Preferential Trade Agreements and Manufactured Goods Exports:

Does It Matter Whom You PTA With?[1]

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[1] Acknowledgments: We thank Amitava K. Dutt, Kevin Gallagher, Ilene Grabel, Kevin Grier, Robin Grier, James Hartigan, Jeffrey B. Nugent, Arslan Razmi, Jaime Ros, and the session participants at the ASSA 2011 meeting in Denver, and the Eastern Economics Association 2012 meeting in Boston, and department of economics seminar participants at the University of Oklahoma and GLODEM seminar participants at Koç University for their comments and suggestions. For financial support, we thank the Office of the Vice President for Research at the University of Oklahoma, and the Dean of Faculty Office and the School of Critical Social Inquiry at Hampshire College. We thank Lord Andzie Quainoo for his research assistance. Authorship seniority is shared equally by the authors. All remaining errors and omissions are ours.

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ABSTRACT

This paper explores two questions. First, do Preferential Trade Agreements (PTAs) affect manufactured goods exports of 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

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 potential developmental impacts of PTAs on developing countries by focusing on the changes in manufactured goods trade, as opposed to total merchandise trade. Second, we explore whether the manufactured goods trade 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 might matter 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 aside from a few exceptions that are also region specific (Coulibaly and Fontagne, 2006).

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 49% in one year (or, under different specifications, in the range of 15% - 61%). In contrast, developing countries, which have PTAs with the North either end up suffering an annual loss, or, depending on the specification, experience no significant change in their manufactured goods 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. Similarly, the share of S-S exports in global high-skill manufactures exports reached 17% by 2005 from

1% in 1978 with an annual growth rate of 17% (Demir and Dahi, 2011). Furthermore, as of 2005 51% of developing country manufactures exports were exported to other developing countries (COMTRADE).[2]

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 and contradictory (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).[3] 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 under South-South PTAs (Puga and Venables, 1997; Venables, 2003; Schiff, 2003). Last but not least, North-South PTAs are argued to facilitate increasing vertical specialization or value chain fragmentation, what Krugman (1995) referred to as the slicing up of the value added.[4]

In contrast, the classical development theory and new trade literature has 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. 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 in return may help stimulate 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 (thus helping the recovery from current global downturn (ESCAP, 2009)). 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).

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 capability. 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. 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).

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 might matter 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. [5] To the extent that PTAs enhance manufactures exports, we can then start evaluating the success or failure of PTAs according to their potential long term developmental impact. Much of the traditional PTA literature, both theoretical and empirical, is taken up by trade creation versus trade diversion debate. These questions are not unimportant; however there is reason to question the disproportionate attention still given to the classic Vinerian dichotomy. First, as Ethier (1998) argued given that the new regionalism took place under large multilateral liberalization of tariffs and that marginal PTA liberalization remains rather low, the "Vinerian perspective, though not irrelevant, should be secondary in theoretical models appropriate to an analysis of the new regionalism (Ethier 1998, 1150)". Second, since North-North, South-North and North-South trade barriers appear to be significantly lower than the ones present in South-South trade (Kowalski and Shepherd, 2006, also see Kee et al., 2009; Medvedev, 2010), 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. In fact, 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). Besides, there is also some empirical evidence showing that South-South PTAs are no more trade diverting than other PTAs (Cernat, 2001). Third, since higher transportation costs and former colonial linkages with Northern countries (which always appear to be significant in Gravity models of trade), in addition to higher trade barriers (Kee et al., 2009), continue to limit South-South trade expansion, 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.[6] Last but not least, in the case of industrial development

what matters are *dynamic* not *static* gains. That is to say if South-South PTAs are found to enhance industrial development, the long term gains may very well outweigh the static short term losses.

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 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 out of 1,827 coefficient estimates are reported as negative. 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. Accordingly, 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. Coulibaly and Fontagne (2009) focus on the West African Economic and Monetary Union to measure the extent to which geography inhibits South-South trade and find a colonial bias of trade as well as

disadvantage for low infrastructure and landlocked countries in non-agricultural raw materials and machinery trade.

3. EMPIRICAL METHODOLOGY

In our analysis of the developmental effects of South-South and South-North PTAs, we first estimate the following *traditional* gravity model, adopted from Rose and van Wincoop (2001) and Rose (2004).[7]

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

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*[8], *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*. Thus, 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 heterogeneous effects on manufactured goods trade. For comparison purposes we also report coefficient estimates without separating PTAs into South-South and South-North in the regression estimations. ε represents the normally distributed error term capturing omitted other influences on trade. Given the theoretical ambiguity as discussed in the previous section, the net effect of South-South and South-North PTAs on Southern manufactured goods exports is an empirical question. If the skeptics of South-South PTAs are right, we should then expect to find a positive and significant coefficient estimate for γ_1 and a negative or insignificant coefficient estimate for γ_2. Yet if

the counter view is right, then we should expect to find the opposite result that is a negative or insignificant γ_1 and a positive and significant γ_2.

