

Services Liberalization and GVC Participation

New Evidence for Heterogeneous Effects
by Income Level and Provisions

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Abstract

Participation in global value chains is a key element in the industrialization strategies of many developing nations. This paper investigates the role of services liberalization in promoting participation in global value chains. Using the gravity framework, it examines the impact of services trade agreements on gross trade and global value chain trade (backward and forward participation) in goods. It finds that services

trade agreements promote both, but especially global value chain trade, although the effects are heterogeneous: the impact is greater for developing nation exporters. Moreover, services agreements that allow the export of services without local presence (non-establishment rights) are particularly important in fostering participation in global value chains.

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Services Liberalization and GVC Participation: New Evidence for Heterogeneous Effects by Income Level and Provisions*

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1 Introduction

Global value chains (GVCs) have transformed trade and development since the late 1980s by fragmenting the production process across borders (Baldwin, 2013, 2016). Coming under multiple labels such as trade in tasks, international fragmentation, offshoring, and the second unbundling, GVCs have attracted enormous attention from both academics and policy makers in the developing and developed world.

Although studies on GVCs and trade have been focused mostly on the manufacturing sector, services also play a critical role in GVCs. However, the role of services in value chains is often underappreciated and poorly understood despite the dominance of services in many national economies in terms of GDP and employment (Low, 2013). One of the most startling new facts concerning services has emerged from the breakthrough that came with the development of “value added trade” concept (Koopman et al., 2014; Timmer et al., 2014; Johnson and Noguera, 2012). A joint OECD-WTO project found that services contribute over 50% of total value added embodied in the exports of the US, UK, France, Germany and Italy. Even for China, traditionally viewed as a goods exporter, about one-third of its value added exports come from the service sector.

The importance of services in GVCs, however, goes beyond their large share in value added. It has been argued that a well-functioning services sector enables and facilitates fragmentation, leading to an international reallocation of production stages (Jones and Kierzkowski, 1990; Francois, 1990c; Deardorff, 2001). The recent popularization of the GVC concept has also highlighted this connection, with many authors emphasizing how services is like the glue that holds supply chains together and ensures that they function in a fluid manner (Low, 2013; Egger et al., 2015; Francois et al., 2015).

Besides the rise of GVCs, another phenomenon, not unrelated, that characterizes trade in the past three decades is the rapid surge of bilateral and plurilateral trade agreements.¹ This proliferation has not only been in terms of quantity but also the quality or “depth”. Recent trade agreements often include provisions on services, investment, environmental and labor standards, as well as tariff reductions (Hofmann et al., 2017).² These deep agreements have also been partly motivated by the international expansion of production networks since a harmonization in certain national policies facilitates cross-border business activities and allows GVCs to work smoothly (Lawrence, 1996). Furthermore, the actors involved in regional trade agree-

¹Hereafter, I use the term regional trade agreements (RTA) for all bilateral and plurilateral trade agreements, also referred to as preferential trade agreements (PTA).

²Regarding services, half of the 302 RTAs listed in the WTO database as currently in force covers only goods and the other half covers both goods and services.

ments (RTAs) have also become more diverse. In 2010, South-South trade agreements represented two-thirds of all RTAs in force, compared to barely 20 percent three decades earlier (WTO, 2011).

Using the variation in the coverage and members of RTAs, this paper examines the heterogeneous impact of services liberalization on countries' GVC participation. Specifically, I test whether a country pair engages in more GVC-trade when it has freer trade in services via RTAs, using the gravity equation. By focusing on manufacturing GVCs, the paper seeks to identify the role of services trade liberalization beyond boosting trade in services, but as the “enabler” for a broader unbundling of production. The outcome variable, therefore, is GVC-trade (measured by trade in intermediate goods, backward and forward linkages based on international input-output data) as well as gross trade in manufacturing between country pairs. The variable of interest is a dummy variable for an RTA in services. However, taking into account the asymmetric and non-discriminatory nature of services liberalization, the specification is adjusted to allow for heterogeneous effects by countries' income level as well as specific provisions. To address the endogenous adoption of RTAs, I include country-pair fixed effects and hence, identify the effect of services trade agreements from country pairs that first had an RTA covering only goods, and then services later on (Baier and Bergstrand, 2007).

The empirical findings of this paper show that services trade agreements (or substantive provisions on services) increase gross trade and, to a larger extent, GVC-trade in manufacturing from developing (South) to developed countries (North), and between developing countries. The trade-enhancing effect of RTAs that cover services is almost *double* the effect of RTAs that only cover goods for Southern exporters. Regarding specific provisions, services agreements that have a provision to allow the export of services without local presence (i.e. right of non-establishment) significantly increase GVC-trade in manufacturing.

This paper is related to three groups of literature. First, it contributes to the small but growing literature on the role of services in GVCs. Early theoretical research on the role of services in international trade and fragmentation includes Jones and Kierzkowski (1990) and Deardorff (2001) who argue that trade liberalization in services can stimulate fragmentation of production of both goods and services, thus increasing international trade and gains from trade.³ Empirical research on services and GVCs has been limited, due to the relative scarcity of data on services trade or services liberalization. Some recent attempts include Francois et al. (2015) who examine the value-added linkages between services and goods and stress

³On more recent theoretical contributions, Nordås (2010) analyzes the impact of services trade liberalization on industrial structure and shows how countries can strengthen their comparative advantage in manufacturing following trade liberalization in services.

the importance of services for the total cost structure of traded goods and services. Debaere et al. (2013) show that, for Ireland, greater availability of services increases firms' foreign sourcing of materials relative to sales, and Miroudot and Shepherd (2016) analyze trade in services with new measures of trade costs, distinguishing between services used as inputs and for final consumption. The main message from these studies, emphasizing the importance of services linkages for trade and performance in the goods sector, is in line with the findings of this paper. Nonetheless, the literature has not yet empirically established how preferential services liberalization affects trade flows and GVC participation in manufacturing.

Second, a large strand of literature studies the impact of regional trade agreements on trade flows, but fewer studies focus on services trade agreements. However, as many of the major trade agreements now also cover services, some effort has been made to better understand the implications of trade agreements in services (Francois and Hoekman, 2010).⁴ Yet, the effect of having RTAs covering services, or whether they actually are preferential, is debated due to the often non-discriminatory nature of services restrictions (Roy et al., 2007; Miroudot et al., 2010; Miroudot and Shepherd, 2014).⁵ Shingal (2016) is one of the first to take into account heterogeneous provisions found in services RTAs, but only considers the aggregate number of provisions ("depth") and how it affects services trade flows, as opposed to this paper that examines the effect of specific provisions on manufacturing GVC-trade.

Finally, this paper relates to the recent literature on the relationship between goods and services trade.⁶ The increasing shift towards services of the manufacturing sector (sometimes called servitization or servicification) has been stressed by many authors (Neely et al., 2011; Lanz and Maurer, 2015; Crozet and Milet, 2017; Breinlich et al., 2018).⁷ A number of recent studies analyze the interaction between trade in goods and services. For example, Ariu et al. (2017) examine the interaction of goods and services trade at the firm level, and show how trade liberalization in one sector can promote trade in the other. Ariu et al. (2018) show that demand

⁴For example, Egger et al. (2012) structurally analyze the impact of preferential liberalization of trade in goods and services on both types of trade flows for European countries, finding much larger welfare gains from preferential liberalization in goods *and* services than just one of the two.

⁵To deal with this issue, Marchetti and Roy (2008) and Miroudot et al. (2010) delve deeper into investigating the actual commitments made in services RTAs and compare them with countries' multilateral commitments.

⁶There is also a growing literature that analyzes trade in services at the firm level (Kelle and Kleinert, 2010; Breinlich and Criscuolo, 2011; Ariu, 2015) and aggregate (Freund and Weinhold, 2002; Kimura and Lee, 2006), but the review here focuses only on those that study the interlinkages with the goods sector.

⁷See Baines et al. (2009) for a review of this literature.

complementarities between services and goods enable firms to boost manufacturing exports by also providing services. Such bundling of trade in goods and services by firms provides another mechanism through which services liberalization can boost manufacturing exports. Studies have shown that services trade liberalization (or restrictiveness) affects the performance of the manufacturing sector in terms of exports (Hoekman and Shepherd, 2015; Nordås and Rouzet, 2015; van der Marel, 2016; Liu et al., 2018) and productivity (Arnold et al., 2011; Beverelli et al., 2017). However, most of the empirical studies on the impact of services liberalization on the goods sector use country-level measures of services restrictiveness while this paper links preferential liberalization of services to manufacturing GVCs.

This paper is one of the first attempts to empirically test the impact of services liberalization on manufacturing trade flows in the context of GVCs. It is also one of the few studies that shed light on the effect of services trade agreements on trade flows. The evidence on the heterogeneous effects of services trade agreements, depending on countries' income level as well as specific provisions, is a novel contribution to the literature. Finally, the findings entail policy implications for developing countries pursuing a more active participation in GVCs.

The remainder of the paper is organized as follows. Section 2 discusses the role of services in GVCs: how and why services liberalization should affect cross-border production sharing. The empirical specification is described in Section 3, and the data in Section 4. Section 5 presents the results and Section 6 concludes.

