Preferential Trade Agreements and Manufactured Goods Exports: Does It Matter Whom You PTA With?

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ABSTRACT

This paper explores two questions. First, can Preferential Trade Agreements (PTAs) affect industrial development in developing countries? Second, does it matter for developing countries whom they sign the PTAs with? We find that the answer to both questions is yes. Using bilateral manufactured goods exports data from 28 developing countries during 1978-2005, we find that South-South PTAs have a significantly positive effect on manufactured goods exports. In contrast, no such effect is detected in the case of South-North PTAs. We confirmed the robustness of these findings to estimation methodology, sample selection, time period, zero trade flows, and multilateral trade resistance.

JEL Classification Codes: F13; F14; F15; O14; O24; L60

Keywords: Manufactured goods exports; Preferential Trade Agreements; South-South and South-North trade; Gravity equation; Industrial development; Developing countries

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1. INTRODUCTION

The number of Preferential Trade Agreements (PTAs) and the share of preferential trade in world trade have increased significantly since the 1990s. At least 197 PTAs were formed during 1990-2010 (accounting for 32% of world trade), exceeding the total number of PTAs signed in the previous 50 years (numbering 23) (Medvedev, 2010; WTO, 2011). Moreover, a growing number of these PTAs are signed among developing countries, reaching a total of 110 during this period (compared to 78 for South-North and 9 for North-North PTAs). This growing importance of PTAs in world trade re-ignited the academic interest on the subject. An Econlit search yields 521 published journal articles on PTAs since 1990.[1] Despite the diversity of research on the topic, however, we still do not know whether PTAs induce any changes in the structure of trade and production patterns across countries. Likewise, we know little about the trade effects of different types of PTAs, in particular, South-South and South-North PTAs, which together account for more than 95% of PTAs signed since 1990. In this study we extend the existing research in two new dimensions. First, we consider the developmental impacts of PTAs on developing countries and focus on the changes in manufactured goods trade, as opposed to total merchandise trade. Second, we explore whether the trade and development effects of PTAs between developing countries are any different than those between developing and developed countries.

Despite the growing research on PTAs, these two questions received little attention in the literature. As numerous studies in development economics and the new trade theory convincingly show, what you export matters for long term development and growth (Myrdal, 1956; Kaldor, 1967; Lewis, 1980; Amsden, 1987; Lall and Ghosh, 1989; Antweiler and Trefler, 2002; An and Iyigun, 2004; Hausmann et al., 2007). However, empirical cross-country studies of

PTAs usually focus exclusively on aggregate trade effects without examining the changes in the structure of trade. The few studies that do so are typically country or region specific case studies (Yeats, 1998; Egoume-Bossogo and Mendis, 2002; Lee and Park, 2005). Likewise, despite the resurgence in research looking at the differential effects of South-South integration in trade and finance (Kowalski and Shepherd, 2006; World Bank, 2006; Akin and Kose, 2008; Demir and Dahi, 2011), this line of work is not yet extended to the case of PTAs. While the theoretical literature on South-South regionalism has in retrospect been pessimistic (Schiff and Winters, 2003; Venables, 2003), new evidence emerging from various studies shows the South-South trade to be dynamic, and with a significant developmental potential (UNIDO, 2004; WTO, 2003; Kowalski and Shepherd, 2006; World Bank, 2006; Demir and Dahi, 2011). The question whether developing countries are developmentally better off engaging in North-South or South-South PTAs, however, remains an empirical one that is yet to be answered. To our knowledge, no cross-country empirical examination of PTAs has tackled this important question.

We should point out that in this study we will not be exploring the question of trade diversion resulting from the formation of PTAs.[2] Having said this, however, we note that that since the North-North, South-North and North-South trade barriers have been shown to be significantly lower than the ones present in South-South trade (Kowalski and Shepherd, 2006, also see Kee et al., 2009), it is unlikely that South-South PTAs are trade diverting from the North, which has retrospectively been the main point of contention among trade theorists on the relative costs and benefits of South-South PTAs.[3] Moreover, consistent with Mundell (1968)'s assertion that "a member's gain from a free-trade area will be larger the higher are the initial tariffs of partner countries", South-South trade barrier reduction is found to generate a significant increase in South-South exports, while no such effect is reported in the case of North-South,

South-North, or North-North trade (Kowalski and Shepherd, 2006). There is also some empirical evidence showing that South-South PTAs are no more trade diverting than other PTAs (Cernat, 2001). Furthermore, since higher transportation costs and former colonial linkages with Northern countries (which always appear to be significant in Gravity models of trade)[4], in addition to higher trade barriers (Kee et al, 2009), continue to limit South-South trade expansion (Kowalski and Shepherd, 2006), PTAs might be seen as a way of compensating for such trade barriers that are lower in South-North, North-South or North-North trade.

Using the Gravity model approach to trade and employing the bilateral manufactured goods exports data from 28 developing countries to 241 importing countries (that account for more than 80% of developing country manufactured goods exports) during 1978-2005, we find that South-South PTAs have a significantly positive effect on manufactured goods exports of developing countries. In contrast, no such effect is detected in the case of South-North PTAs. According to point estimates, South-South PTAs increase developing country manufactured good exports by 35% in one year (or, under different specifications, in the range of 13% - 61%). In contrast, developing countries, which have PTAs with the North either end up suffering an annual loss equal to 45% of their manufactured goods exports, or, depending on the specification, experience no significant change in their exports. We confirmed the robustness of our findings using a rich battery of robustness tests taking into account the sensitivity of our parameter estimates to the estimation methodology, sample selection, time period, zero trade flows, and multilateral trade resistance.

The organization of the paper is as follows: The next section provides a brief literature review of the PTAs, South-South trade, and the importance of the structure of trade. The third

section introduces the methodology and data. The fourth section presents the empirical results followed by a discussion of the robustness tests. The final section concludes.

2. Preferential Trade Agreements, Industrial Development and Global Trade

There has been a radical increase in the number of PTAs across countries since 1990s, with the South-South PTAs accounting for a majority of them. A similar trend took place with regard to the share of developing countries in world manufactured goods trade. Between 1978 and 2005 the share of the South in world manufactures exports increased from 5% to 32% while that of South-South manufactures exports reached 16% from 2%. During this period the annual growth rate of real South-South manufactures exports was significantly higher than the world average reaching 14% as opposed to 6% for the latter. Furthermore, as of 2005 51% of developing country manufactures exports were exported to other developing countries (COMTRADE).[5]

Nevertheless, despite the significant increase in South-South trade integration and their share in world trade, academic research on the determinants and desirability of PTAs remains divided (Bhagwati, 1998; Panagariya, 2000; Baier and Bergstrand, 2004; Magee, 2008). The trade literature long argued that PTAs can benefit member states through economies of scale and comparative advantage, as well as higher competition (Schiff, 2003). However, these arguments are generally reserved for North-North and South-North but not South-South PTAs. First, it is argued that similar production and trade structures in the South make it more difficult to benefit from economies of scale. Second, given the lower industrial development and research and development activities in the South, greater technology diffusion for the Southern country can be reaped from South-North integration (Schiff and Wang, 2008).[6] Third, the more advanced members are argued to be the likely winners in South-South integration, thanks to their higher industrial and institutional development. As a result, lower income Southern countries might be

better off entering South-North PTAs. It is also claimed that industries with long term development potential are more likely to move to the bigger and richer members leading to divergence once the barriers are lowered (or removed) under South-South PTAs (Puga and Venables, 1997; Venables, 2003; Schiff, 2003).

