of South-South TAs (TA_SS); $\sum_t b_t$ is a set of time dummies accounting for trade-specific effects at each time t ; and $\epsilon_{ij,t}$ is the error term.

For both extended models we use the following variables: $TA_NN_{ij,t}$ is a dummy variable that takes the value of 1 if the trade pair (i, j) is North-North and part of a TA at time t , and 0 otherwise; $TA_NN_{ij,t-5}$ is a dummy variable that takes the value of 1 if the trade pair (i, j) is North-North and was part of a TA at time $t-5$, and 0 otherwise; $TA_NS_{ij,t}$ is a dummy variable that takes the value of 1 if the trade pair (i, j) is North-South and part of a TA at time t , and 0 otherwise; $TA_NS_{ij,t-5}$ is a dummy variable that takes the

value of 1 if the trade pair (i, j) is North-South and was part of a TA at time $t-5$, and 0 otherwise; $TA_SS_{ij,t}$ is a dummy variable that takes the value of 1 if the trade pair (i, j) is South-South and part of a TA at time t , and 0 otherwise; $TA_SS_{ij,t-5}$ is a dummy variable that takes the value of 1 if the trade pair (i, j) is South-South and was part of a TA at time $t-5$, and 0 otherwise;

The extended models allow us to capture the differentiated effects of TAs on bilateral exports depending on whether the pair country are two “North” countries (NN), a “North” and a “South” country (NS), or two “South” countries (SS).

3.2 Export Product Unit Value

Inspired by other strands of the international trade literature, we also test our models using “Unit Values” of the products exported, by dividing the total value exported by the total weight exported in kilograms ([35] Latzer and Mayneris 2021; [37] Manova and Zhang 2012; [11] Bastos and Silva 2010). Using the unit value as the dependent variable in our estimations allow us to analyse if the value per unit exported is affected by TAs. To be consistent in our effort to understand the potentially heterogenous effects of TAs according to the different category of the members in trade volume, but also in quality upgrading and industrialization development of countries, we focus on manufacturing products ([13] Chatzilarou and Dadakas 2023) with HS 2-digit codes 84 (Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof) and 85 (Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles) which are part of the “Machinery and mechanical appliances; electrical equipment; parts thereof; sound recorders and reproducers, television image and sour sound recorders and reproducers, and parts and accessories of such articles” category from the World Customs Organization. Our aim is to compare the effects of TAs on trade volumes against the effects on the unit value of manufacturing products exported.

3.3 Defining North and South

Defining which countries belong to the “North” and “South” categories is a key step in order to properly analyse the impact of TAs on different bilateral export relationships. However, it is important to consider that any way in which we categorize countries can be criticised for not taking into consideration the diverse and heterogenous characteristics of individual countries within each group. Furthermore, especially since our focus is to analyse South-South relationships, it is possible to further disaggregate from the “South” group the emerging economies which are becoming more relevant at the political and economic world stage and are challenging the hegemony of traditional developed economies. The level of disaggregation, as well as the level of attention to heterogenous characteristics among and within groups, depends on the research question at hand. For the purposes of this paper, we will not consider such heterogeneity within groups, and just focus on categorising countries as “North” and “South”, but by no means does this assumes that countries are homogenous within groups. This is just a useful distinction to study heterogeneity across TA effects.

One intuitive approach could be to categorize countries based on their income level, but this approach would need to deal with a dynamic list of groups, as countries change their category through time. Also, high-income countries include non-industrialized small-nations which we do not expect to generate significant effects on the industrial development as well as technology- and skills-upgrading of trade-partner countries. For such reasons, we have decided to use the same categorization of countries as Dahi & Demir ([16] Dahi and Demir 2017) which takes into consideration characteristics such as incomes, production and trade structures, factor endowments, and human and institutional development to construct a list of “North” and “South” countries, and also keeps the groups consistent over time. This results in 23 countries categorized as “North”, and the rest as “South”. A detailed list of the countries and their categories can be found in the Appendix I.

3.4 Data

To construct our dataset we have combined TA data from the “Design of International Trade Agreements” (DESTA) ([19] Dür, Andreas, Leonardo Baccini and Manfred Elsig 2014) and

from the CEPII “Trade and Production Database” (TradeProd) ([48] Thierry Mayer, Gianluca Santoni, Vincent Vicard 2023). The DESTA database aims to aggregate all agreements that have the potential to liberalise trade, including all agreements notified to the World Trade Organisation (WTO) and other agreements from a wide range of sources, covering 880 agreements for 204 countries since 1948 to 2023 in the last updated version.

Our sample consists of TAs signed between the years 2000 to 2010 and the country members to these TAs, totalling 154 agreements and 143 member countries. For ease of estimation, and to get a sense of geographical differences, we estimate our models by TA region for five main regions: Africa, Americas, Asia, Europe and Intercontinental (We exclude Oceania [11 countries and 1 agreement] for lack of sufficient trade data for our estimations). Each region has the following samples of agreements and countries: Intercontinental (114 countries and 64 agreements), Europe (42 countries and 41 agreements), Asia (35 countries and 33 agreements), Americas (15 countries and 13 agreements) and Africa (10 countries and 2 agreements). A detailed list of the TAs in our sample and their member countries can be found in the Appendix II.

For all countries in our sample, we get international trade and domestic trade flows from the TradeProd database, which has been created specifically for estimating gravity models and combines trade data from the UN Commodity Trade Statistics Database (COMTRADE) and production data from UNIDO Industrial Statistics database (INDSTAT). We also download export data directly from COMTRADE for all countries in our sample to construct our export product unit value measurements. For estimations on trade flows, we use international trade flow data as reported by importer. In order to measure the appropriate lags for the effects of each agreement, our period of interest for international flow data is between 1995 to 2015, and since we are estimating in 5-year intervals, we get trade flow data for the years 1995, 2000, 2005, 2010 and 2015. Finally, as mentioned before, export product unit values are constructed using the total value exported per product per year divided by the net weight exported of said product for said year at the HS 2-digit code level for the 84 and 85 codes for manufacturing products. As it is not possible to get data for product unit values for domestic trade, the estimations using this measure as the dependent variable will suffer from bias as the estimation does not include intra-trade effects. However, the direction

of bias is important as not including intra-trade measures is expected to bias the effects of TAs downwards ([53] Yotov et al. 2016), so we use this estimates as illustrative conservative measurements of the effects of TAs on the unit value of exported products.

4 Findings

This section presents and describes the results of estimating our gravity models.

4.1 Benchmark Results

We begin by briefly discussing the results of our benchmark estimation by region, contained in Table 1. We immediately see that the average total or “cumulative” effects of TAs on trade flows, relative to non-TA-members, after accounting for phase-in effects (the sum of the current and lagged TA estimates), is heterogenous across regions. Only Americas, Europe and Intercontinental TAs have statistically significant results, with all coefficients being positive and generally similar to the results we would expect according to the literature. The smallest effect, that of Intercontinental TAs, has a statistically significant coefficient at the 5% of 0.203 with a standard error of (0.106). We interpret this coefficient as Intercontinental TAs having an average a partial effect of $(\exp(0.203)-1) \times 100\% = 22.5\%$ increase in trade flows. The largest effect, that of Europe’s TAs, has a statistically significant coefficient at the 1% of 0.475 with a standard error of (0.025). We interpret this coefficient as Europe’s TAs having an average a partial effect of $(\exp(0.475)-1) \times 100\% = 60.8\%$ increase in trade flows. On the other hand, Africa and Asia does not have statistically significant results, with Asia’s coefficient taking a negative value. Interestingly, Africa’s TA coefficient is highly significant and positive, and TA Lag is not significant and negative, while Asia’s TA coefficient is not significant and positive, and TA Lag is highly significant and negative.

Table 1: Benchmark Model Regional Results

	(1)	(2)	(3)	(4)	(5)
Variables					
	PPML Africa	PPML Americas	PPML Asia	PPML Europe	PPML Intercontinental
TA	0.578*** (0.154)	0.287*** (0.071)	0.064 (0.083)	0.237*** (0.019)	0.015 (0.093)
TA Lag	-0.278 (0.300)	0.146 (0.149)	-0.167*** (0.056)	0.238*** (0.022)	0.188*** (0.043)
TA + TA Lag	0.301 (0.295)	0.433*** (0.140)	-0.103 (0.094)	0.475*** (0.025)	0.203* (0.106)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.997	0.999	0.999	0.997	0.998
Observations	5838	10997	25308	28168	73930

Notes: Robust standard errors clustered at the country-pair in parentheses. Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

4.2 TA Heterogeneity Results

The results of our model allowing for heterogenous effects of TAs is shown in Tables 15 through Table 19 in Appendix III. Again, we can observe significant heterogeneity across regions and TAs. Africa in Table 15 has no statistically significant effect for any TA. Americas in Table 16 has ten TAs with statistically significant and positive coefficients, two with no statistically significant effect, and one TA with a statistically significant and negative coefficient. Asia in Table 17 has eight TAs with statistically significant and positive coefficients, nine with no statistically significant effect, and four TAs with statistically significant and negative coefficients. Europe in Table 18 has eighteen TAs with statistically significant and positive coefficients, nine with no statistically significant effect, and one TA with a statistically significant and negative coefficient. And finally, Intercontinental in Table 19 has twenty-eight TAs with statistically significant and positive coefficients, twenty with no statistically significant effect, and six TAs with statistically significant and negative coefficients. Across the regions, 64 out of 118 (54.24%) coefficients have significant and positive effects, 42 out of 118 (35.59%) have no significant effects, and 12 out of 118 (10.17%) have significant and negative effects. A summary of the findings can be found on Figure 5, with the significance of the coefficients on the Y axis (all non-significant coefficients assigned a value of -1 for ease of visualization, and significant coefficients assigned a value of 1, 2 or 3 according to their significance, with the highest significance being 3) magnitude of the coefficients on the X axis, showing negative and positive coefficients.