Following earlier research, we estimate equation (1) first using the OLS with country-pair robust standard errors, then add year fixed effects to control for global shocks. Third, we introduce country specific fixed effects to account for all time-invariant exporter and importer specific factors. Fourth, we include country-pair fixed effects to capture all time-invariant observable and unobservable bilateral factors between trading country pairs.[9] Next, 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, and employ the Poisson pseudo-maximum likelihood (PPML) estimator à la Silva and Tenreyro (2006).

However, as pointed out by Anderson and van Wincoop (2003) the traditional gravity estimation of equation (1) may be mis-specified as it omits multilateral resistance (MR) terms causing biased coefficient estimates. They argue that bilateral trade between country *i* and *j* is affected by multilateral resistance from other trade partners and as a result a theoretically consistent gravity model should take into account multilateral resistance terms such as respective price indices in exporting and importing countries. There are several methods offered in recent literature to deal with the MR terms. Anderson and van Wincoop (2003) employ a nonlinear least squares method to estimate the underlying structural gravity model and to obtain the MR terms. An alternative method is to use country-year fixed effects (which captures all time-varying exporter and importer observables and unobservables). This method, however, prevents the estimation of time varying non-MR exporter and importer specific variables. In addition, given the large number of trading partners we have, it 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 and may cause spurious regression results. A third method to approximate MR terms is suggested by Baier and Bergstrand (2009a) who show that a log-linear first-order Taylor series approximation of the MR terms of the Anderson and van Wincoop (2003) model yields results that are almost identical to those estimated by the non-linear least squares method. Given its accuracy and computational easiness, as well as its ability to allow the estimation of country-time specific effects, this method has been employed frequently in recent literature (Baier and Bergstrand, 2009a, 2009b, Egger and Nelson, 2011). To carry out the Baier-Bergstrand approximation, we modify equation (1) as follows:

$$X_{ijt} = \beta_0 (RGDP_{it})^{\beta_1} (RGDP_{jt})^{\beta_2} (Dist_{ij})^{\beta_3} (Area_i * Area_j)^{\beta_4} e^{\beta_5 (Lang_{ij})} e^{\beta_6 (Adj_{ij})} e^{\beta_7 (LandL_{ij})}$$

$$e^{\beta_8 (ComCol_{ij})} e^{\beta_9 (CurCol_{ij})} e^{\beta_{10} (Colony_{ij})} e^{\beta_{11} (ComNat_{ij})} e^{\beta_{12} (D_{ijt})} e^{\gamma_1 (PTA\_N_{ijt})} e^{\gamma_2 (PTA\_S_{ijt})} V_{ijt} \varepsilon_{ijt} \quad (2)$$

Where V_{ijt} is

$$(MRDist_{ij})^{\phi_3} (MR(Area_i * Area_j))^{\phi_4} e^{\phi_5 (MRLang_{ij})} e^{\phi_6 (MRAdj_{ij})} e^{\phi_7 (MRLandL_{ij})} e^{\phi_8 (MRComCol_{ij})}$$

$$e^{\phi_9 (MRCurCol_{ij})} e^{\phi_{10} (MRColony_{ij})} e^{\phi_{11} (MRComNat_{ij})} e^{\phi_{12} (MRPTA\_N_{ijt})} e^{\phi_{13} (MRPTA\_S_{ijt})}$$

Here, the MR terms (which are applied to each of the exogenous variables (except for national incomes) in equation 1) are calculated as, for example:

$$MRDist_{ij} = \left(\frac{1}{N}\right) \sum_{j=1}^{N} lnDist_{ij} + \left(\frac{1}{N}\right) \sum_{i=1}^{N} lnDist_{ij} - \left(\frac{1}{N^2}\right) \sum_{i=1}^{N} \sum_{j=1}^{N} lnDist_{ij}$$

That is, the first (second) term is the mean distance of country *i* (*j*) from its trading partners, and the third term is a constant.

On the issue of MR term bias, we should note that unlike previous research we directly take into account the exporting country prices via the measurement of the export volumes. The importing country price terms, however, are not directly included because of data availability problems. We also undertake

several sensitivity tests to check the robustness of our findings to the MR term approximation method of Baier and Bergstrand (2009a). First we split the sample into different time periods to provide partial control for the time variant price effects. Third, we add another (admittedly imperfect) proxy for the multilateral price effects by including effective real exchange rates for country *i* and *j* at time *t*. If all these fail, the bias created by the misspecification of multilateral trade resistance term is found to be downward, reducing the likelihood of finding a positive and significant estimate (Cipollina and Salvatici, 2010).