2 The role of services in GVCs

Why should services liberalization affect manufacturing GVC participation? Jones and Kierzkowski (1990) provide a simple theoretical framework where trade liberalization in services could lead to an increased fragmentation of the production process across borders. In their framework, the use of multiple locations as production blocks for a given production process (i.e. GVCs) is encouraged by the disparity in productivities and factor prices found between countries (or regions).⁸ Fragmentation, therefore, essentially lowers the marginal costs of production while increasing the total fixed costs arising from the multiple locations. A key element of this fixed cost of fragmentation is the cost of *services linkages* — for example, transportation, telecommunications and various producer services such as financial and business services — which are necessary for coordinating dif-

⁸Such production cost differentials are consistent with traditional trade models such as the Ricardian and Heckscher-Ohlin models without factor price equalization.

ferent stages of production.⁹ If such services linkages were more costly to build across borders than domestically, international fragmentation would be the more efficient production choice as long as the additional fixed cost is outweighed by the reduction in marginal costs. This implies that a services trade agreement that reduces the cost of services linkages between production blocks would increase GVC-trade between countries. The next sections of this paper test this hypothesis empirically.

2.1 Characteristics of services trade liberalization

Trade liberalization in services has some important differences from trade liberalization in goods: it is fundamentally *asymmetric*, and often tends to be *non-discriminatory*. In a typical trade model, RTAs liberalizing trade in goods are often modeled as a symmetric reduction in trade cost that increases trade. This makes sense when the liberalization takes the form of reciprocal reduction in tariffs, for example. However, services liberalization is profoundly different due to the special nature of services: its global concentration in the North as well as its non-discriminatory character. What matters is to get good services into a country which, in most cases, developed countries already have. Therefore, we should not expect a preferential liberalization in services trade between a developing and developed country to have a symmetric impact on the two partners: it will enhance the quality of services available in the South while having a small effect on the North.

Furthermore, many of the restrictions in services trade are in fact behind-the-border measures or non-discriminatory in nature. This makes it difficult to analyze the impact of services trade liberalization through RTAs as they often do not provide substantial preferential treatment to partner countries as is the case for goods. Miroudot and Shepherd (2014) provide evidence that indeed the trade cost reduction for country pairs that are part of an RTA is much smaller and diminishing over time for services, while trade costs are significantly lower within RTAs for goods. This means that we cannot expect an unambiguous trade-promoting effect of services trade agreements. Nonetheless, this does not mean that services RTAs do not provide any preferential liberalization. Depending on the specific provisions and commitments included in the services agreement, preferential liberalization of services *can* affect trade flows between partner countries.¹⁰

⁹Services that facilitate GVCs are not limited to those directly supporting trade (i.e. trade services such as transportation and insurance) but also include various business services. The role of producer services in specialization and the division of labor has also been stressed in Francois (1990a,c) and Egger et al. (2015).

¹⁰Comparing commitments in services RTAs to multilateral commitments in GATS, Marchetti and Roy (2008) and Miroudot et al. (2010) show that many RTAs in services *do* go beyond GATS and introduce preferential bindings. Furthermore, even if the trade

Finally, although the empirical analysis in this paper is limited to the preferential (or bilateral) dimension of services liberalization, it is worth noting that services restrictions that hinder GVC-trade can be both unilateral and bilateral. Unilateral restrictions include domestic barriers to competition or administrative requirements that make any type of business activity more costly and hence, hinder participation in GVCs. A country with very restrictive and uncompetitive logistics or transport services, for instance, will not be an attractive destination for production offshoring from any country. On the other hand, there could also be bilateral restrictions. For instance, when a firm sources intermediate inputs from a foreign country, it may want to provide its own legal or banking services to the foreign affiliate or supplier. The cost of building such services linkages can vary bilaterally depending on regional trade agreements that grant preferential treatment.

These characteristics of services liberalization necessitate a careful approach in examining the effect of services trade agreements on trade flows, bringing us to the next section which describes how the impact of services RTAs is expected to differ by income levels and specific provisions.

2.2 Heterogeneous effects of services trade agreements

Not all services trade agreements are the same. Specific provisions and commitments made in the services trade agreements determine whether an agreement would effectively reduce the cost of services linkages in GVCs and how preferential the treatment will be. Furthermore, the asymmetric nature of services liberalization conjectures that services trade agreements play a stronger role in facilitating GVC participation of developing countries where services sectors tend to be more restrictive.

With whom you sign the services trade agreement matters

The possibility that production stages can be dispersed geographically increases the chance for less developed countries to participate in the industrialization process by liberalizing trade in services and attracting manufacturing activities. This is formalized in the North-South model of global sourcing in Antràs and Helpman (2004) where a Northern firm's choice of supplier location is governed by the trade-off between the lower variable costs of southern manufacturing against the lower *fixed organizational costs* in the North.¹¹ The location of production is determined by the

cost reduction due to services RTAs were minimal, we know that trade policy can affect trade flows by creating greater certainty of market access between trading partners (Handley and Limão, 2015; Pierce and Schott, 2016).

¹¹The fixed organizational cost includes joint management costs of final and interme-

North-South difference in fixed organizational costs as well as the wage gap. The model predicts that more firms will offshore their manufacturing stages to the South, as the South’s organizational cost disadvantage becomes smaller.¹²

One of the key elements in the fixed organizational costs is the cost of coordination which decreases in the presence of good services links, for example by services trade agreements. However, as discussed above, services RTAs do not necessarily provide substantial preferential treatment to partner countries symmetrically. A North-South RTA in services is likely to affect the services sector in the South more, by allowing access to high-quality services from the North. Moreover, an agreement is more likely to be cost-reducing if the existing barriers to services flows are high, which is often the case for developing countries. This suggests that services RTAs have differential effects depending on whether they are signed between developed countries, between developing countries, or between a developed and a developing country, where the effect should be asymmetric in the last case. In terms of the global sourcing model, this means that North-South RTAs in services that essentially bring good services to the South would lead to an asymmetric reduction in the fixed organizational cost, reducing the fixed organizational cost disadvantage of the South, and result in more offshoring to the South.

Another reason is the comparative advantage profile of developed and developing countries. The relocation of production stages across borders happens for several reasons, and the nature of production sharing varies by countries’ income levels (Taglioni and Winkler, 2016). If developed and developing countries have different comparative advantages, less costly service links allows more production blocks to be dispersed across North-South borders since certain production stages, for example the labor-intensive ones, could be more cheaply carried out in developing countries. This is essentially because developing countries’ comparative advantage is typically in lower costs while developed countries’ comparative advantage is often in technology and innovative capacity and hence, services liberalization strengthens the comparative advantage of developing economies more. Therefore, even if the most efficient providers of service links were located in the developed world, liberalization of services and a subsequent fragmentation of production could result in a finer international division of labor that developing countries could actively share (Jones and Kierzkowski, 1990).

diate goods production such as supervision, quality control, accounting, and marketing. In their model, organizational forms are characterized by ownership structures as well as supplier locations, but I focus here only on the choice of supplier locations. It is assumed that fixed organizational costs are higher in the South than in the North.

¹²The model assumes North to be “home” but the argument goes through for offshoring in a foreign North, as long as the fixed organizational cost is lower than for the South.

Provisions in services trade agreements

Services trade agreements are very heterogeneous in their commitments and provisions. In this section, I introduce four main types of provisions that are frequently found in services RTAs: most-favored nation (MFN), national treatment (NT), the right of non-establishment, and movement of natural persons.¹³ The MFN and NT clauses are core disciplines that are also found in GATT (Article 1 for MFN and Article II for NT) as well as GATS (Article II for MFN and Article XVII for NT), while the right of non-establishment and movement of natural persons are specific to services trade agreements.

The MFN principle guarantees that the best access conditions conceded to one country are automatically extended to all other participants in the system. MFN clauses in RTAs, however, are more complex and diverse than in multilateral agreements. While the MFN discipline in multilateral agreements ensures non-discrimination between all members of the multilateral trade body, in RTAs, the promise of non-discriminatory treatment is a reciprocal trade preference between RTA partners. Furthermore, the reach of these MFN clauses in RTAs is often limited due to specific reservations to the treatment (Fink and Jansen, 2009).

NT implies the absence of all discriminatory measures that may modify the conditions of competition to the detriment of foreign services or service suppliers. By forbidding discrimination against all established firms (even if they are foreign-owned), the scope for preferential treatment of certain foreign providers post-establishment may be limited.

One of the key features in increasingly more RTAs is the comprehensive set of disciplines on investment and the temporary movement of business people. For example, RTAs featuring generic investment disciplines often include a right of non-establishment, which means that no local presence is required as a pre-condition to supply services. The non-establishment provision, for which no GATS equivalent exists, reduces the fixed cost for foreign services providers and is particularly well-suited for promoting e-commerce (Mattoo and Sauv  , 2008).¹⁴ Also, it is particularly relevant to certain services sectors that are not naturally bound by a characteristic specific to some services: proximity requirements. Traditional services are considered to require temporal and spatial proximity between the produc-

¹³The choice of these provisions is governed by the availability of data.