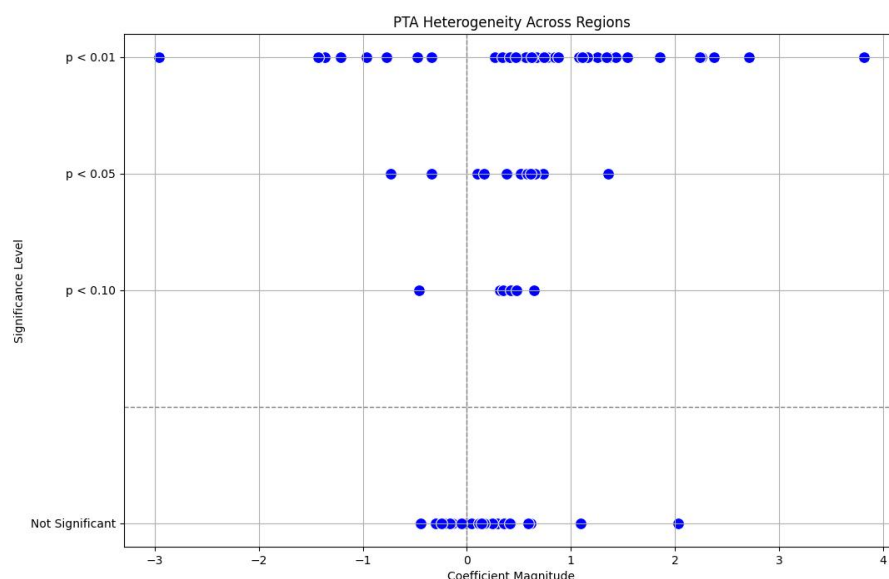


Figure 5: TA Heterogeneity Across Regions

4.3 North-North, North-South and South-South TAs

4.3.1 North-South Benchmark Results

We present the results of our extended models allowing us to capture the differentiated effects of TAs on bilateral exports depending on whether the country pair are two “North” countries (NN), a “North” and a “South” country (NS), or two “South” countries (SS).

The results of the extended benchmark estimation by region, contained in Table 2 again show heterogenous results across regions. It is interesting to note that by disaggregating the TA effects, in the case of Americas and Europe, both of which had significant and positive coefficients in the benchmark estimation, now again have significant and positive coefficients for both NS TA + Lag and SS TA + Lag, but the effects are larger in both cases for the SS TA + Lag coefficient. Asia now has a slightly significant and negative coefficient for NS TA + Lag while the coefficient for SS TA + Lag remains not significant. Intercontinental have significant and positive effects of NS Lag and SS Lag, but NS TA + Lag and SS TA + Lag are both not significant now. Africa’s coefficients remain not significant, and it is the only region with only South-South TAs.

Table 2: Regional Results by TA Type

	Africa	Americas	Asia	Europe	Intercontinental
Variables					
NN TA				0.207*** (0.021)	0.013 (0.072)
NN TA Lag				0.192*** (0.023)	0.016 (0.073)
NN TA + NN TA Lag				0.399*** (0.026)	0.029 (0.102)
NS TA		0.199*** (0.069)	-0.089 (0.089)	0.374*** (0.041)	0.013 (0.144)
NS TA Lag		0.234 (0.190)	-0.067 (0.060)	0.349*** (0.041)	0.231*** (0.061)
NS TA + NS TA Lag		0.434** (0.200)	-0.156* (0.090)	0.723*** (0.046)	0.244 (0.156)
SS TA	0.578*** (0.154)	0.476*** (0.139)	0.153 (0.117)	0.530*** (0.107)	0.004 (0.121)
SS TA Lag	-0.278 (0.300)	-0.023 (0.133)	-0.208*** (0.063)	0.575*** (0.119)	0.204*** (0.073)
SS TA + SS TA Lag	0.301 (0.295)	0.453*** (0.112)	-0.055 (0.130)	1.105*** (0.092)	0.208 (0.128)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.997	0.999	0.999	0.997	0.998
Observations	5838	10997	25308	28168	73930

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

4.3.2 North-South TA Heterogeneity Results

The results of our extended model allowing for heterogenous effects of TAs is shown in Appendix IV in Tables 20 through Table 24. Africa in table 20 only has effects for South-South TAs and again has no statistically significant effect for any TA. Americas in Table 21 has five TAs with North-South estimates, one of which has statistically significant and negative effects for NS TA + Lag and statistically significant and positive effects for SS TA + Lag. Of the remaining four, none have estimates for SS TA + Lag, three are statistically significant and positive, and one is not statistically significant. It has eight TAs with South-South estimates, seven of which have statistically significant and positive effects, while one does not have statistically significant effects. Americas does not have any coefficients for North-North. Asia in Table 22 has two TAs with North-South estimates, one of which is statistically significant and positive, while the other is not statistically significant. It has nineteen TAs with South-South estimates, seven of which have statistically significant and positive effects, four have statistically significant and negative coefficients, and eight does not have statistically significant effects. Asia does not have any coefficients for North-North. Europe in Table 23 has eight TA North-South estimates, five of which are statistically significant and positive, and the others are not statistically significant. One of the five agreements with statistically significant and positive coefficients for NS TA + Lag also has a statistically significant and positive coefficient for SS TA + Lag. None of the other agreements with a NS coefficient have statistically significant coefficients for SS. It has nineteen South-South estimates, thirteen are statistically significant and positive, one is statistically significant and negative, and five are not significant. Finally, the region has one agreement with a North-North estimate, which also has a North-South and a South-South estimate and they are all statistically significant and positive. Intercontinental in Table 24 has thirty TA North-South estimates, of which twelve are statistically significant and positive, fifteen are not statistically significant, and three are statistically significant and negative for NS TA + Lag. None of these TAs also have coefficients for SS TA + Lag of which five are statistically significant and positive, three are not statistically significant, and one is statistically significant and negative. It has twenty-one estimates for South-South, of which fourteen are statistically significant and positive,

five are not statistically significant, and two are statistically significant and negative. It has three agreements with North-North estimates, two statistically significant and positive, and one are not statistically significant. Across the regions and TAs, 23 out of 47 (48.94%) NS coefficients have significant and positive effects, 20 out of 47 (42.55%) NS coefficients have no significant effects, and 4 out of 47 (8.51%) NS coefficients have significant and negative effects; 49 out of 84 (58.33%) SS coefficients have significant and positive effects, 27 out of 84 (32.14%) SS coefficients have no significant effects, and 8 out of 84 (9.52%) SS coefficients have significant and negative effects; and, 3 out of 4 (75%) NN coefficients have significant and positive effects, 1 out of 4 (25%) NN coefficients have no significant effects, and none have significant and negative effects. A summary of the findings can be found on Figure 6 for North-South trade, Figure 7 for North-North trade and Figure 8 for South-South trade, with the significance of the coefficients on the Y axis (all non-significant coefficients assigned a value of -1 for ease of visualization, and significant coefficients assigned a value of 1, 2 or 3 according to their significance, with the highest significance being 3) magnitude of the coefficients on the X axis, showing negative and positive coefficients.