We should also point out that our estimation of equations (1) and (2) has several distinctive features: First, X_{ijt} here is deflated by country specific average manufactured goods export prices (P_{it}), rather than US consumer or producer price deflator, as is almost always done in the literature (the so called 'bronze medal mistake' coined by Baldwin and Taglioni, 2006).[10] Secondly, we have bilateral exports as our left hand side variable, which is consistent with the theoretical basis of the gravity equation that 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]

(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 (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). The sample choice was conditioned by data availability as we seek at least 10 years of continuous data for each country included. 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 World Development Indicators (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 (column numbers in parenthesis) using: OLS with robust standard errors (clustered by country pair) (1), OLS with year fixed effects (2), OLS with year and country fixed effects (3), bilateral and year fixed effects (4), Poisson pseudo-maximum likelihood (PPML) estimator à la Silva and Tenreyro (2006) where the dependent variable is bilateral exports in levels including zero trade flows (5)[13], and OLS with year fixed effects and approximated MR terms as in Baier and Bergstrand (2009), and this is our benchmark specification (6) (all results are with robust standard errors). 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.[14] 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 here, however, is that once we account for the standard gravity effects, whether we still continue to observe any significant effect of PTAs? Surprisingly, the answer is '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 *total* trade. Here we find similar results to those in the literature, a significant effect. The coefficient estimates for the PTA effect, however, are smaller than those previous research, 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 trade.

However, once we separate PTAs into South-South and South-North PTAs, the results differ significantly. In fact, the coefficient estimates for South-North PTAs turn either negative, or become insignificant (except in column (4) at 10% level[15]). 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 0.398 in the benchmark regression (6) (or in the range of 0.138 - 0.474 depending on specification). The coefficient estimates suggest that the signing of a South-South PTA increases country *i*'s manufactured good exports to country *j* in the range of 15% - 61% a year (or 30% based on the benchmark regression in column (6)). In contrast, countries, which have PTAs with the North either face a loss (equal to 45% - 48% in columns (1) and (2)), or experience no significant change in their exports volumes ((3), (5), (6)).

The results from Table (4) are very consistent and may have significant policy implications for developing countries. Overall, the findings appear to be consistent with the predictions of those

theoretical arguments favoring South-South trade (Myrdal, 1956; Amsden, 1980, 1987; Findlay, 1980; Lewis, 1980; Lall and Ghosh, 1989; Darity, 1990; Dutt, 1992; UNCTAD, 2005; UNIDO, 2005; Fugazza and Robert-Nicoud, 2006; World Bank, 2006, 2008). We, however, find no evidence that South-North PTAs have any significant or positive effect on Southern manufactured goods exports to the North.

(a) Sensitivity analysis

In this section, we explore the sensitivity of our findings to time period, unitary income elasticity assumption, 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 in Table 5 we replicated Table 4 (using year fixed effects in all specifications) for the post-1980 period when the mapping of country-pair representation is significantly better and more evenly distributed. The results from Table 5 confirm our findings from Table 4. 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 (6) and (7) we repeat the exercise using the benchmark regression specification with MR terms 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.[16] 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. Furthermore, none of the coefficient estimates for the PTA effect is significantly different than those in Table 5. We also note that the marginally significant yet positive effect of South-North PTAs found with country-pair and time FE model in column (4) of Table 4 disappeared here in column (3). Economically speaking, the point estimates in the benchmark regressions of columns (5)- (7) suggest that in the post 1980, 1989 and 1995 periods a South-South PTA almost doubles the manufactured goods exports of a developing country in two years.

<Insert Table 5 Here >

Next we analyze if any of our results change when we force the income elasticities to unity despite the fact that they are found to be significantly different from unity in Tables 4 and 5. 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 (4) where the dependent variable is without the log) as in Baier and Bergstrand (2007). The results are again highly supportive of our earlier findings. We then proceed to take into account the multilateral price terms using our MR proxies as well as the annual average effective real exchange rates for importing and exporting countries. Including the effective real exchange rates for country *i* and *j* allow us to control for changes in relative prices and competitiveness in each country directly. We note, however, that, because of data limitations on exchange rates we lose 14% of the observations in this exercise.[17] Columns (6) and (7) present estimation results with and without enforcing the unitary income elasticity assumption. The findings are again supportive of our earlier coefficient estimates. In particular, we continue to find a significantly positive trade effect of South-South PTAs and a negative or insignificant South-North PTA effect across different specifications. As expected, we also find that due to decreasing relative competitiveness a real exchange rate appreciation in country *i* (*j*) has a significantly negative (positive) effect on its exports (imports) to (from) country *j* (*i*). Other standard gravity controls appear with similar coefficient estimates as before.

<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 including the MR terms and year fixed effects with robust standard errors allowing for intragroup correlation. In an online appendix, we present all robustness tests with full gravity results.

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. Therefore, Table 7 repeats default estimates first for different cuts of the sample (i.e. including only one importing country region based on income level at a time), and later for the entire sample using total PTA interactions with the income groups. In both cases, the results are very similar and 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.[18] In contrast, PTAs signed with low and middle income countries have significant trade enhancing effects. We note, however, that PTAs signed with low income countries have three times larger economic effect on manufactures exports of our sample countries. The coefficient estimates suggest that PTAs signed with low income countries increase developing country exports to these markets by 111% - 133% as opposed to 36% - 37% in the case of middle income countries.