In contrast, the classical trade and development literature had a more positive view of South-South PTAs, focusing on their developmental benefits through infant industry development, economies of scale, and decoupling rather than on the static welfare gains (from trade creation and diversion), or the 'stumbling block/building block" dichotomy (Meade, 1956; Myrdal, 1956; Lipsey, 1960; Linder et al., 1967; Lewis, 1980). Myrdal (1956), for example, suggested that regional integration in the South can help developing countries overcome local market size limitations during industrialization. Accordingly, given the strongly skill biased structure of output expansion in international trade (Antweiler and Trefler, 2002), increasing market size can help developing countries enjoy scale effects and increase the skill content of their exports while reducing the cost of intermediaries, which can help stimulate increasing export penetration into Northern markets in industrial goods (Fugazza and Robert-Nicoud, 2006). Likewise, Lewis (1980), and more recently UNCTAD (2005) and World Bank (2008) also pointed out that South-South trade can reduce the growth dependence of the South on Northern growth, leading perhaps to decoupling from Northern business cycles.[7] Furthermore, the structure of South-South trade is argued to have dynamic and long term benefits for developing countries due to its comparatively higher technology and human capital intensive factor content (Amsden, 1987; Lall and Ghosh, 1989; Demir and Dahi, 2011). Besides, similarity in production pattern and resource base may facilitate appropriate technology transfer (Amsden, 1980, 1987; UNIDO, 2005; World Bank, 2006).[8]

In addition to the debate above, the effects of PTAs on the structure of trade are of particular importance for long term development and growth. Development economics and the new trade theory provide strong evidence that not all trade is equal and what you export matters for long term economic performance (Kaldor, 1967; An and Iyigun, 2004; Hausmann et al., 2007). Exports in more technology intensive industries are likely to generate larger spillovers (such as innovation and physical and human capital accumulation) and linkages for development than lower technology and labor intensive ones (Hausman et al., 2007). Earlier on, this point was also raised by Kaldor (1967) in his three growth laws; which stated that there is a strong positive relationship between the growth of manufacturing output and i) the growth of GDP, ii) the growth of labor productivity in manufacturing (i.e. the Verdoorn's law), and iii) the growth of productivity in non-manufacturing sectors. Note that the question we raise here is different than the one usually discussed in the literature, which is whether PTAs are trade creating or diverting. To the extent that PTAs enhance manufactures exports and industrial development, then we can start evaluating the success or failure of PTAs according to their long term developmental impacts rather than simply by static trade creation/diversion effects.

Turning to the empirical work on PTAs, the majority of research reports a significantly positive effect of PTAs on member trade. Cipollina and Salvatici (2010) review 85 papers including 1,827 point estimates on the effects of PTAs and find that the mean effect is 0.59 (or an 80% increase in trade) while the median is 0.38 (or a 46% increase in trade). While the range of coefficient estimates is quite large (-9.01 - 15.41), only 312 estimates out of 1,827 reported negative effects. Nevertheless, despite the diversity of research, there are only few studies that compare heterogeneous effects of PTAs within and between developing and developed countries. Among the few, Medvedev (2010), using a cross sectional analysis, reports that while North-

North PTAs are insignificant in stimulating preferential trade, North-South PTAs increase trade by 40% and South-South PTAs increase them by 163%. Moreover, Kowalski and Shepherd (2006) argue that South-South trade barrier reduction generates a significant increase in South-South exports, while no such effect is present in the case of North-South, South-North, or North-North trade. At the regional level, Soloaga and Winters (2001) report heterogeneous effects of nine PTAs on intra-bloc trade during 1980-1996. While all Latin American PTAs are found to have positive and significant effects on member trade, PTAs within the EU are found to have significantly negative effects, and NAFTA, EFTA, and ASEAN are found with negative effects at changing significance levels. The empirical work on the structure of trade under PTAs has also been scarce. Sanguinetti et al. (2010) examine the impact of PTAs on South-South manufacturing production patterns in the case of MERCOSUR for the period of 1985-1998 and find that South-South PTAs cause a spatial regional reorganization of production along the lines of internal comparative advantage. Likewise, Chemsripong et al. (2009) study Thailand's intra-industry (IIT) trade in manufactures with its APEC trading partners during 1980-1999, and find that the larger the gap in economic size and income, the lower the IIT.

We now move to the next section where we present the empirical methodology.

3. EMPIRICAL METHODOLOGY

In our analysis of the developmental effects of South-South and South-North PTAs, we estimate the following theoretically-consistent gravity model, adopted from Rose and van Wincoop (2001), Anderson and van Wincoop (2003), Rose (2004) and Baier and Bergstrand (2007):

$$X_{ijt} = \beta_0 (RGDP_{it})^{\beta_1} (RGDP_{jt})^{\beta_2} (Dist_{ij})^{\beta_3} (Area_i * Area_j)^{\beta_4} e^{\beta_5 (Lang_{ij})} e^{\beta_6 (Adj_{ij})} e^{\beta_7 (LandL_{ij})}$$
$$e^{\beta_8 (ComCol_{ij})} e^{\beta_9 (CurCol_{ij})} e^{\beta_{10} (Colony_{ij})} e^{\beta_{11} (ComNat_{ij})} e^{\beta_{12} (D_{ijt})} e^{\gamma_1 (PTA\_N_{ijt})} e^{\gamma_2 (PTA\_S_{ijt})} \varepsilon_{ijt} \quad (1)$$

Where X_{ijt} is the (non-zero) real manufactured good exports from country *i* to country *j* at time *t*. GDP_i and GDP_j are the real GDPs of country *i* and *j*[9], *Dist* is the (km) distance between the *i* and *j*, *Lang* is a binary dummy variable equal to 1 if *i* and *j* share a common language, and 0 otherwise, *Area* is the area of country *i* and *j* (in square km.), *Adj* is a binary variable equal to 1 if *i* and *j* share a common border, and 0 otherwise, *Landl* is the number of landlocked countries in the country pair (0, 1, 2), *ComCol* is a binary variable equal to 1 if *i* and *j* had a common colonizer after 1945, *CurCol* is a binary variable equal to 1 if *i* and *j* are in a colonial relationship, *Colony* is a binary variable equal to 1 if *i* and *j* have ever had a colonial link after 1945, *ComNat* is a binary variable if *i* and *j* were the same country, D_{ijt} is a vector of time, country, and country pair fixed effects. Finally, PTA_N_{ijt} and PTA_S_{ijt} are binary variables equal to 1 if country *i* has a preferential trade agreement with a Northern or Southern country *j* at time *t*. ε represents the normally distributed error term capturing omitted other influences on trade.

In equation (1) γ_1 and γ_2 are the key parameters of interest that we want to explore to determine whether South-South and South-North PTAs have different effects on manufactured goods trade. In the benchmark model (using a panel structured as country-pair and time) we estimate the gravity equation using the OLS with country-pair robust standard errors and year fixed effects (to control for such changes as exchange rates, world business cycle, etc.). For robustness, we also employed fixed effects, random effects, GMM, PPML and Tobit estimators.

We should point out that, in addition to the research question at hand, our estimation of equation (1) has several distinctive features: First, X_{ijt} here is deflated by country specific average manufactured goods export prices (P_{it}) (as a proxy for the bilateral export prices), rather than US consumer or producer price deflator ($P_{US,t}$), as is almost always done in the literature (the so called 'bronze medal mistake' coined by Baldwin and Taglioni, 2006).[10] In addition, to

account for global shocks, apart from those through global inflation trends, we also include time fixed effects. Secondly, given the focus of our study, we have the bilateral exports from major developing economies as the left hand side variable. Therefore, our left hand side variable is consistent with the theoretical basis of the gravity equation, which explains only one-way trade flows between source and destination countries (Anderson and van Wincoop, 2003). This feature not only helps us avoid the 'silver medal mistake' but also allows us to have a much more disaggregated and larger sample, limiting the possibility of multicollinearity and aggregation bias (Wooldridge, 2002; Yu, 2010).[11] Thus, this is one of the most comprehensive trade datasets employed in the current literature and includes bilateral manufactured goods exports from 28 countries up to 241 countries between 1978 and 2005.

The question on the multilateral price terms remains to be discussed. First, unlike previous research we directly take into account the exporting country prices via the measurement of the export volumes. However, because of data availability problems the importing country price terms are excluded in the benchmark regressions. We also do not include country-time dummies in the benchmark regression to control for multilateral price terms. The reason is that given the large number of trading partners we have, including time variant country fixed effects would require us to include 28 x 28 (784) plus 28 x 241 (6,748) dummy variables for *it* and *jt* (in addition to 5,321 country-pair dummies for *ij*), which would put significant pressure on our data and estimation.