¹⁴Mattoo and Fink (2004) categorize services trade restrictions into those that increase the fixed and/or variable cost of services trade and those that impose quantitative restrictions on sales and/or number of providers. The requirement to establish a local presence, the need to re-qualify for foreign professionals, and license fees for entry into the market are examples of measures that increase the fixed cost.

tion and consumption of the service (e.g. haircut). However, ICT development has allowed many modern services to be traded and consumed from distance (e.g. e-learning courses, financial products). Therefore, the right of non-establishment is naturally more important for certain services sectors (e.g. business and financial services) than others (e.g. construction and transport services).

Consider financial services, for example. A financial institution can deliver its services abroad through physical channels such as branches and representative office, or through remote channels like call centers or electronic channels using internet. While supplying insurance services is often allowed on a cross-border basis with certain regulations, in the case of banking, pure cross-border supply is often prohibited by requiring that services be provided through a commercial presence (Marchetti, 2009). Such requirements of local presence can increase the fixed cost of providing services across borders by requiring additional capital and liquidity as well as higher regulatory complexity.

Finally, many RTAs explicitly allow movement of natural persons in the provision of services either in the form of a chapter or an annex. This clause is specific to mode 4 of services trade where a service is supplied through the temporary presence of a natural person of one member in the territory of another member (e.g. independent professionals). When supply chains are internationally dispersed, or firms offshore certain production tasks abroad, the ease of temporarily moving people around could be essential. For instance, a firm may decide to offshore its assembly process to a developing country only if it knows that it could easily send its own managers or engineers when necessary. It is noteworthy, however, that the issue of movement of persons is also often dealt with outside the scope of RTAs such as migration policies.

3 Empirical specification

To examine the heterogeneous effect of services trade agreements on gross trade and GVC-trade, I use the gravity equation. The gravity equation is a very strong and robust empirical tool in international trade, widely used and developing over time in terms of econometric techniques to accurately estimate the effects of RTAs on trade flows (Carrère, 2006; Santos Silva and Tenreyro, 2006; Baier and Bergstrand, 2007; Bergstrand et al., 2013, 2015).¹⁵ The microfoundations of the gravity model also provide theoretical validity to the gravity models (Eaton and Kortum, 2002; Anderson and van Wincoop, 2003).

¹⁵See Cipollina and Salvatici (2010) and Head and Mayer (2014) for a survey on the use of gravity equations to identify the effect of RTAs.

To control for observed and unobserved heterogeneity across countries and pairs, and to address endogeneity, I include a rich set of importer-year, exporter-year, and country-pair fixed effects. One of the biggest and oldest concerns in identifying the effect of trade policy on trade flows is endogeneity, since countries that trade more with each other are arguably more likely to conclude an RTA. Baier and Bergstrand (2007) argue that the most plausible estimates of the average effect of RTAs on bilateral trade flows can be obtained by the use of panel data with country-pair fixed effects. This eliminates an important source of endogeneity that is due to time-invariant unobserved heterogeneity between country pairs.¹⁶

In estimating the gravity equation, I use the Poisson Pseudo Maximum Likelihood (PPML) estimation, as advocated by Santos Silva and Tenreyro (2006), to account for heteroskedasticity in the trade flow data which can lead to inconsistent estimation of log-linearized OLS.¹⁷ A diagnosis of the error term, following Head and Mayer (2014), supports the use of PPML over OLS or Gamma PML.¹⁸

The baseline estimating equation is given by

$$Y_{ijt} = \exp(\beta_0 + \beta_1 RTA_{ijt} + \beta_2 SERV_{ijt} + \alpha_{ij} + \alpha_{it} + \alpha_{jt}) + \epsilon_{ijt} \quad (1)$$

where Y_{ijt} is gross or GVC-exports in manufacturing from country i to country j in year t . Three alternative measures of GVC-exports (described in detail below) will be used: gross exports in intermediate goods, backward GVC-exports, and forward GVC-exports. α_{ij} captures all time-invariant country pair-specific effects such as distance, cultural and linguistic similarities, as well as any unobserved bilateral characteristics that may affect the trade flow between the two countries. α_{it} and α_{jt} are country-year fixed effects that capture all exporter and importer characteristics that vary over time such as output, price levels and multilateral resistance. RTA is a

¹⁶The fixed effects, however, cannot account for country-pair-specific changes over time, other than trade agreements, that may affect trade flows (Bergstrand et al., 2015). The concern for potentially remaining endogeneity is partially addressed in the robustness checks by interacting distance with year dummies. This would control for the changing effects of distance, possibly an important element of changes in bilateral trade costs, over time.

¹⁷The PPML regressions were technically implemented using the STATA command *ppml_panel_sg*, developed by Zylkin (2017), which speeds up the estimation with many fixed effects (Larch et al., 2017).

¹⁸Head and Mayer (2014) compare the performance of OLS, PPML, and GPML under different data generating processes and show that PPML performs best when the mean-variance ratio is constant (CVMR). Using Monte Carlo simulations, the authors show that the Manning and Mullahy (2001) test statistic (“MaMu test”) can be used to distinguish between log-normal and CVMR. For my sample, the MaMu test delivers 1.64 (significantly less than 2), supporting CVMR error and hence a preference for PPML estimation. The authors also find no evidence of bias due to the incidental parameter problem with PPML using multi-way fixed effects.

dummy variable which takes value one when the country pair has an RTA (FTA or stronger), and $SERV$ is a dummy variable for having a services trade agreement or a substantive services provision.¹⁹

Note that variable $SERV$ is equivalent to an interaction term with RTA (i.e. $RTA_{ijt} \times SERV_{ijt}$) since there are no observations where a country pair has a services agreement without having an RTA in goods. Hence, β_2 captures the extra effect of having a services agreement additional to a goods RTA. Also note that the identification is within country pairs since dyad fixed effects are included. This means that β_2 is identified *not* by comparing GVC-trade of a country pair with an RTA only covering goods to another pair with an RTA that also covers services, but by comparing GVC-trade of a country pair when it only had an RTA in goods to later when it also had a services trade agreement. This would be the case when a country pair that already has a bilateral or regional trade agreement in goods later becomes part of another RTA (perhaps with different members involved) that also covers services, or when a country pair signs a bilateral or regional trade agreement for goods and services but the date of entry into force is different for the two.^{20 21}

A caveat for the bilateral framework is that it has some limitations in addressing the particular research question of this paper for two main reasons. First, GVCs are not bilateral. As the name suggests, GVCs involve a chain or network of countries at the global or regional level, often more than two. Although bilateral measures GVC-trade are available, these are admittedly not an ideal measure to capture the degree of “global” value chains. Second, estimating the impact of services trade liberalization through a bilateral framework (i.e. RTAs) is much less straightforward than for goods liberalization because many of the restrictions in services trade are behind-the-border measures or non-discriminatory, as discussed in Section 2.1. The bilateral framework of the gravity equation can identify only the effect of services liberalization that is *preferential*.²² Despite these

¹⁹See next section on data for more details.

²⁰An example of the first case would be New Zealand and Thailand. They first signed a bilateral trade agreement for goods (entry into force: 2005), and then became part of the ASEAN-Australia-New Zealand agreement which also covered services (entry into force: 2010). An example of the latter case would be the ASEAN-China trade agreement which entered into force in 2005 for goods and in 2007 for services.

²¹In the interpretation, I implicitly assume that RTAs with sequential entry into force for goods and services are not different from those with simultaneous entry into force. See Egger and Shingal (2017) for a discussion on this.

²²The potential spillover effects of services RTAs are not captured in my specification. Say there are three countries, A, B, and C, all trading pairwise with RTAs in goods. Then countries A and B sign a services trade agreement but A and C do not. The benefits of A and B’s services agreement could spill over onto all of A’s trade (due to the nondiscriminatory nature of services restrictions). The presence of such positive spillovers would suggest that the gravity coefficients are a lower bound of the trade-

limitations, it allows us to capture to the extent that is possible the impact of services trade liberalization on cross-country trade flows while minimizing concerns for endogeneity often present in country-level indicators of services liberalization. One should however be cautious in interpreting the results of bilateral (or preferential) services liberalization.

Bilateral measure of GVC participation

The outcome variable is a bilateral measure of GVC-trade in manufacturing.²³ The focus on manufacturing GVC-trade is conceptually because the objective of this paper is to identify the role of services liberalization in the fragmentation of the production process, going beyond facilitating services trade. In addition, this solves potential problems arising from the fact that services trade data in the inter-country IO tables are often imputed using a gravity model, which can hence cast doubt to the validity of using the gravity model to analyze the data.

The most basic measure of GVC-trade would be *gross trade in intermediate goods*, as trade within a GVC entails parts and components crossing borders multiple times. More sophisticated indicators of GVC participation can be calculated based on either backward or forward linkages. At the unilateral country level, backward and forward linkages are defined as the foreign value added in domestic exports, and the domestic value added in foreign exports, respectively. It is worthwhile looking at GVC indicators based on both backward and forward linkages as they bring out different aspects of GVC participation, depending on the country's specialization pattern. For instance, exports of countries that are specialized in high value-added tasks are better captured by forward linkages, while exports of countries specialized in simpler tasks will have stronger backward linkages. This implies that backward linkages may empirically be a better measure for the GVC participation of lower income countries, while forward linkages are more appropriate for wealthier countries or primary commodity exporters (Kummritz, 2016).

enhancing effect of services agreements.