<Insert Table 7 Here >

Next, we check whether our earlier results are affected by regional differences. Accordingly, in Table 8 we report coefficient estimates for PTA effects after excluding one importing geographical region (defined using the World Bank regional classification) at a time from the sample. This robustness test allows us to check whether our earlier findings are driven by either intra-regional or triangular trade, particularly in East and South East Asia. The results here are again very similar, except with the case of exclusion of MENA, which causes South-South effect to be significantly higher, and South-North effect to be marginally significant and positive at the 10% level. This is perhaps 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 to check whether our results are biased in any direction because of sample selection bias caused by low trade volume country pairs, or small and low income countries. Thus, we first drop the low trade volume country pairs by excluding those observations at the bottom 1^{st}, 5^{th}, and 10^{th} percentiles. Second, we drop the smallest (1^{st}, 5^{th}, and 10^{th} percentiles) importing countries based on their real GDPs from the sample. Third, we exclude the poorest country

pairs (1^{st}, 5^{th}, and 10^{th} percentiles) based on joint real GDP per capita levels. All results confirm our initial findings. Fourth, we conduct a rough database error test by comparing 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 reported to be more complete than those from 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 and serial correlation problem. Table 10 presents these results first using a Tobit estimator and then the Heckman model to double check the robustness of our results to excluding zero trading volumes. As discussed in section 3, the common practice of censoring at zero trade across trading partners may cause omitted variable and selection bias (as we only focus on countries that has a trade relationship), even though one cannot know a-priori whether missing observations as well as zero trade observations are really missing or simply zero trade between trade partners (Silva and Tenreyro, 2006; Helpman et al., 2007; Cipollina and Salvatici, 2010). In addition to the PPML method of Silva and Tenreyro, which we used in section 3 and reported on Table 4, we experiment with two additional methods here, which are a simple Tobit estimator (with and without censoring at the bottom 1^{st}, 5^{th}, and 10^{th} percentiles of export levels) and the Heckman selection model using full maximum likelihood estimator. The Heckman model first estimates a Probit model where the dependent variable is a binary variable showing whether or not a given observation is in the sample (i.e. uncensored observations in total sample, which consists of both censored and uncensored observations). Then it estimates the benchmark model by OLS, taking into account a measure of probability of trade taking place using the Probit estimates from the first stage estimation. We included the MR terms in both equations, and also experimented with additional control variables for the selection equation, including a measure of creditors' rights (*Creditor*) in country *i and j* from Djankov et al. (2007), which captures the level of fixed entry costs for foreign investors, and per capita real GDPs in exporting and importing

countries (we note, however, that the number of observations falls when we use *Creditor* due to smaller sample). Next, we employ the quantile regression method and report the median coefficient estimates to see if our earlier findings continue to hold for the median quantile as well. We then utilize the Prais-Winsten and Cochrane-Orcutt method with robust standard errors taking into account possible autocorrelation. In all these cases the results confirm our earlier findings.

<Insert Table 10 Here >

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 possible 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 members' 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 theoretically consistent 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 15 – 61% a year whereas South-North PTA membership either does not significantly alter manufactures exports or decreases them by up to 48%. The empirical findings also suggest that

developing countries benefit most from PTAs with lower and middle income countries, rather than with upper income partners.

We believe that our findings may 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. In fact, it is possible that increasing trade integration between Southern countries at very different stages of technological development, such as China and many African and South American countries, may lead to the classic North-South pattern of trade and divergence with poorer countries exporting primary products and the more advanced countries exporting manufactured goods (Venables, 2003). There is some evidence that this may already be underway in the case of China-Latin American integration with a deindustrializing effect on the latter group of countries (Moreira, 2007; Jenkins, Peters and Moreira, 2008). 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. Last but not least, further work needs to be done to explore the role of production networks and vertical specialization in international trade and PTA formation.[19]

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ENDNOTES

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

[2] 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).

[3] 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.

[4] Baldwin and Robert-Nicoud (2010) argue that these are perhaps best conceived as trade in *tasks* rather than trade in goods however they appear on official trade statistics as traditional inter-industry trade.

[5] 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 diversion effects.

[6] 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."

[7] The theoretical roots of structural gravity equation, including Linder's (1961) preference similarity hypothesis, is also applicable to disaggregated goods (by sectors) and factor endowments (Anderson, 2011). Thus, besides the current article, several other studies have also used the gravity model to study disaggregated trade in manufactures (Rauch, 1999; Eaton and Kortum, 2004).

[8] 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.

[9] The Hausman test confirms the choice of fixed-effects (with a p-value at 1% level) over random-effects model. Yet, 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).

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

[14] Except for *CurCol* which appears with mixed coefficient sign and significance levels.