Nevertheless, we also undertake several sensitivity tests to check the robustness of our findings to the exclusion of multilateral price terms. First, similar to Rose and van Wincoop (2001), Baier and Bergstrand (2007), and Yu (2010), we report the benchmark results using country pair fixed effects, which are expected to reduce the 'golden medal bias' created by the

possible correlation between the omitted variables (such as the multilateral price terms) and the trade-cost terms. We should note, however, that using country pair effects results in downward bias in the estimated effect of PTAs on trade between two partners. Second, we split the sample into different time periods to provide partial control for the time variant price effects. Third, we try to control directly for the multilateral price effects by including effective real exchange rates for country *i* and *j* at time *t*. Last, we experiment with the Arellano and Bover (1995) and Blundell and Bond (1998) system GMM estimator with a dynamic specification to account for possible endogeneity, reverse causality and path dependence. If all these fail, the bias created by the omission of multilateral trade resistance term is found to be downward, reducing the likelihood of finding a positive and significant estimate (Cipollina and Salvatici, 2010).

(a) Data

We carry out our empirical investigation using annual bilateral manufactures exports data (SITC 5-8) from the U.N. Commodity Trade Statistics Database (COMTRADE) for 28 emerging economies for the period of 1978-2005. The sample includes 11 countries from Latin America (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Paraguay, Uruguay, Venezuela), 1 country from Europe and Central Asia (Turkey), 6 countries from the Middle East and North Africa (MENA) (Algeria, Egypt, Jordan, Morocco, Syria, Tunisia), and 10 countries from East and South East Asia (China, Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, Singapore, South Korea, Thailand). In choosing these countries, the following factors were considered: a) the presence of a sufficiently diversified production and export structure, b) the availability of data, and c) regional representation to avoid sampling bias. Our choice of the time period analyzed is conditioned by data availability. The final dataset is a panel of 77,197 country-year observations from 4,908 country pairs including 28 exporters and 241

importers. The 28 countries in the sample account for 82% of all developing country manufactures exports to the rest of the world (126-226 countries), and 76% of all South-South exports during 1978-2005. We also note that during this period the sample countries' share in global manufactures exports increased significantly, reaching 29% in 2005 from 4% in 1978.

The export data are expressed in current US dollars and we employ country specific export price deflators (from WDI, IFS, and national statistical institutes) to generate real exports. The standard gravity variables are from CEPII, CIA's World Factbook, and Rose (2004). The population and GDP data are from WDI, and, when missing, from IFS, Penn World Table (PWT 6.3), and United Nations statistics. In our investigation the North includes all high-income OECD countries while the South includes all low and middle income countries according to the World Bank definitions. The income and regional classifications are from the World Bank. The data on PTAs are from WTO Regional Trade Agreement Database and Baier and Bergstrand (2007), and include (numbers in parenthesis): bilateral PTAs (50), PTAs with European Union countries (8) (we treat these as a single agreement since all EU PTAs are negotiated as a single body with new members automatically joining the existing PTAs), AFCOM (African Common Market), ANDEAN (Andean Community), APTA (Asia Pacific Trade Agreement), ASEAN (Association of Southeast Asian Nations), CACM (Central American Common Market), COMESA (Common Market for Eastern and Southern Africa), EFTA (European Free Trade Association), Group of Three, LAIA (Latin American Integration Association), MERCOSUR (Southern Common Market), NAFTA (North American Free Trade Agreement), PAFTA (Pan Arab Free Trade Agreement), PTN (Protocol on Trade Negotiations), SAPTA (South Asian Preferential Trade Arrangement.[12]

Table 1 provides the basic summary statistics for the sample used in the regressions. We can see that PTAs are dominated by South-South PTAs even though, as the later figures show, South-North PTAs are also increasingly having a prominent role. Figure 1 shows the total number of trading partners our 28 sample countries have PTAs with. As is clear from the figure, the number of South-South PTAs is significantly more than South-North, even though the latter has increased significantly after mid-1990s. As discussed earlier, the majority of the South-South and South-North PTAs both in our sample and for the rest were launched in the aftermath of the liberalization and globalization wave of the 1980s and 1990s. Figure 2 also highlights the significant change in trade patterns under PTAs during the 1990s. While the share of PTA trade (in total manufactures trade) for our sample countries was less than 5% up until 1992, it increased to 75% by 2005. On the other hand, while more than 99% of the PTA trade of the sample was with other Southern countries up until 1994, its share steadily dropped to a low of 49% in 1999 before climbing up to 72% in 2005.

<Insert Table 1, Figure 1 and Figure 2 Here >

Table 2 shows the regional distribution of trade flows and PTAs. Accordingly, while observations on trade flows are proportionally distributed across different regions, this is not the case for PTAs. While 78% of all South-North PTAs in the sample are with European countries (thanks to the fact that EU negotiates PTAs as a single body), 47% of all South-South PTAs are with Latin American countries. In Table 3 we also see that while inter-regional PTAs are important, intra-regional trade agreements account for a significant portion of South-South and South-North PTAs. For example, almost 50%, 77%, and 53% of all South-South PTAs in East Asia, Latin America and Middle East are intra-regional.

<Insert Table 2 & 3 Here >

4. EMPIRICAL RESULTS

Table 4 presents benchmark regression results where the default estimation is OLS with year fixed effects and robust standard errors (clustered by country pair) (column 2), followed by alternative estimations using time and country fixed effects (3), bilateral fixed effects (4), bilateral and time fixed effects (5), random effects (6), random effects and time fixed effects (7). The time fixed effects here captures not the global inflation patterns or changes in price deflators (since the export values are deflated by country specific export price indexes) but global shocks to trade. Columns (3) - (5) address any omitted time-invariant country or country-pair fixed effects, (including any time-invariant part of multilateral resistance term) (Anderson and van Wincoop, 2003). Columns (6) and (7) present the random effects estimator, which assumes that unobserved country pair specific effects are uncorrelated with the explanatory variables.[13] In column (8) we explore the potential bias created by censoring at zero trade in our estimations. Given the time length and the number of trading partners, we have a large number of missing and zero observations. The question then is how we should treat missing and zero observations? Are the missing observations simply mean zero trade or just missing? The common way of eliminating zero trade flows (i.e. truncation of the sample) and taking the log-linearization may create some bias in estimations, especially in the presence of heteroskedastic errors (Silva and Tenreyro, 2006). To address both issues, similar to Glick and Taylor (2010), we first input zeros for all missing data and use the trade levels rather than logs. Second, we employ the Poisson pseudo-maximum likelihood (PPML) estimator à la Silva and Tenreyro (2006).[14] The results with these adjustments are reported on column (8). Table 4 also presents results for the traditional gravity effects (fixed effect estimates are omitted for brevity). Moreover, for

comparison purposes, in the first row of Table 4 we report results for the PTA effect without separating it into South-South and South-North PTAs.

<Insert Table 4 Here >

Overall, it appears that the model works quite well. The standard gravity variables all appear with the expected signs at significant levels, and within the range of standard coefficient estimates in the literature. Countries with higher incomes, common borders, official common language, common colonial past or linkages trade significantly more with each other.[15] On the other hand, countries, which are distant, large in size, and landlocked trade less. Overall the model explains more than half of the variation in manufactures exports of 28 sample countries.

The key question is once we account for the standard gravity effects, do we still observe any significant effect of PTAs? Surprisingly, the answer is that 'it depends". That is, once we separate PTAs into South-South and South-North, we find that the effects do indeed differ. The top row (PTA) (including the same set of -unreported - gravity controls) presents the familiar result commonly found in previous studies regarding the PTA effect on trade. Here we find similar results to those in the literature, a significant effect.[16] However, once we separate them into South-South and South-North, the results differ significantly. In fact, in the benchmark regression, the effect of South-North PTAs turns negative, or become insignificant (except in model (4) at 10% level[17]). In contrast, the South-South PTAs are found to have an economically and statistically significant effect (at more than 1% level), with a coefficient estimate of 0.296 in the benchmark regression (2) (or in the range of 0.118-0.474 depending on specification). The coefficient estimates suggest that the signing of a South-South PTA increases country *i*'s manufactured good exports by 35% ($e^{0.296}$-1) (or in the range of 13% - 61%) a year. Even the smallest coefficient in Table 4 (0.118) suggests that countries within South-South PTA blocks

trade 13% a year more than those outside. In contrast, countries, which have PTAs with the North either end up suffering a loss equal to 45% ($e^{-0.597}$-1) of their manufactured goods exports a year, or experience no significant change in their exports ((3) – (8)). In other words, South-North PTAs reduce developing country manufactures exports by almost half in one year.