²³Developing novel indicators of GVC participation is still an ongoing process. One of the earliest attempts to measure international fragmentation was the Feenstra and Hanson (1996) foreign content of domestic production, using information from input-output (I-O) tables. Hummels et al. (2001) further narrowed the Vertical Specialization (VS) measure to capture the import content of exports. Recent efforts to build international I-O matrices has led to more advanced measures such as the VAX ratio which is the share of value-added to gross exports as an inverse measure of GVC (Johnson and Noguera, 2012). Koopman et al. (2014) summarize the relationship among these different measures by deriving a comprehensive decomposition of gross exports, and Wang et al. (2013) extend the decomposition to a bilateral and sector level. See Amador and Cabral (2016) and Johnson (2017) for a recent review of different GVC measures.

To build bilateral measures of backward and forward linkages, I use the decomposition method developed in Wang et al. (2013). Their decomposition splits gross bilateral exports into 16 components, broadly into domestic value added absorbed abroad (DVA), domestic value added returning home (RDV), foreign value added (FVA), and pure double counting terms (PDC) at the sector level.²⁴ This accounting framework allows me to construct the following bilateral measures of GVC participation. First, the bilateral sourcing measure, or the *backward* linkage indicator, between countries i and j for industry k is defined as the sum of value added from all industries of all foreign countries in the exports of country i 's industry k to country j .²⁵ Second, the bilateral selling measure, or the *forward* linkage indicator, is the sum of value added from country i 's industry k in country j 's exports to all foreign countries in all industries. This measure includes back-and-forth trade, that is the value added from country i 's export to country j in industry k that comes back to country i .²⁶ To clarify what these bilateral indicators capture, consider for example a GVC of car speakers as in Figure 1. Say a Japanese car manufacturer offshores the production of speakers for a new car model. The Republic of Korea exports the speaker drivers such as tweeters and woofers to Thailand where they produce a frame around it. This is, then, shipped to a Chinese plant for final assembly before being exported to Japan where it will be used in their car production.

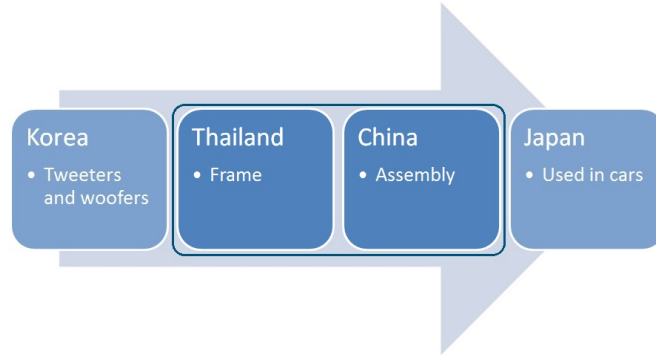


Figure 1: An example GVC of car speakers

²⁴This decomposition based on Koopman et al. (2014) received some criticism recently, for example, by Borin and Mancini (2017) and Miroudot and Ye (2017) who suggest alternative methods. However, the literature has not yet agreed on what the best method is for decomposing bilateral trade so I use the Wang et al. methodology in combination with gross total and intermediate trade flows.

²⁵Industry k in this paper is the aggregate manufacturing sector for reasons discussed above. However, note that the foreign value-added can come from any sector as long as the export from country i to j is in manufacturing.

²⁶The decomposition was technically implemented using the R package *decompr* which automates the calculation of GVC indicators (Quast and Kummritz, 2015).

In this example, Thailand and China are engaged in GVC-trade that also involves Korea (backward) and Japan (forward). The bilateral backward and forward GVC measures for Thailand (T) and China (C) would be:

- *Backward_{TC}*: Korean value-added in Thailand’s exports to China (i.e. the value of the tweeters and woofers)
- *Forward_{TC}*: Thai value added in Chinese exports to Japan (i.e. the value of the frame)

The backward-GVC measure for Thailand and China captures the foreign value added in Thailand’s exports to China, while the forward measure captures the Thai value added exports to China that are re-exported. Both measures are elements of gross trade between Thailand and China but capture different aspects of GVC participation.²⁷

Heterogeneous effects of services agreements

As described in Section 2, the asymmetric and often non-discriminatory nature of services liberalization suggests that the effects of services trade agreements are likely heterogeneous. To allow for such heterogeneity, I include interactions variables with the SERV dummy: first with income pair dummies (*SS*, *NS*, *SN*) and then with provision dummies (*MFN*, *NT*, *NonEst*, *Move*).

$$Y_{ijt} = \exp [\beta_0 + \beta_1 RTA_{ijt} + \beta_2 SERV_{ijt} + \beta_3 (SERV_{ijt} \times SS_{ij}) + \beta_4 (SERV_{ijt} \times NS_{ij}) + \beta_5 (SERV_{ijt} \times SN_{ij}) + \alpha_{ij} + \alpha_{it} + \alpha_{jt}] + \epsilon_{ijt} \quad (2)$$

SS is a dummy variable equal to one if the exporter and importer are both developing countries (South-South), *NS* equals one if the exporter is high-income and the importer is a developing country (North-South), and *SN* equals one if the exporter is a developing and importer is a high-income country (South-North).²⁸ The benchmark (*SERV*) captures the effect of services trade agreements between developed countries (North-North).

²⁷Note that the notion of “forward” and “backward” is relative for these bilateral indicators. The “forward” measure captures what is a forward participation from Thailand’s point of view but a backward participation from China’s point of view. Also, the value of Korean woofers exported to Thailand is captured by the forward-GVC measure between Korea and Thailand (*Forward_{KT}*) as well as the backward GVC measure for Thailand and China (*Backward_{TC}*).

²⁸Income groups are defined according to the World Bank’s classification. North includes countries that were classified as high-income in 1995, and South includes countries that were classified as low- and middle-income in 1995. See Appendix A.1 for the classification of countries.

Similarly for provisions, I estimate

$$Y_{ijt} = \exp [\beta_0 + \beta_1 RTA_{ijt} + \beta_2 SERV_{ijt} + \beta_3 (SERV_{ijt} \times MFN_{ijt}) + \beta_4 (SERV_{ijt} \times NT_{ijt}) + \beta_5 (SERV_{ijt} \times NonEst_{ijt}) + \beta_6 (SERV_{ijt} \times Move_{ijt}) + \alpha_{ij} + \alpha_{it} + \alpha_{jt}] + \epsilon_{ijt} \quad (3)$$

where *MFN* equals one if the services agreement between the country pair (*ij*) at time (*t*) includes a MFN provision. Likewise, *NT*, *NonEst*, and *Move* are dummy variables for having a provision on national treatment, non-establishment, and movement of natural persons.

4 Data

The bilateral indicators of GVC participation are calculated from the OECD Inter-Country Input-Output tables (ICIO).²⁹ These international input-output data allow one to decompose gross trade, using the method developed in Wang, Wei, and Zhu (2013) with a large coverage — 61 countries, 34 industries, and 7 years.³⁰ For the empirical analysis in this paper, I exclude countries that do not have a manufacturing export base (i.e. less than 20 percent of total exports in manufacturing) since I am interested in manufacturing GVCs.³¹ Also, I exclude years 2008, 2009, and 2010 in which trade flows were heavily affected by the global financial crisis. This is also to be consistent with the literature in using 5-year intervals. The resulting dataset has 56 countries and 4 years (1995, 2000, 2005, and 2011).³²

For data on trade agreements, I use the Economic Integration Agreement (EIA) database by Baier and Bergstrand (2007) and the Design of Trade Agreements (DESTA) database by Dür et al. (2014). The latest version of the EIA database covers the period 1950–2012. They code the trade agreements as following: (1) non-reciprocal preferential trade arrangements, (2) preferential trade arrangements, (3) free trade areas, (4) customs union, (5) common market, and (6) economic union. The dummy variable for the existence of an RTA equals one if a country pair has an FTA or stronger, as often used in the literature.

²⁹2015 edition.

³⁰The wide coverage of developing and developed countries makes the OECD ICIO database most suitable for the analysis of heterogeneous effects of services trade agreements by income level. Alternative data sources for ICIOs include the World Input Output Database (WIOD) which provides more detailed sectoral data but limited mostly to advanced economies.

³¹These are Brunei Darussalam, Cyprus, Hong Kong SAR, China, Luxembourg, and Saudi Arabia. See Appendix A.1 for the full list of countries.

³²The baseline regressions include years 1995, 2000, 2005, and 2011 instead of 2010 for two reasons: (i) In 2010, many countries' trade flows were still heavily affected by the crisis, and (ii) by using 2011 instead of 2010, the number of services agreements included in the sample increases significantly.