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

[16] For brevity, in this part we report results using only the benchmark regression with the MR terms. However, other results were very similar to those reported. The estimated MR terms are also not reported for space considerations. All unreported results are available from authors upon request.

[17] 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.

[18] 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.

[19] Due to data availability issues, production networks and sales by foreign affiliates of international firms are not separated from domestic firm sales in this paper. As Anderson (2011) notes, while this is true for most gravity model estimates, it may not necessarily be appropriate if foreign firms face different trade costs than domestic firms.

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)
	OLS	OLS and year FE	OLS and year and country FE	Bilateral and year FE	PPML and year FE	MR terms and year FE
PTA_{ijt}	0.173**	0.191**	0.395***	0.128***	0.182***	0.348***
	(0.087)	(0.088)	(0.068)	(0.035)	(0.048)	(0.087)
PTA_North_{ijt}	-0.657***	-0.597***	-0.009	0.110*	0.059	0.090
	(0.175)	(0.177)	(0.121)	(0.058)	(0.072)	(0.142)
PTA_South_{ijt}	0.286***	0.296***	0.474***	0.138***	0.265***	0.398***
	(0.095)	(0.096)	(0.077)	(0.043)	(0.058)	(0.099)
$ln\ RGDP_{it}$	1.487***	1.487***	1.870***	1.852***	1.111***	1.341***
	(0.021)	(0.022)	(0.089)	(0.038)	(0.020)	(0.024)
$ln\ RGDP_{jt}$	0.996***	0.997***	0.929***	0.991***	1.039***	1.036***
	(0.014)	(0.014)	(0.076)	(0.028)	(0.010)	(0.016)
$ln\ Distance_{ij}$	-1.040***	-1.040***	-1.607***		-0.433***	-1.458***
	(0.039)	(0.039)	(0.033)		(0.021)	(0.044)
Adj_{ij}	1.065***	1.059***	0.279*		1.448***	0.413**
	(0.189)	(0.189)	(0.166)		(0.059)	(0.190)
$Language_{ij}$	0.672***	0.674***	0.766***		0.881***	0.655***
	(0.082)	(0.082)	(0.064)		(0.036)	(0.089)
$Land\ locked_{ij}$	-0.297***	-0.291***	-4.188***		-0.545***	-3.266***
	(0.068)	(0.069)	(0.426)		(0.039)	(0.894)
$ln\ Areap_{ij}$	-0.221***	-0.222***	-0.544***		-0.233***	0.001
	(0.009)	(0.010)	(0.113)		(0.006)	(0.287)
$ComCol_{ij}$	0.918***	0.922***	0.462***		0.119*	0.282**
	(0.105)	(0.105)	(0.085)		(0.069)	(0.121)
$CurCol_{ij}$	-1.954***	-1.956***	-0.697		0.498***	-1.342*
	(0.544)	(0.543)	(0.499)		(0.149)	(0.689)
$Colony_{ij}$	1.177***	1.173***	0.224		-0.641***	0.429
	(0.443)	(0.443)	(0.344)		(0.089)	(0.522)
$ComNat_{ij}$	0.298	0.288	-0.243		0.202***	-0.170
	(0.310)	(0.309)	(0.298)		(0.069)	(0.313)
Constant	-31.94***	-31.96***	-27.90***	-55.49***	-26.83***	-44.92***
	(0.677)	(0.703)	(4.173)	(1.124)	(0.724)	(0.931)
Year FE	No	Yes	Yes	Yes	Yes	Yes
Importer FE	No	No	Yes	No	No	No
Exporter FE	No	No	Yes	No	No	No
Country-pair FE	No	No	No	Yes	No	No
R-squared	0.572	0.574	0.735	0.329	0.778	0.613
RMSE	2.202	2.200	1.736	1.308		2.096
Country pairs	4,908	4,908	4,908	4,908	4,908	4,908
Observations	77,197	77,197	77,197	77,197	130,109	77,197

Notes: The dependent variable is the (natural log) of real manufactured goods exports from country *i* to *j* for all except the PPML (column (5)) 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 country and year effects are not reported for brevity. Time-invariant country pair Gravity variables dropped due to collinearity under country-pair fixed effects model. MR terms refer to multilateral resistance terms, whose coefficient estimates are not reported for space considerations.