(a) Sensitivity analysis

The results from benchmark regressions are very consistent and have significant policy implications for developing countries. In this section, we explore the sensitivity of our findings to time period, sample selection, and estimation methodology. First we check the sensitivity of our results to the time period. Compared to aggregate manufactures exports data, the bilateral data have disproportionally high missing observations prior to 1981. Therefore we replicated Table 5 for the post-1980 period when the mapping of country-pair representation is significantly better.[18] The results from Table 5 confirm our initial findings. South-South PTAs continue to have a significantly positive effect on manufactured goods exports while South-North PTAs appear either with a negative or insignificant effect. In columns (7) and (8) we repeat the exercise for the post 1989 and 1995 periods as well. The post 1989 period marks the date of economic liberalization programs (including trade and finance) in most developing countries. The post-1995 period marks the accession to the WTO for a large number of countries. This exercise can also work as a robustness test for changes in the multilateral resistance effects in the benchmark gravity model. After these time restrictions, we continue to find strong support to our benchmark findings suggesting a significantly positive South-South FTA effect and an insignificant or negative South-North PTA effect. We also note that the marginally significant yet positive effect of South-North PTAs found with country-pair and time FE model in column (5) of Table 4 disappeared here in column (4). Moreover, columns (7) – (8) suggest that the

positive effect of South-South PTAs did actually increase during the post-1989 period. Economically speaking, both in the post 1989 and post-1995 periods a South-South PTA almost doubled the manufactured goods exports of a developing country in two years.

<Insert Table 5 Here >

What if we force the income elasticities to unity, as suggested by theoretical research on gravity modeling, despite the fact that they are significantly different from unity? Columns (1) - (5) in Table 6 replicate Table 4 using the log of 'real bilateral exports divided by the product of real GDPs' (except for column (5) where the dependent variable is without the log) as in Baier and Bergstrand (2007). The results are highly supportive of our earlier findings. We then proceed to take directly into account the multilateral price terms using a proxy measured by annual average effective real exchange rates. We note, however, that, because of data limitations we lose 14% of the observations in this exercise.[19] Columns (6) and (7) present estimation results with and without enforcing the unitary income elasticity assumption. The findings are again supportive of earlier estimates.

<Insert Table 6 Here >

In the following sensitivity tests, for the sake of brevity, the results are reported only for the effects of PTAs, without other gravity controls. All regressions are run using the OLS with time fixed effects, and standard errors robust to country pair clustering. In an online appendix, we present all (reported and unreported) robustness tests with full results (both for the benchmark regression and other specifications as in Table 4).

In Table 7 we check the sensitivity of our results to the income levels of the importing countries. Our definition of North already controls for all high income OECD countries. However, results may still differ between OECD and Non-OECD high income countries.

Besides, Southern countries are not a homogeneous block and South-South PTAs may have heterogeneous effects on developing countries at different levels of development. Table 7 repeats default estimates first for different cuts of the sample, and later for the entire sample using total PTA interactions with the income groups. The results are supportive of our earlier findings. First, we failed to find any robust or significant effect of a PTA signed between a developing country and either a high income OECD or non-OECD country.[20] In contrast, PTAs signed with middle income countries, in particular lower middle income, have significant trade enhancing effects. We continue to find similar results once we interact the total PTA dummy with different income groups. This time PTAs signed with low income, and lower middle income appear to have significant trade enhancing effects, while the opposite is true for PTAs with high income non-OECD countries. PTAs with high income OECD again appear with a negative but insignificant effect. The full sample estimates suggest that PTAs signed with low income and lower middle income countries increase emerging country exports to these markets by 54% ($e^{0.434}$-1) and 78% ($e^{0.575}$-1) in one year. If we merge lower and upper middle income countries (middle income) as in column (3), then the effect becomes 38% ($e^{0.323}$-1).

<Insert Table 7 Here >

Next, we check whether the results are affected by regional differences. In Table 8, we report results after excluding one region at a time from the sample. The results here are again very similar, except with the case of exclusion of MENA, which causes South-South effect to be significantly higher. This is not a surprising result given that inter and intra regional PTAs of the MENA region are reported to be notoriously weak and ineffective (Galal and Hoekman, 2003).

<Insert Table 8 Here >

Table 9 presents additional robustness tests against sample selection bias. We first exclude the poorest country pairs (5^{th}, 10^{th}, and 25^{th} percentiles) based on joint real GDP per capita levels. Next, we drop the smallest (5^{th}, 10^{th}, and 25^{th} percentiles) importing countries based on their real GDPs from the sample. Third, we drop the outlier observations by excluding those at the bottom 1^{st}, 5^{th}, 10^{th}, and 25^{th} percentiles.[21] All results confirm our initial findings. Fourth, we compared the aggregate manufactured goods exports data of country *i* from COMTRADE (using sum of bilateral exports) with those from WDI. Even though the trade data from COMTRADE are more complete than other sources such as IMF or WB (Baranga, 2009), as a sensitivity check, we dropped those observations where the absolute value of percentage difference between these two samples was more than 20% (and called it the *Database error)*. The results, as shown in the last row of Table 9, are similar to those presented earlier.

<Insert Table 9 Here >

We also test the sensitivity of our results to the estimation method, serial correlation problem, endogeneity and dynamic effects, and lagged PTA effects. Table 10 presents these results (using unreported full gravity controls and time fixed effects (results with alternative specifications are also available in an online appendix) using a robust median estimator, a Tobit estimator (excluding zero trading volumes across trading partners may cause omitted variable and selection bias as discussed in Silva and Tenreyro, 2006; Helpman et al., 2007; Cipollina and Salvatici, 2010) (with and without censoring at the bottom 1^{st}, 5^{th}, 10^{th}, and 25^{th} percentile of export levels), and the weighted least squares (using real GDPs as weights). Results are very similar to each other as well as to the previous estimates.

<Insert Table 10 Here >

We next utilize the Prais-Winsten and Cochrane-Orcutt method, which uses the GLS method taking into account possible autocorrelation. We also repeat this exercise using a random effects estimator with an AR(1) disturbance. The estimation results confirm our previous findings. In the following row, we check for dynamic trade effects, controlling for parameter endogeneity and reverse causality problems using the two-step system GMM dynamic panel data estimator by Arellano and Bover (1995) and Blundell and Bond (1998). Using the system GMM method we aim to control for any possible parameter endogeneity, state-dependence, and simultaneity bias as well as to correct for the correlation between the lagged dependent variable and country specific effects and the error term. We compute robust two-step standard errors by the Windmeijer finite-sample correction method.[22] Last, we check for the presence of a lagged PTA effect using the OLS (with time fixed effects), and Prais-Winsten and Cochrane-Orcutt method. In both cases, results are again similar to earlier findings.

5. CONCLUSIONS

The academic research on PTAs continues apace, with special attention given to whether or not they have any significant impact on trade. While contributing to this line of research, we make several departures in this paper from the earlier literature. First, we examine developmental impacts of PTAs by focusing on trade in manufactures rather than total merchandise goods. We argue that whether or not PTAs affect the structure of trade is a more pressing question for developing countries than their effect on aggregate trade. Second, unlike previous studies we do not presume that all PTAs, independent of the development level of the signing partners, have homogenous effects on member trade, and therefore we separate PTAs into two groups that are South-South and South-North (which account for more than 95% of all PTAs since 1990). In the empirical analysis we utilized the standard gravity model methodology for 28 developing

countries (that make up 80% of developing country exports in manufactures) and 241 importing partners over the 1978-2005 period. We find that, first, entering into a PTA has a positive and significant impact on sample country export of manufactures. This finding is in line with existing research on the "aggregate trade effects" of PTAs. However, once we separate PTAs into South-North and South-South, we find that only South-South PTAs have a robust, positive and significant impact on manufactures trade. In contrast, the trade effects of South-North PTAs are either insignificant or negative. The results remain robust withstanding a large variety of sensitivity tests. The coefficient estimates indicate that membership in South-South PTAs increase manufactures exports in the range of 13 – 61% a year whereas South-North PTA membership either does not significantly alter manufactures exports or decreases them by up to 45%. The empirical findings also suggest that developing countries benefit most from PTAs with lower and middle income countries, rather than with upper middle income partners.