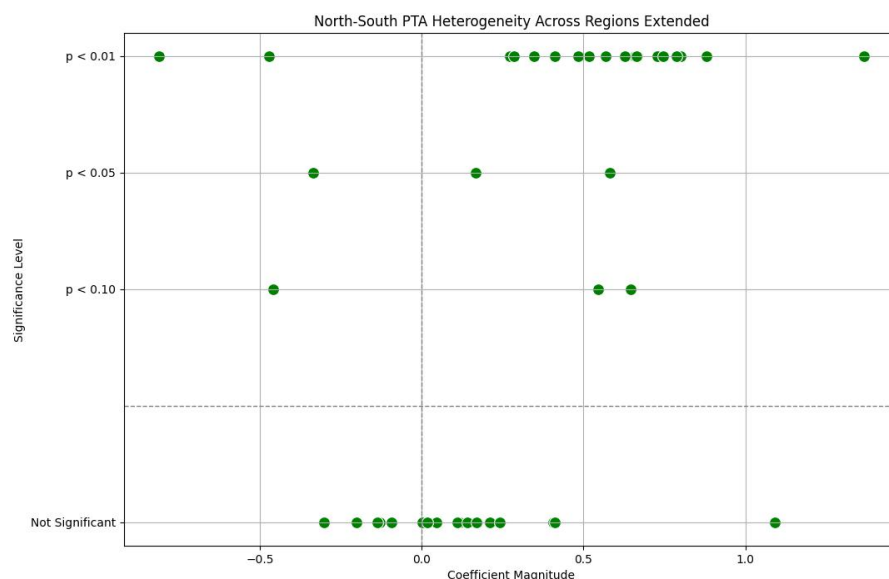


Figure 6: North-South TA Heterogeneity Across Regions Extended

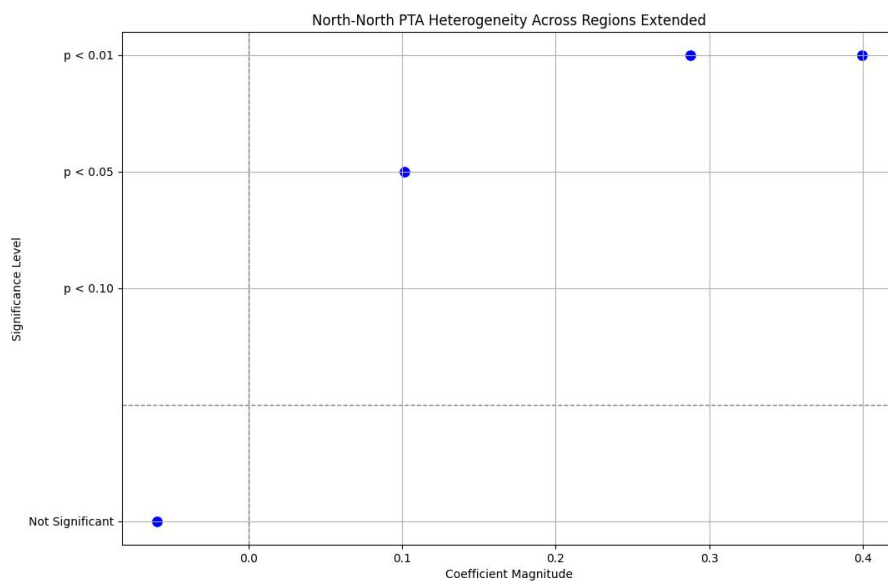


Figure 7: North-North TA Heterogeneity Across Regions Extended

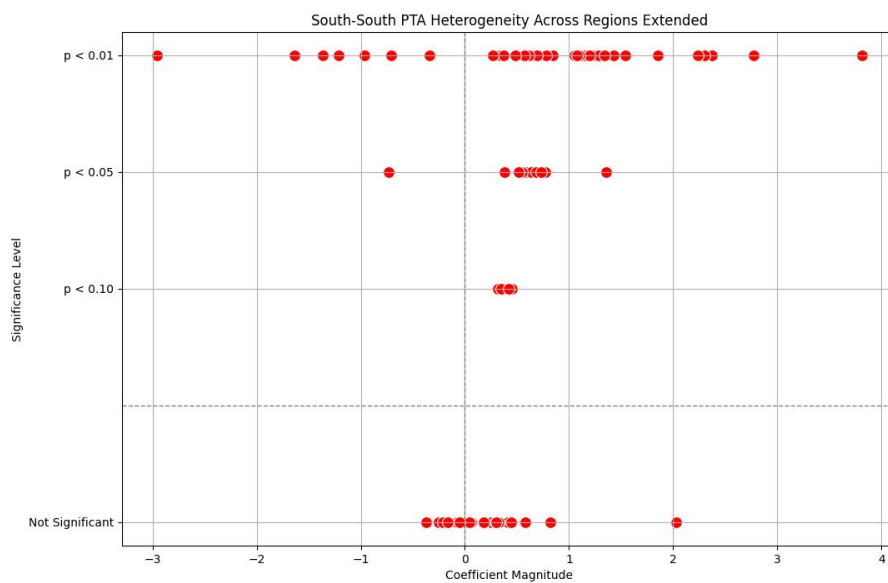


Figure 8: South-South TA Heterogeneity Across Regions Extended

4.4 Export Product Unit Value Results

Finally, we present the results of running our estimations substituting trade flows as our dependent variable for the unit values of products exported, specifically under the HS 2-

digit codes 84 and 85 for manufacturing products, in order to analyse if the effect of TAs goes beyond trade volumes. For ease of comparison, we ran each estimation twice for each HS code: one with trade volume as the dependent variable, and one with the unit value of the product exported as the dependent variable.

Tables 3 and 4, and 5 and 6, show the results of our benchmark model for each region for trade volumes and the unit value of the product exported, and for HS 84 and 85, respectively. We continue to observe heterogeneous results across regions. In table 3, for the trade volume of HS 84, none of the TA + Lag coefficients are statistically significant with the exception of the Intercontinental region, for which it is statistically significant and negative. In table 4, for the unit value of the product exported of HS 84, the effects are not significant for Africa and Asia, they are significant and negative for Americas, and significant and positive for Europe and Intercontinental. Interestingly, these results suggest that Intercontinental TAs reduced the volume of trade of HS 84 products but increased the value per unit. In table 5, for the trade volume of HS 85, TA + Lag coefficients are not statistically significant for Americas, Asia and Intercontinental, while Africa's results are significant and positive, and Europe's are significant and negative. In table 6, for the unit value of the product exported of HS 85, results are only slightly significant for Intercontinental, with a negative coefficient. The rest of the regions do not have significant results.

Tables 7 and 8, and 9 and 10, show the results of our extended benchmark model with North-North, North-South and South-South TAs, for each region for trade volumes and the unit value of the product exported, and for HS 84 and 85, respectively. In table 7, for the trade volume of HS 84, we observe that for North-North trade, TA + Lag coefficient for Intercontinental has a significant and positive coefficient, while Europe's is not significant. For North-South trade TA + Lag coefficients are not significant for Asia and Europe, while they are significant and positive for Americas, and significant and negative for Intercontinental. For South-South trade, TA + Lag for Africa, Asia and Europe do not have significant coefficients, while the coefficients of Americas and Intercontinental are significant and negative. In table 8, for the unit value of the product exported of HS 84, for North-North trade's TA + Lag, Europe's coefficient is significant and positive and the coefficient of Intercontinental is not significant. For North-South trade, none of the TA + Lag coefficients are signifi-

cant. For South-South trade, the TA + Lag coefficients of Africa, Americas and Asia are not significant, while Europe and Intercontinental have significant and positive coefficients. Interestingly, while trade volume for North-South and South-South for Intercontinental TAs decreased, the value per unit of South-South trade increased. In table 9, for the trade volume of HS 85, we observe that for North-North trade, TA + Lag coefficient for Intercontinental has a significant and positive coefficient, while Europe's is not significant. For North-South trade TA + Lag coefficients are not significant for Americas, Asia and Intercontinental, while they are significant and negative for Europe. For South-South trade, TA + Lag for Americas, Asia, Europe and Intercontinental do not have significant coefficients, while the coefficient of Africa is significant and positive. In table 10, for the unit value of the product exported of HS 85, for North-North trade's TA + Lag, Europe and Intercontinental coefficients are not significant. For North-South trade, the TA + Lag coefficients for Americas and Europe are not significant, while they are significant and negative for Asia and Intercontinental. For South-South trade, the TA + Lag coefficients of Africa, Americas and Intercontinental are not significant, while Europe has significant and negative coefficients and Asia has significant and positive coefficients. Interestingly, for Asia's exports, the value per unit of product exported decreased with North-South trade but increased with South-South trade.

Finally, for illustrative purposed, in tables 11 and 12, and 13 and 14, we include the estimates of our model allowing for TA specific effects, extended with North-North, North-South and South-South TAs, for Africa and Americas, for trade volumes and the unit value of the product exported, and for HS 84 and 85, respectively. In table 11, for the trade volumes of HS 84 and 85 for Africa, which only has South-South TAs, we can see that TA 670 had statistically significant and negative effects on the trade volume of HS 84, and not significant for HS 85. TA 787 did not have a significant impact on trade volume of HS 84, while it has significant and positive effects on HS 85. In table 12, for the unit value of products HS 84 and 85 exported for the region of Africa, we can see that TA 670 did not have significant effects on the value per unit of products in HS 84 and 85. TA 787 did not have a significant impact on the value per unit of HS 84, while it has significant and positive effects on HS 85. This is a case where we can see a that a TA has a significant effect on the volume of trade and in the value per unit of a category of manufacturing products of a South-South trade

relationship.

In table 13, for the trade volumes of HS 84 and 85, and table 14 for the unit value of products HS 84 and 85, all for the region of Americas, which has North-South and South-South TAs, we can observe heterogeneous effects of different TAs on the different types of bilateral trade relationships. One interesting example is TA 188, which has North-South and South-South trade among its members. It has positive and significant effects in the trade volumes of HS 84 and 85 for South-South trade, while it has no significant effect in the trade volume of HS 84 and 85 for North-South trade. Furthermore, it has a significant and negative effects on the value per unit of HS 84 for both North-South and South-South trade, and it has no significant effect on the value per unit of HS 85 for both North-South and South-South trade.

Table 3: HS 84 Trade Volume Benchmark Model Regional Results

	(1)	(2)	(3)	(4)	(5)
Variables					
	PPML Africa	PPML Americas	PPML Asia	PPML Europe	PPML Intercontinental
TA	-0.364 (0.695)	-0.289* (0.162)	-0.005 (0.078)	0.288** (0.146)	-0.411*** (0.099)
TA Lag	-0.247 (0.403)	-0.024 (0.120)	-0.053 (0.048)	-0.233* (0.122)	-0.081 (0.077)
TA + TA Lag	-0.610 (0.676)	-0.313 (0.201)	-0.057 (0.080)	0.056 (0.165)	-0.491*** (0.126)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.997	0.997	0.992	0.986	0.989
Observations	1314	4230	10778	18152	36735

Notes: Robust standard errors clustered at the country-pair level in parentheses. Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 4: HS 84 EPUV Benchmark Model Regional Results

	(1)	(2)	(3)	(4)	(5)
Variables					
	PPML Africa	PPML Americas	PPML Asia	PPML Europe	PPML Intercontinental
TA	1.676*** (0.592)	-0.037 (0.356)	0.130 (0.165)	0.164 (0.223)	-0.236 (0.150)
TA Lag	-2.388*** (0.517)	-0.615 (0.484)	-0.129 (0.136)	0.238 (0.188)	0.534*** (0.156)
TA + TA Lag	-0.712 (0.492)	-0.652* (0.339)	0.001 (0.192)	0.402* (0.216)	0.298** (0.141)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.960	0.986	0.982	0.956	0.966
Observations	1299	4053	10223	18019	35947

Notes: Robust standard errors clustered at the country-pair in parentheses. Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 5: HS 85 Trade Volume Benchmark Model Regional Results

	(1)	(2)	(3)	(4)	(5)
Variables	PPML Africa	PPML Americas	PPML Asia	PPML Europe	PPML Intercontinental
TA	0.023 (0.419)	-0.106 (0.178)	0.140 (0.088)	-0.138 (0.152)	0.142* (0.072)
TA Lag	1.009** (0.441)	0.052 (0.172)	-0.070 (0.058)	-0.311** (0.127)	-0.209** (0.926)
TA + TA Lag	1.033** (0.404)	-0.055 (0.253)	0.069 (0.102)	-0.449*** (0.165)	-0.067 (0.872)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.989	0.998	0.993	0.980	0.989
Observations	1205	3836	10465	16436	33999