Table 5: Sensitivity to time period

	Post-1980					Post-1989	Post-1995
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS and year FE	OLS and year and country FE	Bilateral and year FE	PPML and year FE	MR terms and year FE	MR terms and year FE	MR terms and year FE
PTA_North_{ijt}	-0.603***	-0.047	0.015	0.051	0.058	0.094	0.067
	(0.175)	(0.119)	(0.058)	(0.072)	(0.140)	(0.131)	(0.140)
PTA_South_{ijt}	0.287***	0.466***	0.135***	0.266***	0.379***	0.389***	0.429***
	(0.095)	(0.078)	(0.045)	(0.058)	(0.099)	(0.099)	(0.103)
$ln\ RGDP_{it}$	1.491***	1.924***	1.904***	1.113***	1.344***	1.367***	1.397***
	(0.022)	(0.091)	(0.039)	(0.020)	(0.024)	(0.023)	(0.023)
$ln\ RGDP_{jt}$	0.999***	0.912***	0.997***	1.041***	1.033***	1.022***	1.014***
	(0.014)	(0.078)	(0.029)	(0.010)	(0.016)	(0.017)	(0.017)
$ln\ Distance_{ij}$	-1.049***	-1.605***		-0.433***	-1.461***	-1.467***	-1.506***
	(0.039)	(0.033)		(0.021)	(0.044)	(0.044)	(0.046)
Adj_{ij}	1.059***	0.294*		1.452***	0.421**	0.365**	0.262
	(0.188)	(0.164)		(0.059)	(0.189)	(0.181)	(0.187)
$Language_{ij}$	0.679***	0.768***		0.884***	0.664***	0.698***	0.667***
	(0.081)	(0.064)		(0.036)	(0.089)	(0.089)	(0.089)
$Land\ locked_{ij}$	-0.298***	-4.182***		-0.545***	-3.470***	-4.663***	-5.349***
	(0.068)	(0.436)		(0.039)	(0.902)	(0.980)	(0.975)
$ln\ Areap_{ij}$	-0.217***	-0.529***		-0.233***	-0.015	-0.142	-0.183
	(0.010)	(0.113)		(0.006)	(0.283)	(0.251)	(0.214)
$ComCol_{ij}$	0.924***	0.465***		0.114	0.294**	0.292**	0.332***
	(0.105)	(0.086)		(0.069)	(0.121)	(0.123)	(0.123)
$CurCol_{ij}$	-1.396**	-0.222		0.540***	-0.814	-0.594	-0.718
	(0.548)	(0.499)		(0.149)	(0.691)	(0.707)	(0.754)
$Colony_{ij}$	1.166***	0.213		-0.659***	0.423	0.305	0.324
	(0.449)	(0.344)		(0.089)	(0.524)	(0.527)	(0.544)
$ComNat_{ij}$	0.292	-0.241		0.197***	-0.170	-0.098	-0.085
	(0.309)	(0.296)		(0.069)	(0.314)	(0.323)	(0.338)
Constant	-32.14***	-29.29***	-57.09***	-26.95***	-44.73***	-45.07***	-46.68***
	(0.700)	(4.240)	(1.193)	(0.727)	(0.928)	(0.938)	(0.951)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Importer FE	No	Yes	No	No	No	No	No
Exporter FE	No	Yes	No	No	No	No	No
Country-pair FE	No	Yes	Yes	No	No	No	No
MR terms	No	No	No	No	Yes	Yes	Yes
R-squared	0.578	0.739	0.308	0.779	0.616	0.636	0.651
rmse	2.193	1.727	1.291		2.092	2.057	2.043
Number of idpair	4,905	4,905	4,905	4,905	4,905	4,905	4,905
Observations	74,116	74,116	74,116	117,529	74,116	55,238	37,319

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	PPML and year FE	OLS and year FE and RER	MR Terms and year FE and RER	MR terms and year FE and RE
PTA_North_{ijt}	-0.687***	-0.029	0.072	-1.303***	0.147	0.171	0.101
	(0.180)	(0.121)	(0.058)	(0.033)	(0.150)	(0.155)	(0.141)
PTA_South_{ijt}	0.218**	0.478***	0.137***	0.352***	0.394***	0.380***	0.385***
	(0.102)	(0.077)	(0.043)	(0.012)	(0.103)	(0.108)	(0.103)
$ln\ RGDP_{it}$							1.454***
							(0.024)
$ln\ RGDP_{jt}$							1.093***
							(0.017)
$ln\ RER_{it}$						-0.815***	-0.733***
						(0.070)	(0.069)
$ln\ RER_{jt}$						0.140***	0.136***
						(0.042)	(0.043)
$ln\ Distance_{ij}$	-0.910***	-1.611***		-0.272***	-1.439***	-1.467***	-1.502***
	(0.040)	(0.033)		(0.004)	(0.044)	(0.046)	(0.046)
Adj_{ij}	1.364***	0.279*		2.259***	0.417**	0.389*	0.364*
	(0.192)	(0.166)		(0.021)	(0.193)	(0.203)	(0.202)
$Language_{ij}$	0.486***	0.771***		0.031***	0.575***	0.578***	0.675***
	(0.083)	(0.064)		(0.009)	(0.089)	(0.0915)	(0.091)
$Land\ locked_{ij}$	-0.504***	-4.216***		-0.880***	-3.739***	-3.954***	-2.203**
	(0.072)	(0.417)		(0.007)	(0.827)	(0.866)	(0.882)
$ln\ Areap_{ij}$	-0.195***	-0.549***		-0.314***	-0.079	-0.149	0.0296
	(0.009)	(0.110)		(0.001)	(0.246)	(0.225)	(0.306)
$ComCol_{ij}$	0.948***	0.463***		-0.183***	0.287**	0.313***	0.310**
	(0.103)	(0.085)		(0.011)	(0.119)	(0.119)	(0.122)
$CurCol_{ij}$	-0.896*	-0.672		0.655***	-1.338*	-1.014	-1.002
	(0.513)	(0.500)		(0.199)	(0.684)	(0.676)	(0.693)
$Colony_{ij}$	1.071**	0.209		-0.432***	0.521	0.559	0.415
	(0.417)	(0.345)		(0.052)	(0.490)	(0.488)	(0.538)
$ComNat_{ij}$	0.226	-0.240		0.301***	-0.195	-0.211	-0.159
	(0.298)	(0.298)		(0.033)	(0.309)	(0.311)	(0.325)
Constant	-21.47***	-6.949**	-34.91***	-22.07***	-39.78***	-46.94***	-57.64***
	(0.410)	(2.888)	(0.047)	(0.045)	(0.802)	(1.134)	(1.275)
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
MR Terms	No	No	No	No	Yes	Yes	Yes
RMSE	2.274	1.740	1.313		2.127	2.041	1.986
Overall R^2	0.240	0.557	0.069	0.028	0.336	0.380	0.653
Number of country pairs	4,908	4,908	4,908	4,908	5,321	4,185	4,185
Number of observations	77,197	77,197	77,197	77,197	130,109	66,118	66,118