We believe that our findings have significant policy implications for trade policy in developing countries. Thrasher and Gallagher (2008) shown that South-North PTAs severely restrict industrial and developmental policy space for developing countries. Arguably this may be the price Southern countries need to pay to have access to the Northern markets in industrial goods. However that argument loses its momentum if such market access is not in fact materializing, as our results suggest. Given that policy makers negotiating PTAs in the South have multiple goals in mind besides merely increasing trade volume, such as industrial development, production diversification and long run growth, our findings indicate that they might be better off entering South-South PTAs rather than South-North PTAs. Perhaps the large and growing number of South-South PTAs reflects an implicit (or explicit) understanding of this observation. We should note, however, that there are also new questions that arise from our

research, which demand exploration in future studies. First, our study focuses on the case of emerging countries that represent more than 80% of all developing country manufactured goods trade. As a result, while providing lessons and guidance, our findings cannot be directly generalized to the experiences of other developing countries at the lower ladders of development. Second, it would be interesting to apply our analysis to the case of certain sub-groups of manufactured goods, such as those classified as low, medium and high skill, allowing us to further deepen our understanding of the developmental impacts of PTAs.

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ENDNOTES

[1] We did the search on February 2, 2012 using the PTA, regional trade agreements, or multilateral trade agreements as a keyword in the abstracts or titles.

[2] For a discussion see Bhagwati et al. (1998), and Panagariya (2000). Also note that empirical research on the net trade effects of PTAs is inconclusive. For example, Carrere (2004) finds significant intra-bloc trade creation but also evidence of trade diversion. In contrast, Egoume-Bossogo and Mendis (2002), Lee and Park (2005), and Mayda and Steinbertg (2009) report significant trade creation but no trade-diversion effects.

[3] Also, Ethier (1998) argues that trade diversion is not as big a concern in the 'new regionalism' given the high level of overall multilateral liberalization, and the fact that marginal PTA liberalization remains rather low.

[4] Note that this point was raised much earlier on by Myrdal (1956, 261) who argued that due to the colonial legacy, "governments and businesses in underdeveloped countries are conditioned and trained to negotiate and cooperate with their opposite partners in advanced countries but not with the governments and businesses in other underdeveloped countries."

[5] Note that South-South bank lending and FDI flows have also increased significantly. The share of South-South FDI in global FDI flows, for example, increased from 16% in 1995 to 37% in 2003 (World Bank, 2006, 2008; also see Akin and Kose, 2008).

[6] Schiff et al. (2002), and Schiff and Wang (2008), for example, find that the impact of trade related technology diffusion on Southern TFP is higher in South-North than South-South trade.

[7] It is also possible that South-North PTAs can yield more benefits to Northern countries than the Southern ones due to asymmetries in bargaining power, negotiating capacity and retaliatory power. Even though these asymmetries are also present between Southern countries, the gap is

likely to be smaller. Thrasher and Gallagher (2008), for example, show that South-South PTAs leave the greatest policy space available to "deploy effective policy for long-run diversification and development" than South-North PTAs.

[8] We should also note that Structuralist North-South models have long discussed how interactions between countries with asymmetrical economic structures, patterns of specialization, and development can lead to uneven development (Findlay, 1980; Darity, 1990; Dutt, 1992; and also see the survey articles Findlay, 1984; Dutt, 1989; and Darity and Davis, 2005).

[9] Notice that we choose not to force the income elasticities to unity given that all previous research as well as our empirical results indicate that they are significantly different from one. However, the alternative specification is also tested in the robustness section.

[10] In addition to the Bronze medal error, the common practice of using US CPI to deflate export values, or the practice of using exporting country CPI to measure export price levels are theoretically incorrect and can cause serious bias in estimation given the effect of changes in nontradable, and exported commodity prices, and their different weights in consumption baskets across countries.

[11] As noted by Baldwin and Taglioni (2006), however, most gravity equations are not estimated on uni-directional trade but on average trade, the mis-calculation of which causes the "silver medal mistake."

[12] Like Baier and Bergstrand (2007), we excluded the Global System of Trade Preferences (GSTP) from our PTA classification.

[13] The Hausman test confirms the choice of fixed-effects (with a p-value at 1% level) over random-effects model. However, the estimates obtained by country fixed-effects "might suffer from the so-called incidental parameters problem, due to insufficient degrees of freedom to

consistently estimate the parameters of interest" (Bastos and Silva, 2010, 106). To address this problem, we also reported results with the random-effects estimation.

[14] Note that the PTA coefficient estimate in Silva and Tenreyro (2006) using the PPML estimator is 0.38.

[15] Except for the variables *CurCol* and *ComNat*, which appear with mixed coefficient sign and significance levels.

[16] The coefficient estimates, however, are smaller than others, whose median is 0.39 (Cipollina and Salvatici, 2010). The smaller coefficient estimates here might be expected given that we are testing the effects of PTAs on manufactured goods trade, rather than total merchandise goods.

[17] We discuss this point more in the robustness section.

[18] For brevity, in Table 5 we excluded the country-pair FE and Random effects models without year fixed effects. However, the results were very similar to those reported and are available from authors upon request.

[19] The data source is WDI, IFS, and country statistics. When not available, we used the bilateral real exchange rates with respect to the US dollar and relative producer prices.

[20] South Korea is classified as a high-income OECD country in 2005 by the WB, which is why we have South-South PTAs showing up for high income OECD group. This may also serve as a robustness check on the sensitivity of the results to Korea being classified as Emerging South. However, note that Korea was classified as 'upper-middle income' until 1994 and then again during 1998-2000 (World Bank, 2011). Besides, South Korea is a signer of the GSTP agreement.

[21] We experimented with different thresholds (for upper/lower tails) and found similar results.

[22] We treated lagged exports and real GDPs of trading partners as endogenous in instrument selection.

Table 1: Summary statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
ln Exports	77,197	14.689	3.368	1.483	25.747
PTA	77,197	0.105	0.307	0	1
PTA_North	77,197	0.012	0.107	0	1
PTA_South	77,197	0.093	0.291	0	1
ln $RGDP_{it}$	77,197	25.244	1.280	22.207	28.269
ln $RGDP_{jt}$	77,197	23.542	2.368	16.479	30.024
ln Distance	77,197	8.796	0.782	4.107	9.892
Adj	77,197	0.032	0.175	0	1
Language	77,197	0.181	0.385	0	1
Land locked	77,197	0.163	0.376	0	2
ln Areap	77,197	24.584	3.513	9.515	32.728
ComCol	77,197	0.100	0.300	0	1
CurCol	77,197	0.000	0.019	0	1
Colony	77,197	0.005	0.069	0	1
ComNat	77,197	0.012	0.111	0	1

Notes: PTA_N_{ijt} and PTA_S_{ijt} are binary variables equal to 1 if country *i* has a preferential trade agreement with a Northern or Southern country *j* at time *t*. $RGDP_i$ and $RGDP_j$ are the real GDP in country *i* and *j*, *Dist* is the distance between the *i* and *j*, *Lang* is a binary dummy variable equal to 1 if *i* and *j* share a common language, and 0 otherwise; *Areap* is the log products of areas of country *i* and *j*, *Adj* is a binary variable equal to 1 if *i* and *j* share a common border, and 0 otherwise, *Land locked* is the number of landlocked countries (0, 1, or 2), *ComCol* is a binary variable equal to 1 if *i* and *j* had a common colonizer after 1945, *CurCol* is a binary variable equal to 1 if *i* and *j* are in a colonial relationship at time *t*, *Colony* is a binary variable equal to 1 if *i* and *j* have ever had a colonial link after 1945, *ComNat* is a binary variable if *i* and *j* were the same country.