DESTA also provides an extensive database of PTAs signed between 1945 and 2015. Building on the list held by the World Trade Organization (WTO) and World Trade Institute (WTI), it combines agreements from a large number of other sources such as web pages of foreign ministries or governmental institutions. Besides its large coverage, the dataset also measures the depth of each agreement as an additive index that combines seven key provisions. For the purpose of this paper, I use the dummy variable (*SERV*) indicating whether the trade agreement includes a substantive provision on services. Furthermore, to examine the heterogeneous effect of services agreements by contents, I use the more detailed data on different types of provisions found in services trade agreements.³³ In particular, the database codes whether the services agreement contains an MFN clause, national treatment clause, the right of non-establishment, and movement of natural persons, and so on.³⁴

Using these data sources, I construct the main variables of which the summary statistics are provided in Table 1 over time, and in Table 2 across income groups. The three indicators of GVC participation — gross exports in intermediate goods, backward-, and forward-linkage measures — are expressed as shares of total gross bilateral exports, and the two trade agreement variables are dummy variables taking value one if the country pair has an FTA or stronger (*RTA*), or if the country pair has a services agreement (*SERV*). Provisions in the services trade agreement are also expressed as dummy variables equal to one if the services agreement includes a specific provision: *MFN*, *NT*, *NonEst* (right of non-establishment), and *Move* (movement of natural persons).

Table 1 shows that the average GVC participation rate has been steadily increasing since 1995. At the same time, regional trade agreements in goods and in services also saw a rapid increase. In 2011, 46 percent of the country pairs in the dataset have an RTA covering goods, and 42 percent have an RTA for services as well. The provisions data show that a smaller share of services agreements includes an MFN clause, while provisions on NT, non-establishment, and movement of persons are more frequently found.³⁵

The comparison between different income pairs also shows interesting trends. The share of intermediate goods in total gross manufacturing trade is highest between developed countries. For the backward and forward GVC-measures, developing countries tend to have higher backward linkages

³³The World Bank's Content of Deep Trade Agreements database (Hofmann et al., 2017) also codes RTAs that include specific provisions (including services). However, DESTA's information on the detailed provisions included in the services agreement makes it more suitable for the analysis in this paper.

³⁴See Appendix A.2 for more details.

³⁵The provisions are not mutually exclusive and different combinations of these provisions are included in services trade agreements. See Table A.1 for the pattern of complementarity between provisions.

Table 1: Summary statistics (mean) over time

	1995	2000	2005	2011
Intermediate goods	0.536	0.546	0.562	0.573
Backward-GVC	0.215	0.239	0.252	0.252
Forward-GVC	0.139	0.156	0.159	0.167
RTA	0.199	0.301	0.388	0.460
SERV	0.150	0.204	0.330	0.423
— MFN	0.007	0.044	0.073	0.102
— NT	0.139	0.157	0.280	0.369
— NonEst	0.123	0.161	0.260	0.349
— Move	0.144	0.172	0.278	0.367

The three GVC-variables are expressed as shares of total gross bilateral trade in manufacturing. *RTA*, *SERV*, *MFN*, *NT*, *NonEst*, and *Move* are dummy variables, and therefore the mean shows the share of country pairs that have the respective agreement or provision.

Table 2: Summary statistics (mean) across income groups

	South-South	North-North	North-South	South-North
Intermediate goods	0.550	0.578	0.545	0.550
Backward-GVC	0.250	0.225	0.232	0.245
Forward-GVC	0.145	0.172	0.154	0.155
RTA	0.218	0.495	0.345	0.345
SERV	0.145	0.456	0.284	0.284
— MFN	0.033	0.076	0.062	0.062
— NT	0.114	0.420	0.237	0.237
— NonEst	0.106	0.419	0.216	0.216
— Move	0.115	0.407	0.249	0.249

The three GVC-variables are expressed as shares of total gross bilateral trade in manufacturing. *RTA*, *SERV*, *MFN*, *NT*, *NonEst*, and *Move* are dummy variables, and therefore the mean shows the share of country pairs that have the respective agreement or provision. 930, 600, 775, 775 are the number of directional country pairs that are included in South-South, North-North, North-South, and South-North, respectively. Values are averaged across sample years.

in their exports to the developed and developing countries, while forward linkages show the opposite trend. This is intuitive since higher income countries tend to export high value-added inputs to each other (as part of the production process of sophisticated goods), or to developing countries for assembly. On the other hand, developing countries have a high share of foreign-value added in their exports since their participation in GVCs is often characterized by lower value-added activities such as assembly. In terms of trade agreements, high-income country pairs are most likely to have an RTA and a large share of them include a services agreement. A smaller share of developing country pairs has RTAs, and having an RTA for services is even less likely.

5 Results

Section 2 highlighted the need to go beyond average effects in studying services trade agreements: due to the often asymmetric and non-discriminatory nature of services liberalization, services RTAs do not necessarily provide substantial preferential treatment to partner countries. Taking this into account, it could be expected that having an RTA in services, on average, does not have a significant effect on GVC-trade or bilateral trade flows in general. Indeed, the results shown in Table 3 find basically no additional effect of having a services agreement on trade flows.

Table 3: Services RTAs and trade flows (average effect)

	(1)	(2)	(3)	(4)
	Gross exports (total)	GVC-exports		
		Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.130*** (0.0386)	0.133** (0.0439)	0.124** (0.0446)	0.138** (0.0490)
SERV	-0.0208 (0.0390)	-0.0190 (0.0437)	-0.00370 (0.0453)	-0.00440 (0.0470)
Obs.	12320	12320	12320	12320

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The lack of the effect of services trade agreements may seem discouraging, but is in fact not surprising for the reasons described above. However, this does not mean that bilateral or regional agreements in services trade do not matter. Despite the lack of average effect, services agreements affect trade flows and GVC participation of country pairs in a heterogeneous manner depending on the countries' income level or the specific provisions included in the services trade agreement.

Heterogeneous effects of services RTAs by income group

The discussion in Section 2 conjectures an asymmetric impact of services trade liberalization for developed and developing economies. Consistent with the intuition, the empirical results in Table 4 show that the effect of services agreements are heterogeneous across income groups, with a significantly positive impact on exports and especially GVC-exports for developing countries. Compared to the baseline (NN), services agreements increase GVC-exports from developing to developed countries (SN) as well as between developing countries (SS), and the increase is proportionately larger than for total gross exports. In contrast, services agreements gener-

ally do not increase GVC-exports from developed countries either to their developed counterparts (NN, baseline) or to developing countries (NS).

Table 4: Heterogeneous impact of services RTAs by income group

	(1)	(2)	(3)	(4)
	Gross exports (total)	Intermediate goods	GVC-exports	
			Backward (sourcing)	Forward (selling)
RTA	0.134*** (0.0386)	0.135** (0.0448)	0.128** (0.0441)	0.144** (0.0499)
SERV	-0.119 (0.0620)	-0.122 (0.0708)	-0.159* (0.0762)	-0.0711 (0.0728)
SERV*SS	0.233** (0.0888)	0.237* (0.0991)	0.363** (0.114)	0.145 (0.0983)
SERV*NS	0.0169 (0.0751)	0.0224 (0.0826)	0.0589 (0.0901)	-0.0398 (0.0866)
SERV*SN	0.238** (0.0749)	0.265** (0.0842)	0.296*** (0.0870)	0.298** (0.0931)
Obs.	12320	12320	12320	12320

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. The baseline (SERV) is between developed countries (NN).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The asymmetric effect of services trade agreements is evident: a services agreement between a developing (South) and developed country (North) increases gross and GVC-exports from South to North, but not the other way around. Furthermore, the increase is proportionately larger for GVC-trade than for gross trade.

The average effect of signing an RTA is a 14.3 percent increase in gross bilateral trade.³⁶ When a North-South country pair further concludes a services agreement (or the services agreement enters into force at a later stage), this increases total gross exports from South to North by an additional 12.6 percent, making the total effect of their RTA (in goods and services) a 27 percent increase in total gross trade.³⁷ When looking only at intermediate goods, the effect of a goods RTA is almost the same but the additional effect of the services agreement is larger at 15.4 percent, suggesting that

³⁶The coefficients (β) in the PPML regressions are interpreted as $(e^\beta - 1)$ percent change in trade flows.

³⁷Note that baseline *SERV* is the effect of services trade agreements on developed country pairs (NN). Hence, the interpretation of the coefficients on interaction variables are always relative to North-North services agreements. To compute the effect of services agreements on South-North trade, for example, one needs to add the coefficients of *SERV* and *SERV*SN*. Table A.2 reports coefficients where *SERV*NN* is introduced instead of *SERV*.

services liberalization is particularly more important for GVC-trade (trade in intermediate goods) than the more traditional final-goods trade. The stronger positive impact of services agreements on GVC-exports is found consistently with backward and forward indicators as well. Services trade agreements additionally increase backward-GVC exports by 14.7 percent, and forward-GVC exports by 25.5 percent which are 2 and 13 percentage points larger, respectively, than the effect on total exports.

The positive impact of services liberalization on GVC-trade between the South and North is consistent with the theoretical predictions. The higher forward-GVC measure captures the increased value added in South's export to the North that will be re-exported to the rest of the world. This can be explained by manufacturing firms in the North offshoring parts of their production processes to the South. As discussed in Section 2, less costly service links between the South and North makes it more economically reasonable for Northern countries to offshore production activities to the South.