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 (4) 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*
	(1)		(2)
Only Low Income		0.746***	
		(0.221)	
Only Middle Income		0.308***	
		(0.117)	
Only High Income OECD	-0.183	0.432	
	(0.140)	(0.492)	
Only High Income Non-OECD	-0.342	0.029	
	(0.513)	(0.228)	
*PTA*Income Group Interactions*			
*PTA*Low Income*			0.845***
			(0.230)
*PTA*Middle Income*			0.317***
			(0.120)
*PTA*High Income OECD*			0.116
			(0.144)
*PTA*High Income Non-OECD*			-0.107
			(0.235)

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

Table 8: Sensitivity to regional differences

	PTA_North	*PTA_South*
Exclude one region at a time		
No East Asia	0.101	0.329***
	(0.142)	(0.114)
No South Asia	0.097	0.380***
	(0.142)	(0.103)
No East or South Asia	0.105	0.279**
	(0.142)	(0.118)
No Europe	0.499	0.393***
	(0.454)	(0.109)
No Latin America	0.030	0.383***
	(0.143)	(0.111)
No MENA	0.226*	0.543***
	(0.135)	(0.112)
No Noth America	0.049	0.395***
	(0.147)	(0.099)
No Sub Saharan Africa	-0.023	0.325***
	(0.144)	(0.102)

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

Table 9: Sample selection sensitivity

Drop the smallest bilateral trade volume pairs	*PTA_North*	*PTA_South*
Drop bottom 1%	0.078	0.369***
	(0.141)	(0.098)
Drop bottom 5%	0.118	0.355***
	(0.139)	(0.094)
Drop bottom 10%	0.107	0.306***
	(0.137)	(0.091)
Drop smallest importing countries based on RGDP		
Drop bottom 1%	0.089	0.396***
	(0.142)	(0.099)
Drop bottom 5%	-0.759**	2.285**
	(0.351)	(0.945)
Drop bottom 10%	0.072	3.766***
	(0.418)	(0.625)
Drop lowest income country pairs based on joint RGDP p/c		
Drop bottom 1%	0.082	0.395***
	(0.142)	(0.099)
Drop bottom 5%	0.055	0.359***
	(0.142)	(0.099)
Drop bottom 10%	0.058	0.355***
	(0.142)	(0.101)
Database error	0.079	0.389***
	(0.147)	(0.102)