Table 2: Regional distribution of trade and PTA observations based on export destination

	Importing Region						
	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	North America	South Asia	Sub-Saharan Africa
Distribution of Total Import Observations (%)	15.06	25.83	20.78	11.82	2.25	4.27	19.99
Distribution of PTAs (%)							
South-South	16.46	10.02	47.42	14.59	0.00	9.69	1.83
South-North	1.66	77.72	0.00	15.52	5.10	0.00	0.00

Table 3: Regional percentage distribution of PTA_South and PTA_North

	Importing Region						
Exporting Region	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa	North America
South-South PTAs							
East Asia & Pacific	49.86	7.98	20.37	6.77	15.02	0.00	0.00
Europe & Central Asia	14.74	19.65	42.20	8.38	15.03	0.00	0.00
Latin America & Caribbean	6.31	7.64	77.03	4.34	4.34	0.35	0.00
Middle East & North Africa	5.24	14.64	11.94	52.73	6.70	8.74	0.00
South Asia	19.57	12.86	25.91	8.70	32.97	0.00	0.00
South-North PTAs							
East Asia & Pacific	63.64	27.27	0.00	0.00	0.00	0.00	9.09
Europe & Central Asia	0.00	87.04	0.00	12.96	0.00	0.00	0.00
Latin America & Caribbean	0.35	55.90	0.00	30.21	0.00	0.00	13.54
Middle East & North Africa	0.00	92.02	0.00	6.65	0.00	0.00	1.33

Notes: The table refers to the regional percentage distribution of South-South and South-North PTA agreements.

Table 4: Benchmark regression results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS and year FE	OLS and year and country FE	Bilateral FE	Bilateral and year FE	Random Effects	Random Effects and year FE	PPML and year FE
PTA_{ijt}	0.173**	0.191**	0.395***	0.091***	0.128***	0.149***	0.148***	0.182***
	(0.087)	(0.088)	(0.068)	(0.035)	(0.035)	(0.034)	(0.034)	(0.048)
PTA_North_{ijt}	-0.657***	-0.597***	-0.009	0.043	0.110*	0.072	0.093	0.059
	(0.175)	(0.177)	(0.121)	(0.058)	(0.058)	(0.058)	(0.058)	(0.072)
PTA_South_{ijt}	0.286***	0.296***	0.474***	0.118***	0.138***	0.187***	0.176***	0.265***
	(0.095)	(0.096)	(0.077)	(0.044)	(0.043)	(0.041)	(0.041)	(0.058)
$ln\ RGDP_{it}$	1.487***	1.487***	1.870***	2.030***	1.852***	1.828***	1.595***	1.111***
	(0.021)	(0.022)	(0.089)	(0.019)	(0.038)	(0.013)	(0.019)	(0.020)
$ln\ RGDP_{jt}$	0.996***	0.997***	0.929***	0.976***	0.991***	1.089***	1.027***	1.039***
	(0.014)	(0.014)	(0.076)	(0.025)	(0.028)	(0.011)	(0.012)	(0.010)
$ln\ Distance_{ij}$	-1.040***	-1.040***	-1.607***			-1.192***	-1.138***	-0.433***
	(0.039)	(0.039)	(0.033)			(0.042)	(0.040)	(0.021)
Adj_{ij}	1.065***	1.059***	0.279*			0.854***	1.007***	1.448***
	(0.189)	(0.189)	(0.166)			(0.211)	(0.202)	(0.059)
$Language_{ij}$	0.672***	0.674***	0.766***			0.848***	0.785***	0.881***
	(0.082)	(0.082)	(0.064)			(0.088)	(0.084)	(0.036)
$Land\ locked_{ij}$	-0.297***	-0.291***	-4.188***			-0.026	-0.209***	-0.545***
	(0.068)	(0.069)	(0.426)			(0.068)	(0.066)	(0.039)
$ln\ Areap_{ij}$	-0.221***	-0.222***	-0.544***			-0.250***	-0.217***	-0.233***
	(0.010)	(0.010)	(0.113)			(0.009)	(0.009)	(0.006)
$ComCol_{ij}$	0.918***	0.922***	0.462***			1.049***	1.036***	0.119*
	(0.105)	(0.105)	(0.085)			(0.112)	(0.107)	(0.069)
$CurCol_{ij}$	-1.954***	-1.956***	-0.697			-2.408	-2.209	0.498***
	(0.544)	(0.543)	(0.499)			(2.031)	(1.934)	(0.149)
$Colony_{ij}$	1.177***	1.173***	0.224			1.046**	1.257**	-0.641***
	(0.443)	(0.443)	(0.344)			(0.523)	(0.498)	(0.089)
$ComNat_{ij}$	0.298	0.288	-0.243			0.271	0.281	0.202***
	(0.310)	(0.309)	(0.298)			(0.333)	(0.317)	(0.069)
Constant	-31.94***	-31.96***	-27.09***	-59.55***	-55.49***	-41.05***	-35.31***	-28.845***
	(0.677)	(0.703)	(3.514)	(0.442)	(1.177)	(0.515)	(0.622)	(0.755)
Year FE	No	Yes	Yes	No	Yes	No	Yes	Yes
Country-pair FE	No	No	No	Yes	Yes	No	No	No
Country FE	No	No	Yes	No	No	No	No	No
RMSE	2.202	2.200	1.736	1.314	1.308	1.316	1.313	
Overall R^2	0.572	0.574	0.735	0.406	0.416	0.567	0.570	0.869[a]
Within R^2				0.323	0.329	0.323	0.329	
Number of observations	77,197	77,197	77,197	77,197	77,197	77,197	77,197	130,109
Number of country pairs	4,908	4,908	4,908	4,908	4,908	4,908	4,908	5,321

Notes: The dependent variable is the (natural log) of real manufactured goods exports from country *i* to *j* for all except the PPML (column (8)) where we use the level without logs. PTA_N_{ijt} and PTA_S_{ijt} are binary variables equal to 1 if country *i* has a preferential trade agreement with a Northern or Southern country *j* at time *t*. $RGDP_i$ and $RGDP_j$ are the real GDP in country *i* and *j*, *Dist* is the distance between the *i* and *j*, *Lang* is a binary dummy variable equal to 1 if *i* and *j* share a common language, and 0 otherwise; *Areap* is the log products of areas of country *i* and *j*, *Adj* is a binary variable equal to 1 if *i* and *j* share a common border, and 0 otherwise, *Land locked* is the number of landlocked countries (0, 1, or 2), *ComCol* is a binary variable equal to 1 if *i* and *j* had a common colonizer after 1945, *CurCol* is a binary variable equal to 1 if *i* and *j* are in a colonial relationship at time *t*, *Colony* is a binary variable equal to 1 if *i* and *j* have ever had a colonial link after 1945, *ComNat* is a binary variable if *i* and *j* were the same country. Coefficient estimates for fixed/time effects are not reported for brevity. Time-invariant country pair Gravity variables dropped due to collinearity under country-pair fixed effects model. [a] is the pseudo-R-squared.