Notes: Robust standard errors clustered at the country-pair level in parentheses. Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 6: HS 85 EPUV Benchmark Model Regional Results

	(1)	(2)	(3)	(4)	(5)
Variables	PPML Africa	PPML Americas	PPML Asia	PPML Europe	PPML Intercontinental
TA	2.098** (1.032)	-0.360 (0.583)	0.965*** (0.324)	-0.198 (0.278)	-0.010 (0.190)
TA Lag	-0.478 (0.650)	0.421 (0.408)	-0.299 (0.294)	-0.184 (0.247)	-0.280 (0.208)
TA + TA Lag	1.620 (1.150)	0.062 (0.524)	0.666 (0.494)	-0.382 (0.333)	-0.290* (0.175)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.939	0.990	0.992	0.950	0.956
Observations	1130	3698	9934	16235	33070

Notes: Robust standard errors clustered at the country-pair in parentheses. Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 7: HS 84 Trade Volume Regional Results by TA Type

	Africa	Americas	Asia	Europe	Intercontinental
Variables					
NN TA				-0.087 (0.163)	0.084 (0.080)
NN TA Lag				-0.234 (0.191)	0.187* (0.098)
NN TA + NN TA Lag				-0.321 (0.233)	0.272** (0.121)
NS TA		-0.082 (0.108)	-0.001 (0.096)	0.236* (0.133)	-0.455*** (0.104)
NS TA Lag		0.294* (0.151)	-0.079 (0.059)	-0.242* (0.139)	-0.126 (0.093)
NS TA + NS TA Lag		0.212** (0.097)	-0.080 (0.112)	-0.006 (0.169)	-0.580*** (0.111)
SS TA	-0.364 (0.695)	-0.310* (0.189)	-0.006 (0.117)	0.417* (0.215)	-0.315*** (0.102)
SS TA Lag	-0.247 (0.403)	-0.123 (0.112)	-0.037 (0.080)	-0.129 (0.160)	0.057 (0.082)
SS TA + SS TA Lag	-0.610 (0.676)	-0.433* (0.229)	-0.043 (0.126)	0.287 (0.228)	-0.258** (0.125)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.997	0.997	0.992	0.986	0.989
Observations	1314	4230	10778	18152	36735

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 8: HS 84 EPUV Regional Results by TA Type

	Africa	Americas	Asia	Europe	Intercontinental
Variables					
NN TA				0.316 (0.258)	0.584 (0.516)
NN TA Lag				0.250 (0.226)	-0.740** (0.296)
NN TA + NN TA Lag				0.566** (0.266)	-0.155 (0.362)
NS TA		1.033** (0.471)	0.403 (0.278)	0.202 (0.236)	-0.345** (0.166)
NS TA Lag		-1.925*** (0.609)	-0.005 (0.244)	0.139 (0.202)	0.576*** (0.180)
NS TA + NS TA Lag		-0.891 (0.601)	0.399 (0.268)	0.341 (0.227)	0.231 (0.170)
SS TA	1.676*** (0.592)	-0.974*** (0.324)	-0.004 (0.195)	0.097 (0.265)	-0.063 (0.231)
SS TA Lag	-2.388*** (0.517)	0.603* (0.311)	-0.148 (0.149)	0.327 (0.232)	0.542** (0.234)
SS TA + SS TA Lag	-0.712 (0.492)	-0.371 (0.368)	-0.152 (0.233)	0.424* (0.253)	0.479** (0.196)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.960	0.986	0.982	0.956	0.966
Observations	1299	4053	10223	18019	35947

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 9: HS 85 Trade Volume Regional Results by TA Type

	Africa	Americas	Asia	Europe	Intercontinental
Variables					
NN TA				0.041 (0.208)	0.272** (0.128)
NN TA Lag				-0.160 (0.208)	0.271 (0.190)
NN TA + NN TA Lag				-0.119 (0.246)	0.543** (0.274)
NS TA		-0.494 (0.345)	0.158* (0.085)	-0.051 (0.152)	0.154* (0.084)
NS TA Lag		0.700*** (0.270)	-0.038 (0.094)	-0.315** (0.153)	-0.248** (0.108)
NS TA + NS TA Lag		0.206 (0.442)	0.121 (0.120)	-0.366** (0.174)	-0.094 (0.091)
SS TA	0.023 (0.419)	0.082 (0.206)	0.118 (0.128)	-0.004 (0.211)	0.039 (0.152)
SS TA Lag	1.009** (0.441)	-0.176 (0.168)	-0.088 (0.081)	-0.142 (0.157)	-0.090 (0.176)
SS TA + SS TA Lag	1.033** (0.404)	-0.094 (0.280)	0.030 (0.160)	-0.146 (0.196)	-0.051 (0.194)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.989	0.998	0.993	0.980	0.989
Observations	1205	3836	10465	16436	33999

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 10: HS 85 EPUV Regional Results by TA Type

	Africa	Americas	Asia	Europe	Intercontinental
Variables					
NN TA				0.024 (0.349)	0.867* (0.494)
NN TA Lag				0.409 (0.292)	-0.847** (0.411)
NN TA + NN TA Lag				0.433 (0.364)	0.020 (0.490)
NS TA		-0.582 (1.139)	0.076 (0.388)	-0.244 (0.332)	-0.133 (0.198)
NS TA Lag		0.918 (0.629)	-1.017*** (0.370)	0.084 (0.245)	-0.200 (0.232)
NS TA + NS TA Lag		0.336 (0.851)	-0.941** (0.407)	-0.160 (0.356)	-0.333* (0.199)
SS TA	2.098** (1.032)	-0.208 (0.517)	1.662*** (0.481)	-0.218 (0.369)	0.097 (0.301)
SS TA Lag	-0.478 (0.650)	0.068 (0.493)	0.026 (0.328)	-0.672** (0.336)	-0.316 (0.298)
SS TA + SS TA Lag	1.620 (1.150)	-0.139 (0.689)	1.688** (0.679)	-0.890** (0.414)	-0.219 (0.250)
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes
R-Squared	0.939	0.990	0.992	0.951	0.956
Observations	1130	3698	9934	16235	33070

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 11: Africa TA + TA Lag Coefficients by Type for Trade Volume of HS 84 and HS 85

TA ID	HS 84			HS 85		
	NS TA+Lag	SS TA+Lag	NN TA+Lag	NS TA+Lag	SS TA+Lag	NN TA+Lag
NS and SS (or only NS)						
No agreements in this category						
Only SS						
670		-2.234*** (0.678)			-0.041 (1.008)	
787		-0.682 (0.781)			1.507*** (0.573)	
Agreements with NN and NS						
No agreements in this category						
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.997	0.997	0.997	0.989	0.989	0.989
Observations	1314	1314	1314	1205	1205	1205

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 12: Africa TA + TA Lag Coefficients by Type for EPUV of HS 84 and HS 85

TA ID	HS 84			HS 85		
	NS TA+Lag	SS TA+Lag	NN TA+Lag	NS TA+Lag	SS TA+Lag	NN TA+Lag
NS and SS (or only NS)						
No agreements in this category						
Only SS						
670		-0.975 (0.802)			-0.860 (1.031)	
787		-0.693 (0.590)			2.760** (1.148)	
Agreements with NN and NS						
No agreements in this category						
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.960	0.960	0.960	0.939	0.939	0.939
Observations	1299	1299	1299	1130	1130	1130

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 13: Americas TA + TA Lag Coefficients by Type for Trade Volume of HS 84 and HS 85

TA ID	HS 84			HS 85		
	NS TA+Lag	SS TA+Lag	NN TA+Lag	NS TA+Lag	SS TA+Lag	NN TA+Lag
NS and SS (or only NS)						
188	0.056 (0.769)	3.233*** (0.566)		0.483 (0.440)	1.123*** (0.223)	
163	0.579*** (0.151)			-0.095 (0.641)		
168	0.191** (0.077)			-0.514 (0.334)		
218	0.401*** (0.124)			1.765*** (0.331)		
645	0.296** (0.148)			-1.341*** (0.425)		
Only SS						
141		-0.705* (0.372)			-0.613 (0.388)	
213		0.326 (0.397)			1.233*** (0.253)	
239		-0.030 (0.271)			0.008 (0.374)	
616		-0.019 (0.218)			-0.416*** (0.146)	
201		0.479** (0.213)			0.971*** (0.257)	
716		0.270* (0.141)			-0.349 (0.391)	
612		-0.704*** (0.180)			1.089*** (0.276)	
185		0.238 (0.399)			-1.303*** (0.278)	
Agreements with NN and NS						
No agreements in this category						
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.997	0.997	0.997	0.998	0.998	0.998
Observations	4230	4230	4230	3836	3836	3836

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 14: Americas TA + TA Lag Coefficients by Type for EPUV of HS 84 and HS 85

TA ID	HS 84			HS 85		
	NS TA+Lag	SS TA+Lag	NN TA+Lag	NS TA+Lag	SS TA+Lag	NN TA+Lag
NS and SS (or only NS)						
188	-3.217*** (0.748)	-2.778*** (1.013)		-0.568 (0.641)	0.797 (0.606)	
163	-1.314* (0.704)			1.272* (0.715)		
168	1.236*** (0.424)			1.189 (1.497)		
218	-3.916*** (0.716)			1.103 (0.822)		
645	-0.791 (0.885)			-1.662** (0.658)		
Only SS						
141		-0.854** (0.375)			0.662 (0.582)	
213		-0.506 (0.456)			1.089 (0.728)	
239		1.263 (0.866)			1.457 (0.895)	
616		-0.638 (0.435)			0.728 (0.636)	
201		-0.554 (0.610)			1.581*** (0.390)	
716		-0.572 (1.223)			2.042 (1.478)	
612		-0.015 (0.274)			-2.843*** (1.045)	
185		1.023 (0.784)			0.768 (1.005)	
Agreements with NN and NS						
	No agreements in this category					
Exporter-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Importer-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.986	0.986	0.986	0.990	0.990	0.990
Observations	4053	4053	4053	3698	3698	3698

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

5 Analysis and Discussion

Our analysis finds evidence of positive, negative and not significant effects of TAs on both South-South and North-South trade relationships, on trade volumes and on the value per unit of manufacturing products exported, relative to trade with non-members. The magnitudes of our findings are similar to the estimates in the empirical literature on the effects of TAs on trade. Our findings on the heterogeneous of effects of TAs appear to indicate that TAs can have positive and negative effects on North-South and South-South bilateral trade relationships, and that declaring them as stumbling or building blocks of industrial development and growth is not straight forward.