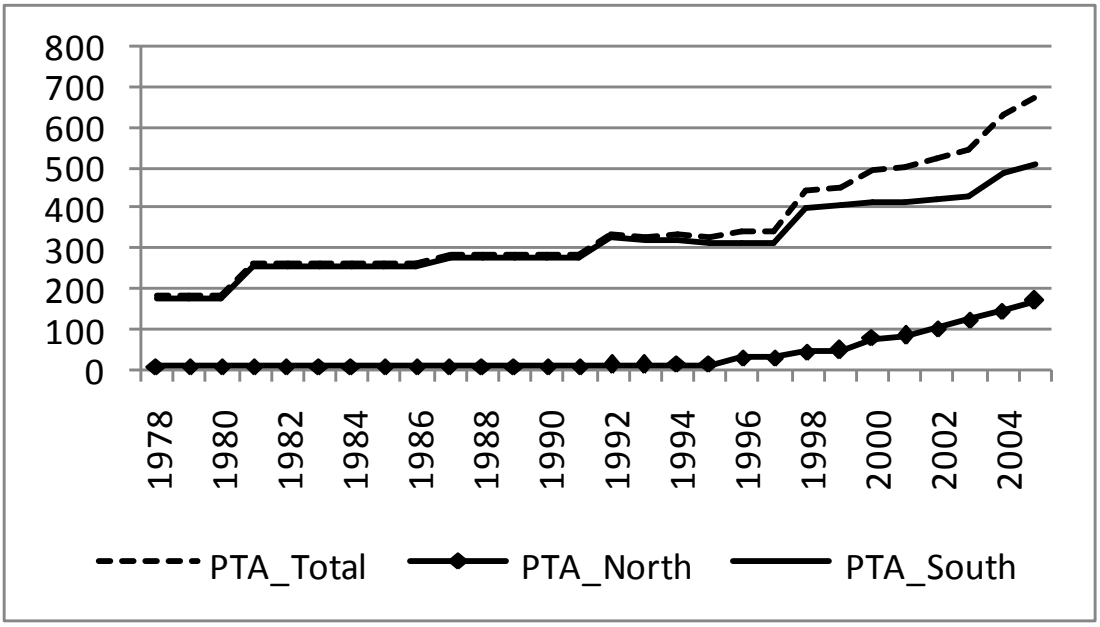
Notes: Regression results are reported only for the PTA variables using the benchmark regression with MR terms and year fixed effects. Full estimation results are available in an online appendix. The database error defined as the difference between COMTRADE and WDI databases.

Table 10: Estimation method and sample selection sensitivity

	PTA_North	*PTA_South*
Tobit		
No censoring	0.079	0.411***
	(0.075)	(0.035)
Bottom 1% censored	0.080	0.411***
	(0.075)	(0.035)
Bottom 5% censored	0.079	0.406***
	(0.075)	(0.034)
Bottom 10% censored	0.084	0.403***
	(0.073)	(0.034)
Heckman selection model		
Using no additional selection variable	0.110	0.430***
	(0.141)	(0.099)
Using Creditor	0.073	0.279***
	(0.146)	(0.103)
Using per capita real GDP	0.055	0.398***
	(0.142)	(0.097)
Median quantile	0.108	0.353***
	(0.088)	(0.040)
Prais-Winsten	-0.091	0.232***
	(0.089)	(0.066)

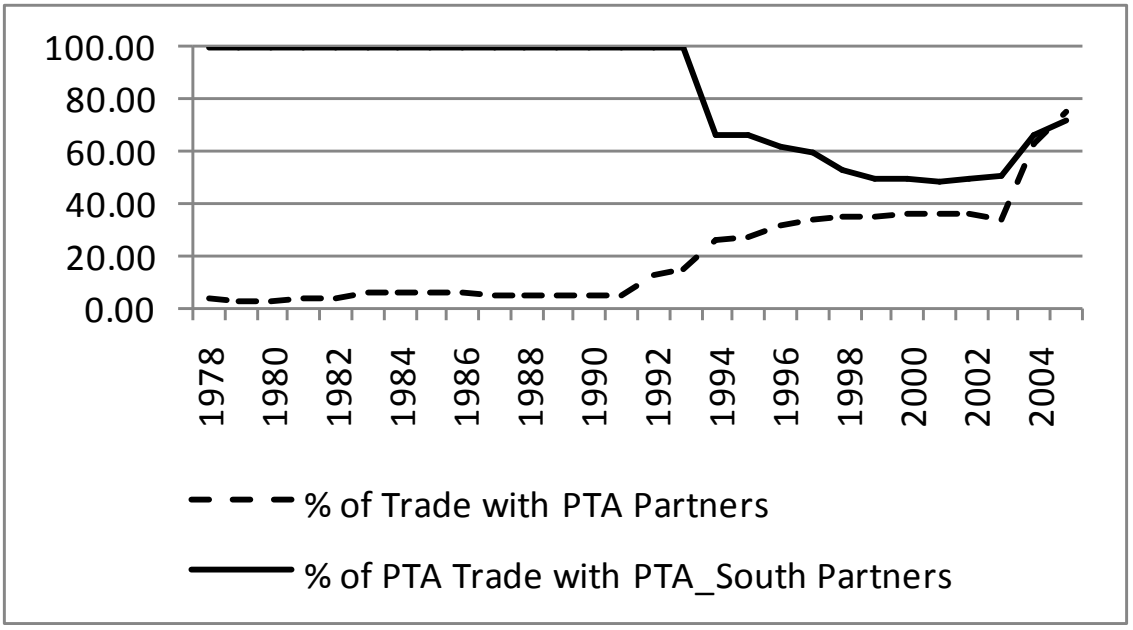
Notes: *Using no additional selection variable* refers to using the same control variables in the selection equation; *Using Creditor* refers to inclusion of creditors' rights variable for country *i* and *j* in the selection equation; *Using per capita real GDP* refers to including per capita GDPs of country *i* and *j* in the selection equation.

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.