Table 5: Sensitivity to time period

	Post- 1980						Post-1989	Post-1995
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS and year FE	OLS and year and country FE	Bilateral and Year FE	Random effects and time FE	PPML and year FE	OLS and year FE	OLS and year FE
PTA_North_{ijt}	-0.660***	-0.603***	-0.047	0.0145	0.0003	0.051	-0.511***	-0.492***
	(0.172)	(0.175)	(0.119)	(0.058)	(0.058)	(0.072)	(0.143)	(0.143)
PTA_South_{ijt}	0.281***	0.287***	0.466***	0.135***	0.182***	0.266***	0.392***	0.407***
	(0.095)	(0.095)	(0.078)	(0.045)	(0.042)	(0.058)	(0.095)	(0.098)
$ln\ RGDP_{it}$	1.493***	1.491***	1.924***	1.904***	1.603***	1.113***	1.518***	1.563***
	(0.021)	(0.022)	(0.091)	(0.039)	(0.019)	(0.020)	(0.022)	(0.022)
$ln\ RGDP_{jt}$	0.998***	0.999***	0.912***	0.997***	1.030***	1.041***	1.006***	1.011***
	(0.014)	(0.014)	(0.078)	(0.029)	(0.012)	(0.010)	(0.015)	(0.015)
$ln\ Distance_{ij}$	-1.049***	-1.049***	-1.605***		-1.143***	-0.433***	-1.057***	-1.070***
	(0.039)	(0.039)	(0.033)		(0.041)	(0.021)	(0.040)	(0.042)
Adj_{ij}	1.062***	1.059***	0.294*		1.005***	1.452***	1.014***	0.953***
	(0.188)	(0.188)	(0.164)		(0.204)	(0.059)	(0.179)	(0.187)
$Language_{ij}$	0.680***	0.679***	0.768***		0.779***	0.884***	0.722***	0.730***
	(0.081)	(0.081)	(0.064)		(0.085)	(0.036)	(0.079)	(0.080)
$Land\ locked_{ij}$	-0.302***	-0.298***	-4.182***		-0.206***	-0.545***	-0.313***	-0.337***
	(0.068)	(0.068)	(0.436)		(0.067)	(0.039)	(0.071)	(0.073)
$ln\ Areap_{ij}$	-0.216***	-0.217***	-0.529***		-0.216***	-0.233***	-0.200***	-0.190***
	(0.010)	(0.010)	(0.113)		(0.010)	(0.010)	(0.010)	(0.010)
$ComCol_{ij}$	0.917***	0.924***	0.465***		1.018***	0.114	0.955***	0.957***
	(0.105)	(0.105)	(0.0858)		(0.108)	(0.0696)	(0.105)	(0.104)
$CurCol_{ij}$	-1.396**	-1.396**	-0.222		-1.631	0.540***	-1.216**	-1.113*
	(0.549)	(0.548)	(0.499)		(1.956)	(0.149)	(0.561)	(0.595)
$Colony_{ij}$	1.165***	1.166***	0.213		1.234**	-0.659***	1.139**	1.140**
	(0.449)	(0.449)	(0.344)		(0.504)	(0.089)	(0.455)	(0.476)
$ComNat_{ij}$	0.302	0.292	-0.241		0.268	0.197***	0.412	0.519
	(0.309)	(0.309)	(0.296)		(0.321)	(0.069)	(0.319)	(0.339)
Constant	-32.18***	-32.14***	-29.12***	-57.09***	-35.73***	-28.00***	-33.36***	-34.79***
	(0.676)	(0.700)	(3.680)	(1.193)	(0.635)	(0.753)	(0.699)	(0.704)
Year FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair FE	No	No	No	Yes	No	No	No	No
Country FE	No	No	Yes	No	No	No	No	No
RMSE	2.196	2.193	1.727	1.291	1.296		2.160	2.154
Overall R^2	0.577	0.578	0.739	0.420	0.575	0.869[a]	0.599	0.612
Within R^2				0.308	0.307			
Number of Observations	74,116	74,116	74,116	74,116	74,116	117,529	55,238	37,319
Number of country pairs	4,905	4,905	4,905	4,905	4,905	5,321	4875	4,767

Table 6: Sensitivity to unitary income elasticity assumption and multilateral price terms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS and year FE	OLS and year and country FE	Bilateral and year FE	Random Effects and year FE	PPML and year FE	OLS and year FE and RER	OLS and year FE and RER
PTA_North_{ijt}	-0.687***	-0.0292	0.072	0.072	-1.118**	-0.675***	-0.645***
	(0.180)	(0.121)	(0.058)	(0.058)	(0.445)	(0.178)	(0.176)
PTA_South_{ijt}	0.218**	0.478***	0.137***	0.169***	0.906***	0.277***	0.351***
	(0.102)	(0.077)	(0.043)	(0.041)	(0.212)	(0.107)	(0.100)
$ln\ RGDP_{it}$							1.570***
							(0.0228)
$ln\ RGDP_{jt}$							1.021***
							(0.0149)
$ln\ RER_{it}$						0.0758	0.421***
						(0.0962)	(0.0903)
$ln\ RER_{jt}$						0.338***	0.332***
						(0.0529)	(0.0529)
$ln\ Distance_{ij}$	-0.910***	-1.611***		-0.988***	-0.849***	-0.873***	-1.026***
	(0.040)	(0.033)		(0.041)	(0.125)	(0.0432)	(0.0424)
Adj_{ij}	1.364***	0.279*		1.437***	1.932***	1.451***	1.105***
	(0.192)	(0.166)		(0.209)	(0.157)	(0.202)	(0.196)
$Language_{ij}$	0.486***	0.771***		0.612***	-0.056	0.564***	0.777***
	(0.083)	(0.064)		(0.087)	(0.417)	(0.0845)	(0.0828)
$Land\ locked_{ij}$	-0.504***	-4.216***		-0.576***	-0.547**	-0.569***	-0.295***
	(0.072)	(0.417)		(0.067)	(0.225)	(0.0755)	(0.0711)
$ln\ Areap_{ij}$	-0.195***	-0.549***		-0.168***	-0.288***	-0.211***	-0.257***
	(0.009)	(0.110)		(0.008)	(0.026)	(0.00983)	(0.0101)
$ComCol_{ij}$	0.948***	0.463***		1.056***	1.219***	0.974***	0.920***
	(0.103)	(0.085)		(0.110)	(0.166)	(0.105)	(0.107)
$CurCol_{ij}$	-0.896*	-0.672		-1.042	-0.028	-0.781	-1.872***
	(0.513)	(0.500)		(2.006)	(1.125)	(0.512)	(0.555)
$Colony_{ij}$	1.071**	0.209		1.268**	0.771	1.127***	1.105**
	(0.417)	(0.345)		(0.515)	(1.154)	(0.419)	(0.457)
$ComNat_{ij}$	0.226	-0.240		0.206	4.156***	0.249	0.328
	(0.298)	(0.298)		(0.329)	(0.267)	(0.295)	(0.312)
Constant	-21.47***	-4.090	-34.93***	-22.72***	-22.15***	-23.32***	-37.36***
	(0.410)	(3.246)	(0.043)	(0.422)	(0.969)	(0.661)	(0.904)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-pair FE	No	No	Yes	No	No	No	No
Country FE	No	Yes	No	No	No	No	No
RMSE	2.274	1.740	1.313	1.318		2.232	2.132
Overall R^2	0.240	0.557	0.002	0.231	-0.043[a]	0.258	0.601
Within R^2			0.069	0.069			
Number of observations	77,197	77,197	77,197	77,197	130,109	66,118	66,118
Number of country pairs	4,908	4,908	4,908	4,908	5,321	4,185	4,185

Notes: The dependent variable for columns (1) - (7) is the (natural log) of real bilateral exports divided by the product of real GDPs (except for column (5) where the dependent variable is without the log). RER_{it} and RER_{jt} are effective real exchange rates for country *i* and *j* at time *t* (an increase is a real appreciation).

Table 7: Sensitivity to income groups

	PTA_North	*PTA_South*	*PTA*	*PTA*
	(1)		(2)	(3)
Only Low Income		0.288		
		(0.224)		
Only Middle Income		0.278**		
		(0.114)		
Only Lower Middle Income		0.335**		
		(0.139)		
Only Upper Middle Income		0.0993		
		(0.185)		
Only high income OECD	0.209	-0.193		
	(0.152)	(0.560)		
Only high income Non-OECD	-1.744***	0.358		
	(0.595)	(0.284)		
*PTA*Income Group Interactions*				
PTA_Low Income			0.434*	0.430*
			(0.222)	(0.222)
PTA_Middle Income				0.323***
				(0.111)
PTA_Lower Middle Income			0.575***	
			(0.132)	
PTA_Upper Middle Income			-0.0442	
			(0.157)	
PTA_High Income Non OECD			-0.687**	-0.684**
			(0.319)	(0.319)
PTA_High Income OECD			-0.287	-0.282
			(0.179)	(0.179)

Notes: Regression results are reported only for the PTA variables using the benchmark regression with time fixed effects. Full estimation results are available in an online appendix.

Table 8: Sensitivity to regional differences

Exclude one region at a time:	*PTA_North*	*PTA_South*
No East Asia	-0.554***	0.198*
	(0.175)	(0.105)
No Europe	-0.992	0.180*
	(0.641)	(0.105)
No Latin America	-0.528***	0.203*
	(0.179)	(0.118)
No MENA	-0.287**	0.406***
	(0.140)	(0.108)
Non North America	-0.677***	0.337***
	(0.179)	(0.0956)
No South Asia	-0.563***	0.284***
	(0.177)	(0.101)
No Sub-Saharan Africa	-0.681***	0.353***
	(0.180)	(0.0993)

Notes: Regression results are reported only for the PTA variables using the benchmark regression with time fixed effects. Full estimation results are available in an online appendix.