5.1 Potential Determinant Mechanisms of Heterogeneous Effects of TAs

Some potential determinant mechanisms of the effects of TAs in the academic literature are related to the content of the TA, and the extent to which it removes trade barriers. TAs should have more potential for larger effects when they remove trade frictions imposed by other trade policies and regulations, domestic or foreign ([10] Baier et al., 2019). Moreover, unilateral trade policies can create a terms-of-trade inefficiency externality when a government introduces a higher trade barrier, shifting the cost to foreign exporters ([5] Bagwell & Staiger, 1999). Since foreign exporters bear the cost of the inefficiency, there is a tendency by governments to set barriers at a higher level than it would be politically efficient. TAs can act as a mechanism to remove or lower said inefficiencies, resulting in better trade and welfare outcomes, or in an observed higher effect of a TA relative to non-members in our case. Through trade diversion, there is a theoretical possibility that the proliferation of TAs can harm the terms of trade of non-TA-members and create significant inefficiencies in the world trading system ([4] Anderson & Yotov, 2016), but empirical evidence so far finds that TAs negligibly harm non-members and global efficiency rises.

Another strand of the relevant literature emphasises the extensive margin of trade ex-ante the signature of a TA as an important determinant of its effects. In particular, that TAs have an important effect in the growth of the extensive margin of trade, which in turn

is a significant factor in the overall growth of total trade ([31] Kehoe & Ruhl, 2013). If a TA is signed between country members with low diversity of traded goods, it is expected that we will see a bigger effects of the TA in trade growth driven by the increase in the number of goods traded and in the volume of trade of the least-traded products ([30] Kehoe et al., 2015). Interestingly, empirical research shows that the number of products exported ex-ante is positively related to the trade creation after a TA, but when heterogeneous effects of TAs within agreements and country-pairs is taken into consideration, the extensive margin of trade does account for differences in trade creation ([10] Baier et al., 2019).

There is also evidence that different types of agreements, such as non-reciprocal preferential trade agreements (NRPTAs), preferential trade agreements (PTAs), free trade agreements (FTA), customs unions (CU), common markets (CMs) and economic unions (EUs), can have different levels and time horizons of trade effects ([9] Baier et al., 2014; [36] Magee, 2008). This can occur because different types of TAs can induce different unobservable effects that reduce trade costs, as we observe that modern TAs not only reduce tariffs, but also regulate all kinds of non-tariff issues in what is called “deep integration” ([4] Anderson & Yotov, 2016). The deeper the integration, the more effective we expect TAs to be ([32] Kohl, 2014). It has also been shown that the design of TAs matters, in terms of institutional design and legal enforceability, with more comprehensive agreements being better at stimulating positive trade outcomes ([33] Kohl et al., 2013).

The differences in market power across member countries could also be important, as countries with less market power relative to other TA members over their terms of trade are expected to grant smaller concessions when they negotiate agreements. Agreements between countries with relatively similar market power over each other’s term of trade potentially have higher potential to eliminate inefficiencies and achieve higher effects ([10] Baier et al., 2019).

Based on the academic arguments mentioned, can we expect that TAs will have more potential for effectively improve trade outcomes when the bilateral relationship is South-South vs North-South? It would appear that it depends highly on the terms of trade inefficiencies and the potential for increases in the extensive margin of trade ex-ante the agreement is in place, as well as in the design and depth of the agreement. These are considerations that

should be taken on a bilateral case-by-case basis, rather than in an aggregated matter. Moreover, as more South-South TAs are signed, and more of the share of global trade happens among South countries, the North-South distinction also starts to lose relevance. Evidence appears to show that the “South” is splitting into groups, with the “Emerging South” growing at an accelerated pace and even challenging the hegemony that developed economies have enjoyed since the Post-World War II period. It could be the case that the same power dynamics observed between developed and developing countries by the classical development literature can also occur in South-South relationships, and that they can become a threat for the development of the least-developed economies in the South ([16] Dahi & Demir, 2017). It is clear that more research focused on South-South dynamics is needed in order to guide the policy decisions of different groups of countries.

It appears clear from the literature studied and from the empirical analysis carried out in this paper, that TAs have significant potential and that they can be an effective development policy tool for South countries based on their dynamic effects on the structure of production capacity, as long as a proper analysis of current capabilities and identification of related products and industries is carried out. South countries should strive to acquire new capabilities close-by in relatedness to the capabilities already in place and choose appropriate partner countries to do so. For more immediate concerns of trade creation and trade diversion, it should be taken into consideration low traded and non-traded products between potential partners to increase the chances of trade creation, as well as striving for deep integration in the design of the agreement as much as possible.

5.2 Limitations

Although the predictive power of the Gravity Model of Trade is well established in the relevant literature, and we have done our best to follow the best practices to avoid endogeneity and biases when studying the effects of preferential agreements on international trade, it is important to note that our empirical analysis does not claim to achieve a causal inference on the effects of TAs. There could be other policies and forces driving the effects described in our estimates. Also, since the period studied comprehends the global financial crisis of 2007-2008, it is possible that running the same models for other periods of time could find

different results. Our estimates could also be constrained by the quality of the data and reporting or measurement error in trade flows, particularly in South countries without robust institutional capacity and statistical infrastructure. By using relatively modern data we hope to mitigate this concern, but we acknowledge that the data of the first half of our period studied (1995-2005) might be less accurate than the later period (2005-2015). Still, this research provides useful insights, even if they are just illustrative, on the heterogeneous effects of TAs, and their development potential and use by developing countries.

6 Conclusion

This paper empirically analysed the effects of TAs on the volume of trade of exports and on the value per unit of manufacturing products exported of member-countries to agreements signed between the years 2000 and 2015, with an ample dataset comprised of 154 agreements and 143 countries, using a gravity model of trade, updated with the best practices in the literature, and subsequent extensions to capture the heterogeneous effects of TAs on its members, and on their disaggregated bilateral trade relationships classified as North-North, North-South and South-South, relative to non-TA-members. We found coefficient magnitudes consistent with the empirical literature and high degrees of heterogeneity on the effects of TAs, and no conclusive answer to the research questions of whether South-South TAs act as building blocks or stumbling blocks to developing countries, or if they are preferable to North-South agreements. We proposed some potential mechanisms driving the heterogeneity of the effects of TAs, and also cautioned against threatening the “South” as a homogeneous group.

In this paper we have proposed several methodological innovations to advance the literature on the effects of TAs. We use a modern data set, comprised of data between the years 1995 and 2015, with data on both international and domestic trade. We do not focus our sample on particular regions or groups of countries, nor on specific agreements. We try to cover as many countries and TAs as possible, without over representation of developed or “North” countries or of the biggest agreements. We extend traditional gravity estimations to capture heterogenous effects of TAs instead of the average “total” partial effect as is common

in the literature, as well as heterogenous effects of TAs on the different categories of bilateral trade relationships (North-North, North-South and South-South). Finally, we complement our main estimations by replacing bilateral trade volume with the export product unit value of manufacturing products (HS codes 84 and 85).

Future research on the heterogenous effects of TAs using gravity models is promising, as the empirical methods continue to improve, and they are applied to get more detailed and nuanced estimates that can better guide the developmental decisions and policies of developing countries. Some potential areas for future research on “South” countries include research on the dynamic effects of TAs on the industrialization process and on technology absorption and upgrading; extending gravity models to capture effects of country-pairs member to a TA, and to capture effects on individual countries of a country-pair member to a TA ([10] Baier et al., 2019); extending the gravity model to capture effects of different types of TAs depending on their depth and content; different sub-classifications of “South” countries should be explored to further understand the limits to South-South cooperation in trade; and, beyond trade volume, the measure of export product unit value can be used to capture the increase or decrease of the value per unit commodities and goods in specific industries.

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8 Appendix

8.1 Appendix I - Sample Countries

Classification	Countries
North	Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.
South	Afghanistan, Albania, Algeria, Antigua & Barbuda, Argentina, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Bhutan, Bosnia & Herzegovina, Botswana, Brazil, Brunei, Bulgaria, Burundi, Cambodia, Chile, China, Colombia, Cook Islands, Costa Rica, Croatia, Cyprus, Czechia, Chile, China, Colombia, Cook Islands, Costa Rica, Croatia, Cyprus, Czechia, Côte d'Ivoire, Dominica, Dominican Republic, Egypt, El Salvador, Estonia, Eswatini, Faroe Islands, Fiji, Georgia, Grenada, Guatemala, Guyana, Haiti, Honduras, Hong Kong SAR China, Hungary, India, Indonesia, Ireland, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kuwait, Laos, Latvia, Lebanon, Lesotho, Liechtenstein, Lithuania, Macao SAR China, Malaysia, Maldives, Malta, Mauritius, Mexico, Moldova, Montenegro, Morocco, Myanmar (Burma), Namibia, Nauru, Nepal, Nicaragua, Niue, North Macedonia, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Qatar, Romania, Russia, Rwanda, Samoa, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, Solomon Islands, South Africa, South Korea, Sri Lanka, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenadines, Suriname, Syria, Taiwan, Tajikistan, Tanzania, Thailand, Tonga, Trinidad & Tobago, Tunisia, Turkey, Tuvalu, Uganda, Ukraine, United Arab Emirates, Uruguay, Vanuatu, Venezuela, Vietnam.