The increase in backward-GVC trade from South to North implies an increase in foreign value added in the exports from South to North. If the input provided by South is not the first stage of production, i.e. if the South imports intermediate inputs from other countries to produce its own intermediate exports to the North, this increase is natural. More exports of a composite intermediate good by South would imply an increase in both domestic and foreign value added in the export. Another intuition for an increase in backward-GVC linkages is that better services linkages (or more liberalized services trade) allow the South to export more downstream or complex inputs that require higher values of imported intermediate inputs.³⁸

Another interesting finding is that services trade agreements also have a positive and significant effect on gross and GVC-trade *between* developing countries. Since trade barriers tend to be highest among developing countries, the flow of services is often highly restrictive, and a bilateral trade agreement aimed at liberalizing services trade could substantially increase GVC trade between the two countries. Having a trade agreement in services additionally increases South-South total gross exports by 12.1 percent, export in intermediate goods by 12.2 percent, and backward-GVC trade by 22.6 percent, without a significant increase in forward-GVC trade. An example could provide more intuition to the results. Let's say that the last two stages a production process are assembly and packaging. One can imagine a manufacturing product being assembled in Vietnam, then shipped to China for final packaging before it is sold as final goods around the world.

³⁸Note that the intermediate inputs that South imports to produce intermediate exports to North can be in any sector (including agriculture and services) as long as the input South exports to North is a manufacturing product.

If more valuable (or more complex) products require better service links between production stages, a services agreement between Vietnam and China (ASEAN-China) could encourage firms to assemble and package more valuable or sophisticated goods in these two countries. So instead of assembling 100 units of fans, after the ASEAN-China agreement, Vietnam assembles 100 units of air purifiers and exports to China for packaging. This would lead to an increase of foreign value-added in Vietnamese exports to China, without necessarily increasing the domestic value added.³⁹

Services trade agreements do not seem to increase GVC- nor gross-exports from developed economies either to other developed countries or developing countries. The lack of North-North effect could be because developed countries already have relatively low levels of services restrictions and the flow of services across each other is not costly regardless of the services RTAs.

Heterogeneous effects of services RTAs by specific provisions

What types of provisions in services trade agreements are important for facilitating GVC participation? The question boils down to what type of service linkages are needed to maintain internationally dispersed production blocks. As discussed in Section 2, one of the key factors that enabled the rise in GVCs or offshoring is the capacity to coordinate different stages of production across borders. The cost of coordination and communication along GVCs has fallen significantly with ICT development but still does exist, and depends on how restrictive the services sector is. Considering that the gravity equation can only identify the effects of preferential services liberalization, the MFN clause in services trade agreements which does not grant preferential treatment to the partner country is not expected to affect a country pair's engagement in GVC-trade. The same holds for the NT provision which is also often a multilateral commitment rather than preferential.⁴⁰ The rights of non-establishment and movement of natural persons, on the other hand, have a more preferential flavor, and are intuitively important for bilateral GVC-trade.

Table 5 shows the estimation results with interaction terms between the services agreement dummy (*SERV*) and provision dummies (*MFN*, *NT*, *NonEst*, and *Move*). As expected, having a MFN or NT clause in the services agreements does not have a significant impact on a country pair's gross- or GVC-trade. However, services trade agreements that grant

³⁹This is assuming that the value of assembly is the same for fans and air purifiers, while the value of intermediate inputs that Vietnam imports is higher for air purifiers than fans.

⁴⁰Even if these provisions do increase trade with all countries, this effect will be absorbed by the country-year fixed effects.

the right of non-establishment significantly increase both gross- and GVC-trade flows. Country pairs tend to trade 12.4 percent more when they have a services agreement that allows services exports without local establishment, compared to when they only have an RTA covering goods. The effect of a services agreement without a non-establishment clause is absent. Furthermore, the positive impact of the non-establishment right is larger at 18.4 percent for trade in intermediate goods, 14.5 percent for backward-GVC, and 12.1 percent for forward-GVC trade, hinting at the particular importance of non-establishment rights as GVCs become more prevalent. Provisions on the movement of natural persons do not show significant effects on GVC trade but one could speculate that this issue is often dealt with outside the scope of RTAs, such as separate visa arrangements or migration policies.

Table 5: Heterogeneous impact of services RTAs by provisions

	(1)	(2)	(3)	(4)
	Gross exports (total)	Intermediate goods	GVC-exports Backward (sourcing)	Forward (selling)
RTA	0.126** (0.0422)	0.119* (0.0476)	0.145** (0.0507)	0.0891 (0.0482)
SERV	-0.0662 (0.0767)	-0.0334 (0.0954)	-0.0573 (0.0644)	-0.0840 (0.118)
SERV*MFN	-0.115* (0.0573)	-0.0838 (0.0634)	-0.192* (0.0750)	0.0256 (0.0615)
SERV*NT	0.135 (0.0811)	0.139 (0.0802)	0.155 (0.0821)	0.105 (0.0820)
SERV*NonEst	0.183*** (0.0536)	0.202*** (0.0559)	0.193** (0.0638)	0.198*** (0.0567)
SERV*Move	-0.160 (0.109)	-0.224 (0.119)	-0.165 (0.104)	-0.147 (0.138)
Obs.	12221	12221	12221	12221

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. *MFN*=1 if the services agreement contains an MFN clause. *NT*=1 if the services agreement contains a national treatment clause. *NonEst*=1 if the services agreement explicitly grants the right of non-establishment (i.e. if it allows the provision of services without local presence). *Move*=1 if the services agreement allows the movement of natural persons in the provision of services.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The intuition for why the non-establishment clause should matter for GVC-trade is straightforward. The requirement of local presence is one of the large fixed costs of building the services links that are needed for multiple production blocks. The relaxation of proximity requirements, therefore,

could result in a reallocation of production activities by facilitating trade in producer services (Francois, 1990b). Furthermore, sectors that are particularly affected by this provision are those without an inherent requirement of proximity in the provision of the services, such as business and financial services, which arguably are particularly important in the context of offshoring.⁴¹

Robustness checks

The findings discussed above are robust to alternative specifications.⁴² First, including an additional dummy variable for the European Union (EU) does not alter the main findings. Controlling for the EU may be important since the nature and implications of the EU agreement are clearly different from all other RTAs. Table A.3 shows that becoming part of the EU is associated with larger trade flows and higher GVC participation, and the magnitude of the effect is larger than an average RTA. However, the main findings that services agreements increases GVC participation of developing countries and that the non-establishment provision plays a key role in promoting GVCs are not driven by the EU agreement.

Second, the results are robust to controlling for the age and different waves of RTAs. Considering that services agreements are always signed either together with or later than RTAs in goods, some may worry that the services agreement dummy is capturing an “aging effect” of RTAs. If the trade-promoting effect of RTAs tends to grow over time, this could bias the effect of services agreements upwards. However, including interaction terms between RTA and age or year dummies does not alter the main findings.

Third, even with the rich set of fixed effects included in the econometric analysis, the issue of endogeneity is not fully tackled if there are other time-varying changes in bilateral trade costs that are specific to country pairs. To partially address this concern, I include interaction terms between distance and year dummies which would capture the changing effects of distance over time, as in Bergstrand et al. (2015).⁴³ If distance is an important element in bilateral trade costs that is changing over time, this approach would control for some changes in bilateral trade costs, other than trade agreements, that could affect trade flows. The findings are robust to this specification.

Finally, the results are also robust to including all countries available

⁴¹The data on services agreements in DESTA unfortunately do not allow sectoral analysis for different services sectors. Some other databases do provide more details on commitments at the sectoral level, but are limited to only a subset of agreements.

⁴²See Appendix A.3 for results.

⁴³I am not able to include the full set of controls suggested by Bergstrand et al. (2015) because there is no clear equivalent of intra-national trade flows for GVC-exports.

in the OECD ICIO database. The average effect of having an RTA is slightly smaller in magnitude than the baseline results, but having a services agreement has a positive and significant effect for developing countries' GVC-exports and for those services agreements that allow services exports without local presence.

6 Conclusion

The link between excellent services and the functioning of GVCs has long been emphasized both by economists and policy makers. This paper is one of the first attempts to empirically assess the importance of this link, in particular, the connection between services trade agreements and GVC participation in manufacturing. Using inter-country input-output tables and detailed data on services trade agreements, I show that having a services agreement is associated with higher gross trade and GVC-trade between developing countries, and from developing to developed countries. The effect is proportionately larger for GVC-trade, suggesting a larger importance of services linkages for fragmented production processes. The finding that services trade agreements asymmetrically benefit developing countries has important policy implications: when the production of goods involves intermediate inputs crossing borders multiple times, lowering tariffs and liberalizing trade in intermediate goods are not the only options available for developing countries to take part in GVCs. Liberalizing trade in services can provide new pathways for developing countries to utilize their comparative advantage in labor-intensive stages by joining GVCs, even when they lack comparative advantage in the integrated process.

The paper's second finding highlights the importance of non-establishment rights in services liberalization in the GVC context. I find that allowing cross-border supply of services without local presence significantly increases countries' participation in manufacturing GVCs. This novel finding warrants further investigation since it is likely to gain relevance as advanced communication technology enables more modern services to be supplied and consumed from distance.