Table 9: Sample selection sensitivity

	PTA_North	*PTA_South*
Without Poorest Country Pairs based on joint RGDP p/c		
Without poorest 5% of joint RGDP p/c	-0.632***	0.304***
	(0.179)	(0.0971)
Without poorest percentile of joint RGDP p/c	-0.633***	0.310***
	(0.179)	(0.0993)
Without poorest quartile of joint RGDP p/c	-0.584***	0.325***
	(0.179)	(0.107)
Without Smallest Importing Countries based on RGDP		
Without smallest 5%	-0.598***	0.297***
	(0.177)	(0.0959)
Without smallest quantile	-0.609***	0.288***
	(0.178)	(0.0960)
Without smallest quartile	-0.691***	0.301***
	(0.177)	(0.0985)
Without Outliers based on real Exports		
Without bottom 1% of real exports	-0.566***	0.275***
	(0.176)	(0.0923)
Without bottom 5%	-0.516***	0.243***
	(0.177)	(0.0891)
Without bottom 10%	-0.495***	0.215**
	(0.174)	(0.0865)
Without bottom 25%	-0.504***	0.186**
	(0.165)	(0.0814)
Database error	-0.661***	0.211**
	(0.167)	(0.0991)

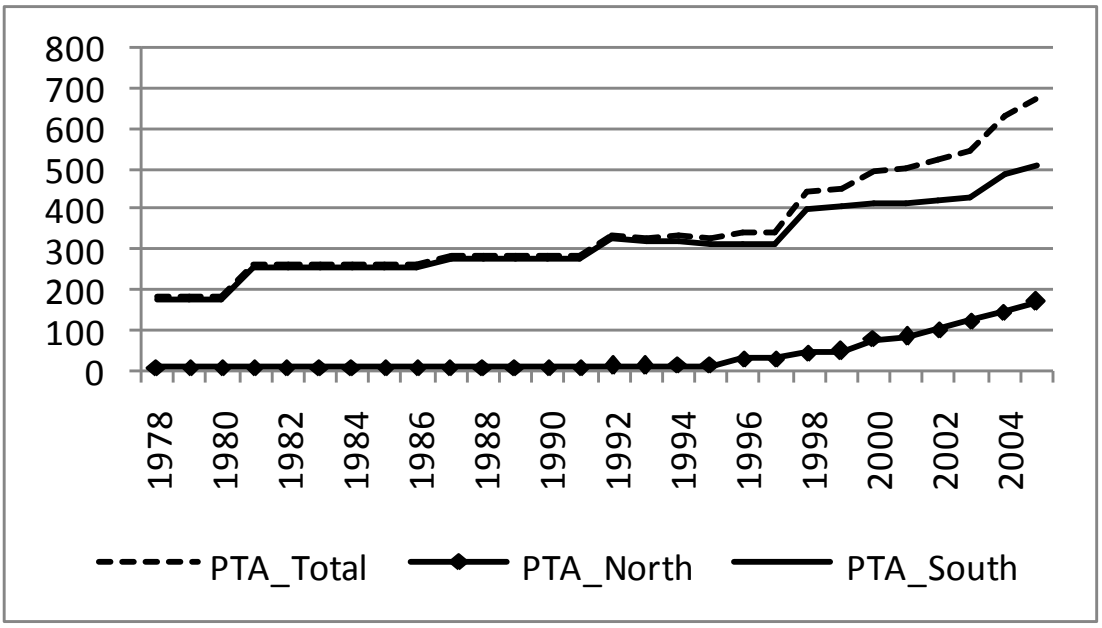
Notes: Regression results are reported only for the PTA variables using the benchmark regression with time fixed effects. Full estimation results are available in an online appendix. Fours groups of regressions are run based on: joint size of real GDP per capita, importing country real GDP, level of real exports, and the database error defined as the difference between COMTRADE and WDI databases.

Table 10: Estimation method sensitivity

	PTA_North	*PTA_South*
Median regression	-0.732***	0.261***
	(0.085)	(0.034)
Tobit		
No censoring	-0.597***	0.296***
	(0.076)	(0.030)
Bottom 1% censored	-0.604***	0.295***
	(0.076)	(0.030)
Bottom 5% censored	-0.605***	0.294***
	(0.075)	(0.029)
Bottom 10% censored	-0.603***	0.294***
	(0.074)	(0.029)
Bottom 25% censored	-0.625***	0.271***
	(0.070)	(0.028)
*Weighted Least Squares**	-0.577***	0.277***
	(0.175)	(0.097)
Controlling for AR errors		
Prais-Winsten	-0.236***	0.183***
	(0.089)	(0.068)
Random-effects with an AR(1) disturbance	-0.098	0.162***
	(0.079)	(0.054)
Dynamic specification		
System GMM	-0.027	0.047***
	(0.056)	(0.017)
*Lagged effects (1 lag)***		
OLS	-0.516	0.434
Prais-Winsten	-0.249	0.199

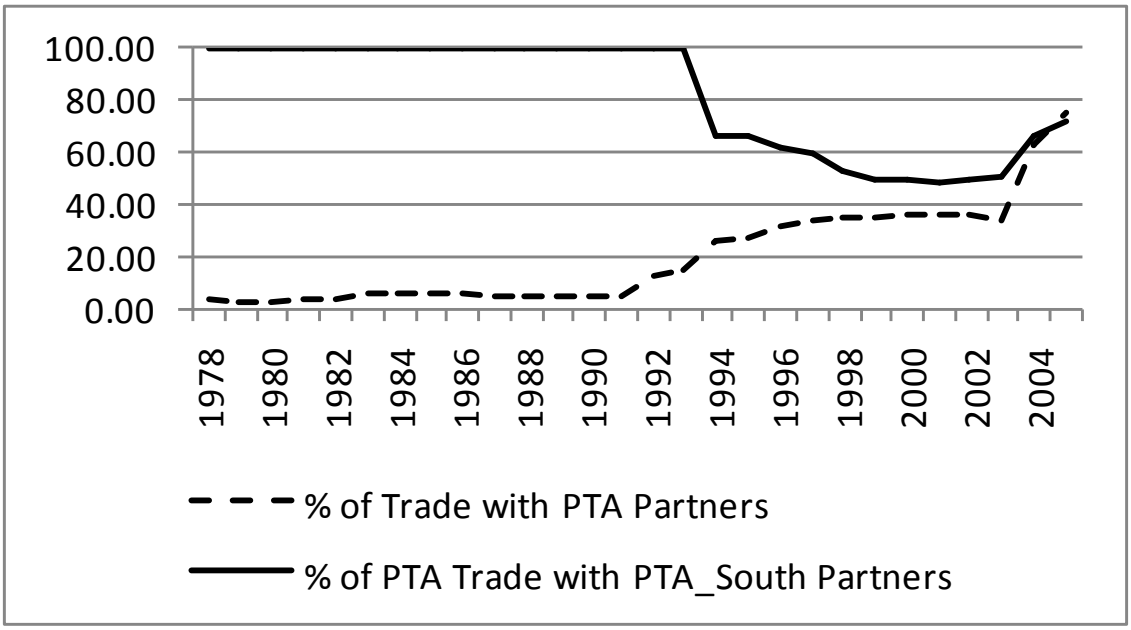
Notes: *Weights are based on real GDPs of country *j*; ** the sum of statistically significant (at 10% or higher) PTA coefficient estimates.

Figure 1: Number of country-pairs with PTA agreements, 1978-2005



Notes: PTA_Total, PTA_North and PTA_South refer to the number of country sample pairs having PTAs in total, with North, and South.

Figure 2: Percentage of trade with PTA partners, and the share of South-South trade in total PTA trade



Notes: The dashed line refers to the percentage share of exports of 28 sample countries to those they have PTAs with. The straight line refers to the percentage share South-South preferential trade of sample countries in their total preferential trade.