8.2 Appendix II - Sample TAs

Region	Agreement ID	Year	Agreement Name	Countries
Intercontinental	4	2004	Agadir Agreement	Egypt, Jordan, Morocco, Tunisia
Intercontinental	15	2006	Turkey Albania	Albania, Turkey
Intercontinental	17	2002	EC Algeria	Algeria, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
Intercontinental	66	2009	ASEAN Australia New Zealand	Australia, Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar (Burma), New Zealand, Philippines, Singapore, Thailand, Vietnam
Intercontinental	75	2008	Australia Chile	Australia, Chile
Intercontinental	82	2003	Singapore Australia	Australia, Singapore
Intercontinental	83	2004	Thailand Australia	Australia, Thailand
Intercontinental	84	2004	US Australia	Australia, United States
Intercontinental	96	2004	US Bahrain	Bahrain, United States
Intercontinental	104	2009	Russian Federation Belarus Kazakhstan	Belarus, Kazakhstan, Russia
Intercontinental	136	2002	Turkey Bosnia and Herzegovina	Bosnia & Herzegovina, Turkey
Intercontinental	152	2001	Bulgaria Israel	Bulgaria, Israel
Intercontinental	164	2008	EFTA Canada	Canada, Iceland, Liechtenstein, Norway, Switzerland
Intercontinental	181	2008	EC CARIFORUM States EPA	Antigua & Barbuda, Austria, Bahamas, Barbados, Belgium, Belize, Bulgaria, Cyprus, Czechia, Denmark, Dominica, Dominican Republic, Estonia, Finland, France, Germany, Greece, Grenada, Guyana, Haiti, Hungary, Ireland, Italy, Jamaica, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, St. Kitts & Nevis, St. Lucia, St. Vincent & Grenadines, Suriname, Sweden, Trinidad & Tobago, United Kingdom
Intercontinental	199	2005	Chile China	Chile, China
Intercontinental	202	2002	EC Chile	Austria, Belgium, Chile, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
Intercontinental	205	2003	EFTA Chile	Chile, Iceland, Liechtenstein, Norway, Switzerland
Intercontinental	206	2006	Chile India	Chile, India
Intercontinental	207	2007	Chile Japan	Chile, Japan
Intercontinental	208	2003	Korea, Republic of Chile	Chile, South Korea
Intercontinental	222	2008	China New Zealand	China, New Zealand
Intercontinental	227	2009	Peru China	China, Peru
Intercontinental	242	2003	Common Economic Zone (CEZ)	Belarus, Kazakhstan, Russia, Ukraine
Intercontinental	252	2008	EC Côte d'Ivoire	Austria, Belgium, Bulgaria, Cyprus, Czechia, Côte d'Ivoire, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom
Intercontinental	263	2002	Turkey Croatia	Croatia, Turkey
Intercontinental	304	2001	EC Egypt	Austria, Belgium, Denmark, Egypt, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
Intercontinental	323	2002	EU Lebanon	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Lebanon, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
Intercontinental	330	2000	EC Mexico	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Mexico, Netherlands, Portugal, Spain, Sweden, United Kingdom
Intercontinental	376	2007	EFTA Egypt	Egypt, Iceland, Liechtenstein, Norway, Switzerland
Intercontinental	383	2001	EFTA Jordan	Iceland, Jordan, Liechtenstein, Norway, Switzerland
Intercontinental	384	2005	EFTA Korea, Republic of	Iceland, Liechtenstein, Norway, South Korea, Switzerland
Intercontinental	386	2004	EFTA Lebanon	Iceland, Lebanon, Liechtenstein, Norway, Switzerland
Intercontinental	390	2000	EFTA Mexico	Iceland, Liechtenstein, Mexico, Norway, Switzerland
Intercontinental	396	2002	EFTA Singapore	Iceland, Liechtenstein, Norway, Singapore, Switzerland
Intercontinental	399	2006	EFTA SACU	Botswana, Eswatini, Iceland, Lesotho, Liechtenstein, Namibia, Norway, South Africa, Switzerland
Intercontinental	401	2004	EFTA Tunisia	Iceland, Liechtenstein, Norway, Switzerland, Tunisia
Intercontinental	415	2004	Egypt Turkey	Egypt, Turkey
Intercontinental	416	2007	Honduras El Salvador and the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu	El Salvador, Honduras, Taiwan
Intercontinental	466	2002	GUAM	Azerbaijan, Georgia, Moldova, Ukraine
Intercontinental	470	2005	Guatemala Chinese Taipei	Guatemala, Taiwan
Intercontinental	490	2004	MERCOSUR India	Argentina, Brazil, India, Paraguay, Uruguay
Intercontinental	508	2007	Southern Common Market (MERCOSUR) Israel	Argentina, Brazil, Israel, Paraguay, Uruguay
Intercontinental	509	2000	Israel Mexico	Israel, Mexico
Intercontinental	512	2001	Romania Israel	Israel, Romania
Intercontinental	518	2004	Japan Mexico	Japan, Mexico
Intercontinental	521	2009	Japan Switzerland	Japan, Switzerland
Intercontinental	543	2000	US Jordan	Jordan, United States

Intercontinental	602	2007	Mauritius Pakistan	Mauritius, Pakistan
Intercontinental	624	2008	Turkey Montenegro	Montenegro, Turkey
Intercontinental	626	2004	Turkey Morocco	Morocco, Turkey
Intercontinental	627	2001	Morocco United Arab Emirates	Morocco, United Arab Emirates
Intercontinental	628	2004	US Morocco	Morocco, United States
Intercontinental	631	2000	New Zealand Singapore	New Zealand, Singapore
Intercontinental	632	2005	Thailand New Zealand	New Zealand, Thailand
Intercontinental	634	2006	Nicaragua and the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu	Nicaragua, Taiwan
Intercontinental	637	2006	US Oman	Oman, United States
Intercontinental	641	2006	Panama Singapore	Panama, Singapore
Intercontinental	642	2003	Panama and the Separate Customs Territory of Taiwan, Penghu, Kinmen and Matsu	Panama, Taiwan
Intercontinental	644	2008	Peru Singapore	Peru, Singapore
Intercontinental	657	2009	Turkey Serbia	Serbia, Turkey
Intercontinental	658	2003	US Singapore	Singapore, United States
Intercontinental	677	2001	Ukraine Tajikistan	Tajikistan, Ukraine
Intercontinental	679	2005	Trans Pacific Strategic Economic Partnership	Brunei, Chile, New Zealand, Singapore
Intercontinental	979	2009	EU Pacific States Interim EPA	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Fiji, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Papua New Guinea, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom
Intercontinental	979	2020	EU Pacific States Interim EPA Accession of Solomon Islands	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Fiji, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Papua New Guinea, Poland, Portugal, Romania, Samoa, Slovakia, Slovenia, Solomon Islands, Spain, Sweden, United Kingdom
Africa	670	2002	Southern African Customs Union (SACU)	Botswana, Eswatini, Lesotho, Namibia, South Africa
Africa	787	2007	East African Community (EAC) Accession of Burundi and Rwanda	Burundi, Kenya, Rwanda, Tanzania, Uganda
Americas	141	2002	Brazil Mexico	Brazil, Mexico
Americas	163	2001	Canada Costa Rica	Canada, Costa Rica
Americas	168	2008	Canada Peru	Canada, Peru
Americas	185	2002	Panama El Salvador (Panama Central America)	Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama
Americas	188	2004	Dominican Republic Central America United States Free Trade Agreement (CAFTA DR)	Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, United States
Americas	201	2006	Chile Colombia	Chile, Colombia
Americas	213	2006	Panama Chile	Chile, Panama
Americas	218	2003	US Chile	Chile, United States
Americas	239	2007	Colombia Northern Triangle (El Salvador, Guatemala, Honduras)	Colombia, El Salvador, Guatemala, Honduras
Americas	612	2000	Mexico Honduras (Mexico Northern Triangle)	El Salvador, Guatemala, Honduras, Mexico
Americas	616	2004	Mexico Uruguay	Mexico, Uruguay
Americas	645	2006	US Peru	Peru, United States
Americas	716	2006	Peru Chile	Chile, Peru
Asia	1	2003	India Afghanistan	Afghanistan, India
Asia	67	2004	ASEAN China	Brunei, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar (Burma), Philippines, Singapore, Thailand, Vietnam
Asia	70	2009	ASEAN India	Brunei, Cambodia, India, Indonesia, Laos, Malaysia, Myanmar (Burma), Philippines, Singapore, Thailand, Vietnam
Asia	71	2008	ASEAN Japan	Brunei, Cambodia, Indonesia, Japan, Laos, Malaysia, Myanmar (Burma), Philippines, Singapore, Thailand, Vietnam
Asia	72	2006	ASEAN Korea, Republic of	Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar (Burma), Philippines, Singapore, South Korea, Vietnam
Asia	100	2001	Asia Pacific Trade Agreement (APTA) Accession of China	Bangladesh, China, India, Laos, South Korea, Sri Lanka
Asia	116	2006	India Bhutan	Bhutan, India
Asia	146	2007	Brunei Darussalam Japan	Brunei, Japan
Asia	220	2003	China Hong Kong, China	China, Hong Kong SAR China
Asia	221	2003	China Macao, China	China, Macao SAR China
Asia	223	2003	Pakistan China	China, Pakistan
Asia	224	2006	Pakistan China	China, Pakistan
Asia	228	2008	China Singapore	China, Singapore
Asia	456	2007	Turkey Georgia	Georgia, Turkey
Asia	474	2001	Gulf Cooperation Council (GCC)	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates