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A Appendix

A.1 Sample coverage

High-income countries (“North”)	Low- and middle-income countries (“South”)
Australia	Argentina
Austria	Brazil
Belgium	Bulgaria
<i>Brunei Darussalam</i>	Cambodia
Canada	Chile
<i>Cyprus</i>	China
Denmark	Colombia
Finland	Costa Rica
France	Croatia
Germany	Czech Republic
<i>Hong Kong SAR, China</i>	Estonia
Iceland	Greece
Ireland	Hungary
Israel	India
Italy	Indonesia
Japan	Latvia
Korea, Rep. of	Lithuania
<i>Luxembourg</i>	Malaysia
Netherlands	Malta
New Zealand	Mexico
Norway	Philippines
Portugal	Poland
Singapore	Romania
Spain	Russian Federtion
Sweden	<i>Saudi Arabia</i>
Switzerland	Slovak Republic
Taiwan, China	Slovenia
United Kingdom	South Africa
United States	Thailand
	Tunisia
	Turkey
	Vietnam

Countries in italics are excluded from the baseline regressions.

Income groups follow the World Bank’s income classification in 1995.

A.2 DESTA services provisions coding

The dummy variables on services agreements and provisions are from Dür et al. (2014). The questions they used to code the data are as follows.

[servicechap] for *SERV*

Does this agreement include substantive provisions stipulating the liberalization of trade in services?

- 0 no mention of services trade liberalization
- 1 services trade liberalization mentioned as general objective
- 2 substantive provisions liberalizing trade in services

DESTA codes 1 if the aim of liberalizing services is mentioned in the agreement's preamble. Also 1 are agreements with a services chapter or article that does not contain any substantive liberalization measures.

SERV equals one if DESTA codes serviceschap=2, zero otherwise.

[servicesmfn] for *MFN*

Does the service chapter contain an MFN clause?

- 0 no service chapter
- 0 no MFN clause included in the service chapter
- 1 MFN clause included in the service chapter

[servicesnationaltreat] for *NT*

Does the service chapter contain a national treatment clause?

- 0 no service chapter
- 0 no national treatment clause included in the service chapter
- 1 national treatment clause included in the service chapter that is limited in scope to specific sectors
- 2 national treatment clause included in the service chapter

Variable NT equals one if servicesnationaltreat ≥ 1 , zero otherwise.

[sernonestablishment] for *NonEst*

Does the service chapter grant the right of non-establishment (that is, does it allow the provision of services without local presence)?

- 0 no service chapter
- 0 the right of non-establishment is not explicitly allowed (it may be either omitted or explicitly excluded)
- 1 the right of non-establishment is explicitly granted

[sermovement] for *Move* Does the service chapter allow the movement of natural persons in the provision of services?

- 0 no service chapter
- 0 movement of natural persons is not explicitly allowed (it may be either omitted or explicitly excluded)
- 1 movement of natural persons in the provision of services is explicitly allowed

A.3 Additional tables

Table A.1: Correlation among provisions

	MFN	NT	NonEst	Move
MFN	1			
NT	-0.3211	1		
NonEst	0.0936	0.1178	1	
Move	-0.4236	0.8650	0.2115	1

Correlations are conditional on the country pair-year having a services agreement.

Table A.2: Heterogeneous impact of services agreements by income group

	(1)	(2)	(3)	(4)
	Gross exports (total)	Intermediate goods	GVC-exports Backward (sourcing)	Forward (selling)
RTA	0.134*** (0.0386)	0.135** (0.0448)	0.128** (0.0441)	0.144** (0.0499)
SERV*NN	-0.119 (0.0620)	-0.122 (0.0708)	-0.159* (0.0762)	-0.0711 (0.0728)
SERV*SS	0.114 (0.0618)	0.115 (0.0675)	0.204** (0.0764)	0.0739 (0.0700)
SERV*NS	-0.102 (0.0541)	-0.100 (0.0604)	-0.100 (0.0605)	-0.111 (0.0672)
SERV*SN	0.119* (0.0561)	0.142* (0.0655)	0.137* (0.0574)	0.227** (0.0777)
Obs.	12320	12320	12320	12320

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. The baseline (SERV) is between developed countries (NN). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.3: Heterogeneous impact of services agreements by income group (controlling for EU)

	(1)	(2)	(3)	(4)
	Gross exports (total)	Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.133*** (0.0387)	0.134** (0.0448)	0.126** (0.0441)	0.142** (0.0501)
SERV	-0.122* (0.0619)	-0.125 (0.0708)	-0.162* (0.0762)	-0.0732 (0.0728)
SERV*SS	0.252** (0.0893)	0.254* (0.0997)	0.386*** (0.114)	0.165 (0.0997)
SERV*NS	0.0212 (0.0752)	0.0255 (0.0827)	0.0652 (0.0902)	-0.0369 (0.0868)
SERV*SN	0.241** (0.0749)	0.267** (0.0842)	0.299*** (0.0868)	0.302** (0.0932)
EU	0.201*** (0.0556)	0.201*** (0.0591)	0.221*** (0.0601)	0.203** (0.0654)
Obs.	12320	12320	12320	12320

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. The baseline (SERV) is between developed countries (NN). $EU=1$ if the country pair is part of the EU. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.4: Heterogeneous impact of services agreements by provisions (controlling for EU)

	(1)	(2)	(3)	(4)
	Gross exports (total)	Intermediate goods	GVC-exports Backward (sourcing)	Forward (selling)
RTA	0.130** (0.0422)	0.122* (0.0477)	0.148** (0.0509)	0.0916 (0.0482)
SERV	-0.0586 (0.0770)	-0.0274 (0.0958)	-0.0484 (0.0649)	-0.0787 (0.119)
SERV*MFN	-0.105 (0.0577)	-0.0753 (0.0638)	-0.182* (0.0762)	0.0369 (0.0616)
SERV*NT	0.0634 (0.0905)	0.0774 (0.0910)	0.0911 (0.0943)	0.0382 (0.0937)
SERV*NonEst	0.151** (0.0578)	0.174** (0.0604)	0.162* (0.0693)	0.165** (0.0599)
SERV*Move	-0.0796 (0.117)	-0.154 (0.125)	-0.0931 (0.117)	-0.0679 (0.141)
EU	0.108 (0.0623)	0.0938 (0.0662)	0.0951 (0.0677)	0.101 (0.0706)
<i>Obs.</i>	12221	12221	12221	12221

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. *MFN*=1 if the services agreement contains an MFN clause. *NT*=1 if the services agreement contains a national treatment clause. *NonEst*=1 if the services agreement explicitly grants the right of non-establishment (i.e. if it allows the provision of services without local presence). *Move*=1 if the services agreement allows the movement of natural persons in the provision of services. *EU*=1 if the country pair is part of the EU. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.5: Heterogeneous impact of services agreements by income group (full sample)

	(1)	(2)	(3)	(4)
	Gross exports (total)	GVC-exports		
		Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.116** (0.0385)	0.122** (0.0442)	0.108* (0.0441)	0.133** (0.0493)
SERV	-0.119 (0.0609)	-0.121 (0.0699)	-0.160* (0.0750)	-0.0742 (0.0720)
SERV*SS	0.224* (0.0878)	0.227* (0.0983)	0.356** (0.114)	0.142 (0.0969)
SERV*NS	-0.0176 (0.0762)	-0.00845 (0.0832)	0.0292 (0.0894)	-0.0669 (0.0879)
SERV*SN	0.185* (0.0775)	0.224** (0.0844)	0.252** (0.0880)	0.255** (0.0935)
Obs.	14640	14640	14640	14640

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. The baseline (SERV) is between developed countries (NN).
 $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Table A.6: Heterogeneous impact of services agreements by provisions (full sample)

	(1)	(2)	(3)	(4)
	Gross exports (total)	GVC-exports		
		Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.102* (0.0425)	0.103* (0.0474)	0.121* (0.0512)	0.0768 (0.0477)
SERV	-0.245* (0.108)	-0.182 (0.113)	-0.226* (0.0982)	-0.218 (0.123)
SERV*MFN	-0.0952 (0.0572)	-0.0701 (0.0632)	-0.174* (0.0749)	0.0363 (0.0606)
SERV*NT	0.132 (0.0827)	0.139 (0.0808)	0.149 (0.0838)	0.104 (0.0829)
SERV*NonEst	0.197*** (0.0530)	0.212*** (0.0554)	0.202** (0.0636)	0.205*** (0.0561)
SERV*Move	0.00571 (0.133)	-0.0886 (0.134)	-0.00464 (0.129)	-0.0228 (0.142)
<i>Obs.</i>	14516	14516	14516	14516

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. *MFN*=1 if the services agreement contains an MFN clause. *NT*=1 if the services agreement contains a national treatment clause. *NonEst*=1 if the services agreement explicitly grants the right of non-establishment (i.e. if it allows the provision of services without local presence). *Move*=1 if the services agreement allows the movement of natural persons in the provision of services. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.7: Heterogeneous impact of services agreements by income group (controlling for RTA age)