Asia	475	2008	Gulf Cooperation Council (GCC) Singapore	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, Singapore, United Arab Emirates
Asia	489	2009	Korea, Republic of India	India, South Korea
Asia	492	2009	India Nepal	India, Nepal
Asia	493	2005	India Singapore	India, Singapore
Asia	495	2007	Japan Indonesia	Indonesia, Japan
Asia	517	2005	Japan Malaysia	Japan, Malaysia
Asia	519	2006	Japan Philippines	Japan, Philippines
Asia	520	2002	Japan Singapore	Japan, Singapore
Asia	522	2007	Japan Thailand	Japan, Thailand
Asia	523	2008	Japan Viet Nam	Japan, Vietnam
Asia	534	2004	Jordan Singapore	Jordan, Singapore
Asia	550	2005	Korea, Republic of Singapore	Singapore, South Korea
Asia	598	2009	New Zealand Malaysia	Malaysia, New Zealand
Asia	599	2007	Pakistan Malaysia	Malaysia, Pakistan
Asia	640	2002	Pakistan Sri Lanka	Pakistan, Sri Lanka
Asia	667	2004	South Asian Free Trade Agreement (SAFTA)	Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
Asia	667	2008	South Asian Free Trade Agreement (SAFTA) Accession of Afghanistan	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
Asia	675	2004	Turkey Syria	Syria, Turkey
Asia	683	2004	Turkey Tunisia	Tunisia, Turkey
Europe	5	2003	Albania Bosnia and Herzegovina	Albania, Bosnia & Herzegovina
Europe	6	2003	Albania Bulgaria	Albania, Bulgaria
Europe	7	2002	Croatia Albania	Albania, Croatia
Europe	8	2006	EU Albania	Albania, Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom
Europe	9	2009	EFTA Albania	Albania, Iceland, Liechtenstein, Norway, Switzerland
Europe	10	2003	Albania Kosovo	Albania, Kosovo
Europe	11	2002	Albania Macedonia	Albania, North Macedonia
Europe	12	2003	Albania Moldova	Albania, Moldova
Europe	13	2003	Albania Romania	Albania, Romania
Europe	14	2003	Albania Serbia and Montenegro	Albania, Serbia
Europe	128	2003	Bulgaria Bosnia and Herzegovina	Bosnia & Herzegovina, Bulgaria
Europe	129	2000	Croatia Bosnia and Herzegovina	Bosnia & Herzegovina, Croatia
Europe	131	2002	Former Yugoslav Republic of Macedonia Bosnia and Herzegovina	Bosnia & Herzegovina, North Macedonia
Europe	132	2002	Moldova Bosnia and Herzegovina	Bosnia & Herzegovina, Moldova
Europe	133	2003	Romania Bosnia and Herzegovina	Bosnia & Herzegovina, Romania
Europe	135	2001	Slovenia Bosnia and Herzegovina	Bosnia & Herzegovina, Slovenia
Europe	150	2001	Bulgaria Estonia	Bulgaria, Estonia
Europe	153	2002	Bulgaria Latvia	Bulgaria, Latvia
Europe	154	2001	Bulgaria Lithuania	Bulgaria, Lithuania
Europe	156	2004	Moldova Bulgaria	Bulgaria, Moldova
Europe	157	2003	Bulgaria Serbia and Montenegro	Bulgaria, Serbia
Europe	192	1995	Central European Free Trade Agreement (CEFTA) Accession of Slovenia	Czechia, Hungary, Poland, Slovakia, Slovenia
Europe	192	1997	Central European Free Trade Agreement (CEFTA) Accession of Romania	Czechia, Hungary, Poland, Romania, Slovakia, Slovenia
Europe	192	1998	Central European Free Trade Agreement (CEFTA) Accession of Bulgaria	Bulgaria, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia
Europe	192	2002	Central European Free Trade Agreement (CEFTA) Accession of Croatia	Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia, Slovenia
Europe	192	2006	Central European Free Trade Agreement (CEFTA) 2006	Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Kosovo, Moldova, Montenegro, North Macedonia, Romania, Serbia
Europe	254	2001	EU Croatia	Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
Europe	255	2001	EFTA Croatia	Croatia, Iceland, Liechtenstein, Norway, Switzerland
Europe	259	2002	Croatia North Macedonia	Croatia, North Macedonia
Europe	260	2004	Moldova Croatia	Croatia, Moldova
Europe	261	2004	Croatia Serbia and Montenegro	Croatia, Serbia
Europe	328	2001	EU North Macedonia	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, North Macedonia, Portugal, Spain, Sweden, United Kingdom

Europe	331	2007	EU Montenegro	Austria, Belgium, Bulgaria, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Montenegro, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom
Europe	335	2003	EC (25) Enlargement	Austria, Belgium, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom
Europe	335	2005	EC (27) Enlargement	Austria, Belgium, Bulgaria, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom
Europe	375	2001	European Free Trade Association (EFTA)	Austria, Denmark, Iceland, Liechtenstein, Norway, Portugal, Sweden, Switzerland, United Kingdom
Europe	389	2000	EFTA Former Yugoslav Republic of Macedonia	Iceland, Liechtenstein, North Macedonia, Norway, Switzerland
Europe	394	2009	EFTA Serbia	Iceland, Liechtenstein, Norway, Serbia, Switzerland
Europe	439	2005	Iceland Faroe Islands	Faroe Islands, Iceland
Europe	589	2004	Moldova Former Yugoslav Republic of Macedonia	Moldova, North Macedonia
Europe	590	2003	Romania Former Yugoslav Republic of Macedonia	North Macedonia, Romania
Europe	594	2001	Ukraine Former Yugoslav Republic of Macedonia	North Macedonia, Ukraine
Europe	619	2003	Moldova Serbia and Montenegro	Moldova, Serbia
Europe	621	2003	Ukraine Moldova	Moldova, Ukraine
Europe	648	2003	Romania Serbia and Montenegro	Romania, Serbia
Europe	651	2000	Russian Federation Serbia	Russia, Serbia

8.3 Appendix III - Regression Tables by Region for TA Heterogeneity Model

Table 15: TA + TA Lag Coefficients for Africa Region

Statistically Insignificant		
TA ID	Estimate	SE
670	0.326	(0.410)
787	0.304	(0.233)
Exporter-Year FE	Yes	
Importer-Year FE	Yes	
Country-Pair FE	Yes	
R-Squared	0.997	
Observations	5838	

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 16: TA + TA Lag Coefficients for Americas Region

Positive and Statistically Significant		
TA ID	Estimate	SE
213	1.342***	(0.434)
218	0.879***	(0.173)
239	0.571***	(0.173)
616	0.488***	(0.044)
168	0.410***	(0.113)
163	0.342***	(0.096)
141	0.265***	(0.024)
716	0.732**	(0.358)
201	0.545**	(0.265)
612	0.515**	(0.251)
Statistically Insignificant		
TA ID	Estimate	SE
185	0.291	(0.376)
645	0.117	(0.141)
Negative and Statistically Significant		
TA ID	Estimate	SE
188	-0.774***	(0.144)
Exporter-Year FE	Yes	
Importer-Year FE	Yes	
Country-Pair FE	Yes	
R-Squared	0.999	
Observations	10997	

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 17: TA + TA Lag Coefficients for Asia Region

Positive and Statistically Significant		
TA ID	Estimate	SE
683	1.080***	(0.237)
70	0.472***	(0.150)
100	0.376***	(0.105)
67	0.342***	(0.125)
675	1.360**	(0.655)
475	0.636**	(0.298)
598	0.166**	(0.083)
474	0.419*	(0.243)
Statistically Insignificant		
TA ID	Estimate	SE
72	0.254	(0.178)
116	0.256	(0.703)
492	0.041	(0.180)
640	0.183	(0.217)
223	-0.014	(0.203)
71	-0.138	(0.091)
456	-0.209	(0.165)
534	-0.165	(0.370)
667	-0.049	(0.241)
Negative and Statistically Significant		
TA ID	Estimate	SE
221	-2.955***	(0.727)
220	-1.215***	(0.093)
599	-0.967***	(0.191)
1	-0.732**	(0.359)
Exporter-Year FE	Yes	
Importer-Year FE	Yes	
Country-Pair FE	Yes	
R-Squared	0.999	
Observations	25308	

Notes: Robust standard errors clustered at the country-pair level in parentheses.
Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 18: TA + TA Lag Coefficients for Europe Region

Positive and Statistically Significant		
TA ID	Estimate	SE
5	3.812***	(0.278)
128	2.712***	(0.211)
13	2.256***	(0.262)
132	2.241***	(0.252)
192	1.107***	(0.163)
7	1.153***	(0.272)
328	0.671***	(0.175)
8	0.667***	(0.161)
621	0.618***	(0.186)
135	0.615***	(0.217)
254	0.565***	(0.084)
394	0.745***	(0.202)
335	0.472***	(0.025)
129	0.553***	(0.206)
9	0.580**	(0.285)
11	0.656**	(0.307)
131	0.615**	(0.281)
594	0.474*	(0.251)
Statistically Insignificant		
TA ID	Estimate	SE
6	0.355	(0.358)
150	0.247	(0.687)
153	0.614	(0.633)
154	0.592	(0.409)
255	0.167	(0.237)
389	0.412	(0.323)
331	0.142	(0.201)
12	-0.246	(1.208)
156	-0.441	(0.445)
Negative and Statistically Significant		
TA ID	Estimate	SE
133	-0.772***	(0.248)
Exporter-Year FE	Yes	
Importer-Year FE	Yes	
Country-Pair FE	Yes	
R-Squared	0.997	
Observations	28168	

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 19: TA + TA Lag Coefficients for Intercontinental

Positive and Statistically Significant		
TA ID	Estimate	SE
627	2.372***	(0.345)
415	1.853***	(0.201)
206	1.539***	(0.180)
75	1.366***	(0.493)
263	1.426***	(0.115)
4	1.254***	(0.268)
626	1.099***	(0.121)
657	0.705***	(0.082)
637	0.667***	(0.102)
202	0.658***	(0.123)
208	0.763***	(0.129)
136	0.744***	(0.185)
490	0.843***	(0.181)
17	0.811***	(0.242)
466	0.710***	(0.147)
304	0.770***	(0.120)
628	0.484***	(0.142)
207	0.516***	(0.114)
518	0.627***	(0.135)
330	0.314***	(0.086)
164	0.288***	(0.073)
96	0.271***	(0.055)
181	0.392**	(0.178)
624	0.388**	(0.163)
521	0.101**	(0.045)
384	0.645*	(0.355)

Continued on next page

Table 19 – continued from previous page

TA ID	Estimate	SE
15	0.313*	(0.179)
227	0.348*	(0.186)
Statistically Insignificant		
TA ID	Estimate	SE
641	2.028	(1.255)
543	1.090	(0.707)
509	0.210	(0.216)
252	0.192	(0.357)
508	0.140	(0.122)
376	0.172	(0.228)
416	0.424	(0.295)
401	0.407	(0.288)
152	0.110	(0.266)
242	0.050	(0.294)
390	0.0471	(0.181)
396	0.019	(0.379)
205	0.0012	(0.178)
602	-0.076	(0.918)
383	-0.202	(0.152)
386	-0.092	(0.168)
84	-0.059	(0.120)
979	-0.126	(0.294)
644	-0.189	(0.122)
658	-0.303	(0.349)
Negative and Statistically Significant		
TA ID	Estimate	SE
399	-0.473***	(0.127)
104	-0.338***	(0.112)
Continued on next page		

Table 19 – continued from previous page

TA ID	Estimate	SE
677	-1.366***	(0.385)
679	-1.429***	(0.430)
323	-0.338**	(0.138)
512	-0.458*	(0.266)
Exporter-Year FE	Yes	
Importer-Year FE	Yes	
Country-Pair FE	Yes	
R-Squared	0.998	
Observations	73930	
Notes: Robust standard errors clustered at the country-pair level in parentheses.		
Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.		

8.4 Appendix IV - Regression Tables by Region for TA Heterogeneity Extended Model

Table 20: Africa TA + TA Lag Coefficients by Type

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
NS and SS (or only NS)			
No agreements in this category			
Only SS			
670		0.326 (0.410)	
787		0.304 (0.233)	
Agreements with NN and NS			
No agreements in this category			
Exporter-Year FE	Yes		
Importer-Year FE	Yes		
Country-Pair FE	Yes		
R-Squared	0.997		
Observations	5838		

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 21: Americas TA + TA Lag Coefficients by Type

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
Agreements with NS and SS (or only NS)			
188	-0.811*** (0.140)	0.685** (0.317)	
163	0.346*** (0.098)		
168	0.410*** (0.113)		
218	0.879*** (0.172)		
645	0.117 (0.141)		
Agreements with only SS			
141		0.265*** (0.024)	
213		1.342*** (0.435)	
239		0.572*** (0.173)	
616		0.488*** (0.044)	
201		0.545** (0.265)	
716		0.732** (0.358)	
612		0.517** (0.251)	
185		0.295 (0.375)	
Agreements with NN and NS			
No agreements in this category			
Exporter-Year FE	Yes		
Importer-Year FE	Yes		
Country-Pair FE	Yes		
R-Squared	0.999		
Observations	10997		

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 22: Asia TA + TA Lag Coefficients by Type

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
Agreements with NS and SS (or only NS)			
598	0.166**		
	(0.083)		
71	-0.138		
	(0.091)		
Agreements with only SS			
70		0.472***	
		(0.150)	
100		0.376***	
		(0.105)	
67		0.342***	
		(0.125)	
683		1.080***	
		(0.237)	
599		-0.967***	
		(0.191)	
220		-1.215***	
		(0.093)	
221		-2.955***	
		(0.0.727)	
675		1.360**	
		(0.655)	
475		0.636**	
		(0.298)	
1		-0.732**	
		(0.359)	
474		0.419*	
		(0.243)	
116		0.256	
		(0.703)	
72		0.254	
		(0.178)	
492		0.041	
		(0.180)	
640		0.183	
		(0.217)	
667		-0.049	
		(0.241)	
534		-0.165	
		(0.370)	
223		-0.014	
		(0.203)	
456		-0.209	
		(0.165)	
Agreements with NN and NS			
No agreements in this category			
Exporter-Year FE	Yes		
Importer-Year FE	Yes		
Country-Pair FE	Yes		
R-Squared	0.999		
Observations	25308		

Notes: Robust standard errors clustered at the country-pair level in parentheses.

Table 23: Europe TA + TA Lag Coefficients by Type

Agreements with NS			
TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
8	0.663*** (0.165)	0.783*** (0.248)	
254	0.568*** (0.086)	0.323 (0.430)	
328	0.738*** (0.179)	0.354 (0.291)	
331	0.241 (0.216)	-0.032 (0.338)	
394	0.747*** (0.200)		
9	0.581** (0.285)		
255	0.171 (0.235)		
389	0.411 (0.333)		
Agreements with only SS			
TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
5		3.811*** (0.278)	
132		2.241*** (0.252)	
7		1.153*** (0.271)	
13		2.303*** (0.246)	
Continued on next page			

Table 23 – continued from previous page

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
128		2.773***	
		(0.213)	
129		0.556***	
		(0.208)	
135		0.696***	
		(0.206)	
192		1.199***	
		(0.152)	
621		0.614***	
		(0.186)	
133		-0.707***	
		(0.225)	
11		0.663**	
		(0.298)	
131		0.599**	
		(0.276)	
154		0.773**	
		(0.354)	
594		0.455*	
		(0.249)	
150		0.444	
		(0.679)	
153		0.817	
		(0.596)	
6		0.411	
		(0.352)	
156		-0.372	
		(0.428)	
12		-0.250	
Continued on next page			

Table 23 – continued from previous page

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
(1.207)			
Agreements with NN			
TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
335	0.727***	1.099***	0.399***
	(0.047)	(0.098)	(0.025)
Exporter-Year FE	Yes		
Importer-Year FE	Yes		
Country-Pair FE	Yes		
R-Squared	0.997		
Observations	28168		
Notes: Robust standard errors clustered at the country-pair level in parentheses.			
Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.			

Table 24: Intercontinental TA + TA Lag Coefficients by Type

Agreements with NS			
TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
17	0.800***	1.055***	
	(0.249)	(0.244)	
330	0.286***	0.662***	
	(0.088)	(0.188)	
304	0.787***	0.591**	
	(0.123)	(0.245)	
202	0.660***	0.612**	
	(0.124)	(0.241)	
679	0.546*	-1.636***	
	(0.310)	(0.400)	
Continued on next page			

Table 24 – continued from previous page

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
323	-0.335** (0.146)	-0.360 (0.247)	
181	0.242 (0.179)	1.288*** (0.309)	
252	0.165 (0.363)	0.580 (0.387)	
979	-0.130 (0.298)	0.061 (0.855)	
75	1.366*** (0.492)		
96	0.271*** (0.055)		
207	0.516*** (0.113)		
518	0.627*** (0.135)		
628	0.484*** (0.142)		
637	0.667*** (0.102)		
399	-0.473*** (0.127)		
384	0.645* (0.355)		
512	-0.458* (0.266)		
543	1.090 (0.707)		
376	0.171		
Continued on next page			

Table 24 – continued from previous page

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
	(0.228)		
152	0.110		
	(0.266)		
205	0.002		
	(0.178)		
390	0.047		
	(0.181)		
396	0.018		
	(0.379)		
401	0.407		
	(0.288)		
508	0.140		
	(0.122)		
509	0.210		
	(0.216)		
658	-0.303		
	(0.349)		
383	-0.202		
	(0.152)		
386	-0.092		
	(0.168)		
Agreements with only SS			
TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
627		2.372***	
		(0.345)	
415		1.854***	
		(0.201)	
4		1.255***	
		(0.268)	
Continued on next page			

Table 24 – continued from previous page

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
626		1.099***	
		(0.121)	
104		-0.338***	
		(0.112)	
136		0.744***	
		(0.185)	
208		0.763***	
		(0.129)	
657		0.705***	
		(0.082)	
206		1.540***	
		(0.180)	
263		1.426***	
		(0.115)	
466		0.710***	
		(0.147)	
490		0.843***	
		(0.181)	
677		-1.366***	
		(0.385)	
624		0.384**	
		(0.163)	
15		0.313*	
		(0.179)	
227		0.348*	
		(0.186)	
242		0.050	
		(0.294)	
416		0.424	
Continued on next page			

Table 24 – continued from previous page

TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
		(0.295)	
641		2.027	
		(1.255)	
644		-0.190	
		(0.122)	
602		-0.076	
		(0.918)	
Agreements with NN			
TA ID	NS TA+Lag	SS TA+Lag	NN TA+Lag
164			0.288***
			(0.073)
521			0.102**
			(0.045)
84			-0.059
			(0.120)
Exporter-Year FE	Yes		
Importer-Year FE	Yes		
Country-Pair FE	Yes		
R-Squared	0.998		
Observations	73930		
Notes: Robust standard errors clustered at the country-pair level in parentheses.			
Significance levels are indicated as follows: *p<0.1; **p<0.05; ***p<0.01.			