	(1)	(2)	(3)	(4)
	Gross exports (total)	Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.142*** (0.0422)	0.154** (0.0481)	0.117* (0.0460)	0.185*** (0.0548)
SERV	-0.118 (0.0620)	-0.121 (0.0707)	-0.159* (0.0760)	-0.0693 (0.0712)
SERV*SS	0.242** (0.0900)	0.260** (0.0999)	0.349** (0.114)	0.199* (0.1000)
SERV*NS	0.0206 (0.0750)	0.0332 (0.0822)	0.0525 (0.0902)	-0.0149 (0.0872)
SERV*SN	0.242** (0.0756)	0.276** (0.0849)	0.290** (0.0881)	0.325*** (0.0944)
RTA_age	-0.00489 (0.0107)	-0.0123 (0.0116)	0.00693 (0.0115)	-0.0279* (0.0131)
Obs.	12320	12320	12320	12320

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. The baseline (SERV) is between developed countries (NN). $RTA_age=1$ in year t if t is the first year for the country pair to have $RTA=1$. RTA_age varies from 1 to 4 since there are four years included in the analysis. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$

Table A.8: Heterogeneous impact of services agreements by provisions (controlling for RTA age)

	(1)	(2)	(3)	(4)
	Gross exports (total)	GVC-exports		
		Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.131** (0.0458)	0.135** (0.0511)	0.127* (0.0520)	0.130* (0.0543)
SERV	-0.0661 (0.0770)	-0.0328 (0.0965)	-0.0578 (0.0636)	-0.0863 (0.122)
SERV*MFN	-0.117* (0.0571)	-0.0935 (0.0633)	-0.182* (0.0732)	-0.00297 (0.0628)
SERV*NT	0.138 (0.0815)	0.149 (0.0807)	0.143 (0.0828)	0.133 (0.0828)
SERV*NonEst	0.184*** (0.0541)	0.206*** (0.0565)	0.189** (0.0634)	0.210*** (0.0577)
SERV*Move	-0.160 (0.109)	-0.227 (0.120)	-0.162 (0.104)	-0.152 (0.140)
RTA_age	-0.00266 (0.0108)	-0.00873 (0.0118)	0.00990 (0.0118)	-0.0228 (0.0130)
Obs.	12221	12221	12221	12221

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. *MFN*=1 if the services agreement contains an MFN clause. *NT*=1 if the services agreement contains a national treatment clause. *NonEst*=1 if the services agreement explicitly grants the right of non-establishment (i.e. if it allows the provision of services without local presence). *Move*=1 if the services agreement allows the movement of natural persons in the provision of services. *RTA_age*=1 in year t if t is the first year for the country pair to have *RTA*=1. *RTA_age* varies from 1 to 4 since there are four years included in the analysis. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.9: Heterogeneous impact of services agreements by income group (controlling for RTA wave)

	(1)	(2)	(3)	(4)
	Gross exports (total)	Intermediate goods	GVC-exports	
			Backward (sourcing)	Forward (selling)
RTA	0.177*** (0.0472)	0.184*** (0.0536)	0.166** (0.0524)	0.229*** (0.0615)
SERV	-0.113 (0.0629)	-0.112 (0.0721)	-0.159* (0.0773)	-0.0549 (0.0724)
SERV*SS	0.258** (0.0892)	0.267** (0.0993)	0.379*** (0.113)	0.182 (0.0975)
SERV*NS	0.0275 (0.0746)	0.0359 (0.0819)	0.0665 (0.0891)	-0.0259 (0.0852)
SERV*SN	0.250*** (0.0747)	0.279*** (0.0840)	0.304*** (0.0860)	0.313*** (0.0924)
RTA*y2000	-0.0540* (0.0252)	-0.0561* (0.0270)	-0.0549 (0.0303)	-0.0988** (0.0315)
RTA*y2005	-0.00686 (0.0377)	-0.00906 (0.0419)	-0.0101 (0.0427)	-0.0401 (0.0457)
RTA*y2011	-0.0743 (0.0383)	-0.0894* (0.0418)	-0.0537 (0.0433)	-0.141** (0.0482)
Obs.	12320	12320	12320	12320

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. The baseline (SERV) is between developed countries (NN). y2000 if a dummy variable equal to one if $t=2000$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.10: Heterogeneous impact of services agreements by provisions (controlling for RTA wave)

	(1)	(2)	(3)	(4)
	Gross exports (total)	GVC-exports		
		Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.170*** (0.0508)	0.170** (0.0562)	0.189** (0.0596)	0.183** (0.0595)
SERV	-0.0679 (0.0781)	-0.0291 (0.0970)	-0.0632 (0.0657)	-0.0867 (0.117)
SERV*MFN	-0.119* (0.0574)	-0.0913 (0.0634)	-0.193* (0.0750)	0.0128 (0.0607)
SERV*NT	0.146 (0.0815)	0.155 (0.0805)	0.158 (0.0828)	0.130 (0.0831)
SERV*NonEst	0.191*** (0.0538)	0.213*** (0.0562)	0.195** (0.0639)	0.213*** (0.0569)
SERV*Move	-0.156 (0.110)	-0.227 (0.120)	-0.158 (0.104)	-0.143 (0.137)
RTA*y2000	-0.0560* (0.0254)	-0.0581* (0.0273)	-0.0598* (0.0302)	-0.107*** (0.0315)
RTA*y2005	-0.0133 (0.0387)	-0.0162 (0.0429)	-0.0291 (0.0444)	-0.0509 (0.0459)
RTA*y2011	-0.0736 (0.0396)	-0.0890* (0.0430)	-0.0553 (0.0446)	-0.146** (0.0491)
Obs.	12221	12221	12221	12221

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. *MFN*=1 if the services agreement contains an MFN clause. *NT*=1 if the services agreement contains a national treatment clause. *NonEst*=1 if the services agreement explicitly grants the right of non-establishment (i.e. if it allows the provision of services without local presence). *Move*=1 if the services agreement allows the movement of natural persons in the provision of services. *y2000* if a dummy variable equal to one if $t=2000$. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.11: Heterogeneous impact of services agreements by income group (controlling for time-varying effects of distance)

	(1)	(2)	(3)	(4)
	Gross exports (total)	Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.137*** (0.0389)	0.131** (0.0450)	0.144** (0.0453)	0.137** (0.0500)
SERV	-0.135* (0.0620)	-0.137 (0.0708)	-0.172* (0.0740)	-0.0862 (0.0747)
SERV*SS	0.246** (0.0898)	0.261** (0.100)	0.345** (0.116)	0.178 (0.0994)
SERV*NS	0.0298 (0.0752)	0.0411 (0.0825)	0.0504 (0.0895)	-0.0169 (0.0880)
SERV*SN	0.251** (0.0762)	0.284*** (0.0855)	0.288*** (0.0871)	0.321*** (0.0952)
ln(dist)*y2000	-0.00501 (0.00932)	-0.00365 (0.00979)	-0.0195 (0.0119)	0.0175 (0.0113)
ln(dist)*y2005	-0.0525*** (0.0152)	-0.0576*** (0.0166)	-0.0675*** (0.0164)	-0.0300 (0.0181)
ln(dist)*y2011	-0.0231 (0.0165)	-0.0194 (0.0180)	-0.0558*** (0.0169)	0.00551 (0.0201)
Obs.	12320	12320	12320	12320

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. The baseline (SERV) is between developed countries (NN). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.12: Heterogeneous impact of services agreements by provisions (controlling for time-varying effects of distance)

	(1)	(2)	(3)	(4)
	Gross exports (total)	GVC-exports		
		Intermediate goods	Backward (sourcing)	Forward (selling)
RTA	0.130** (0.0415)	0.118* (0.0468)	0.157** (0.0503)	0.0891 (0.0485)
SERV	-0.0601 (0.0775)	-0.0255 (0.0956)	-0.0555 (0.0657)	-0.0845 (0.120)
SERV*MFN	-0.110 (0.0566)	-0.0823 (0.0630)	-0.167* (0.0741)	0.0220 (0.0613)
SERV*NT	0.129 (0.0826)	0.133 (0.0816)	0.144 (0.0833)	0.0974 (0.0836)
SERV*NonEst	0.192*** (0.0533)	0.212*** (0.0557)	0.193** (0.0636)	0.204*** (0.0568)
SERV*Move	-0.178 (0.110)	-0.240* (0.120)	-0.188 (0.104)	-0.146 (0.140)
ln(dist)*y2000	-0.00495 (0.00925)	-0.00379 (0.00970)	-0.0182 (0.0117)	0.0175 (0.0112)
ln(dist)*y2005	-0.0526*** (0.0151)	-0.0579*** (0.0165)	-0.0648*** (0.0164)	-0.0308 (0.0178)
ln(dist)*y2011	-0.0260 (0.0167)	-0.0237 (0.0182)	-0.0575*** (0.0169)	-0.000154 (0.0203)
Obs.	12221	12221	12221	12221

Standard errors clustered by country pairs in parentheses. All specifications include exporter-year, importer-year, and country pair fixed effects, and are estimated using PPML. *MFN*=1 if the services agreement contains an MFN clause. *NT*=1 if the services agreement contains a national treatment clause. *NonEst*=1 if the services agreement explicitly grants the right of non-establishment (i.e. if it allows the provision of services without local presence). *Move*=1 if the services agreement allows the movement of natural persons in the provision of services. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$