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Abstract

This paper examines patterns and determinants of trade among developing countries (South-South trade), with emphasis on the role of production sharing in global economic integration of the Southern economies. It begins with an analytical narrative of the emerging trends and patterns of South-South trade using a classification system that helps delineating trade based on global production sharing (network trade) from total recorded trade. Then it undertakes a comparative econometric analysis of the determinants of South-South and South-North trade using the standard gravity model. There is evidence that the share of South-South trade in world trade has increased significantly over the past two decades. However, this increase has predominantly come from the dynamic East Asian countries, reflecting their growing engagement in global production sharing. The growth dynamism of East-Asia centered production networks depends heavily on demand for final (assembled) goods in the Northern markets; South-South trade is largely complementary to, rather than competing with, South-North trade. While regional trading agreements (RTAs) could play a role at the margin, natural economic forces associated with growth and structural change in the economy and the overall macroeconomic climate as reflected in the real exchange rate, and the quality of trade related logistics are far more important in the expansion of South-South network trade.

Keywords: global production sharing, production fragmentation, South-South trade, gravity model, regional trade agreements (RTA)

JEL classification: F02, F13, F15, O2

Production Sharing and South-South Trade

1. Introduction

The policy debate on promoting South-South trade has a history dating back to the late 1940s when development of the countries emerging from the colonial era (which were then called 'underdeveloped' or 'less-developed' countries) began to gain importance as a global policy objective.[1] It has regained new impetus following the onset of the global financial crisis in late 2007. The economic forces unleashed by the crisis are likely to probably hamper the growth momentum of the 'Northern' economies for years. By contrast, the major economies in the South, in particular Brazil, the People's Republic of China (PRC), India and a number of medium-sized economies in the South have withstood the trade and financial shocks of the crisis remarkably well, consolidating their position in the world economy. In this context, the old case for promoting South–South trade as a means of maintaining growth momentum in developing countries (the South) in the face of lacklustre economic prospects in the North has become a prime focus of the international development policy debate. For the first time, policy makers in Northern countries also have begun to see South-South economic corporation in a positive light in the hope that economic consolidation in the South could contribute to redressing global economic imbalances, which contributed to the onset of the global financial crisis.

In response to this new policy emphasis, a number of studies have examined the extent and emerging patterns of South-South trade.[2] All these studies are based on the conventional notion of horizontal specialization in which trade is essentially an exchange of goods that are produced from start to finish in just one country. They have overlooked the ongoing process of 'global production sharing'[3] (the splitting of the production processes into

[1] For details on this debate see Greenaway and Milner (1990), Diaz-Alejandro (1978) and Bhagwati (1996). Athukorala (2011, Section 2) provides a synthesis of this literature.

[2] See in particular WTO 2003, UNCTAD 2005 and 2008, OECD 2006 and IADB 2010.

[3] In the recent literature on international trade, an array of alternative terms have been used to describe this phenomenon, including 'international production fragmentation', 'vertical specialization', 'slicing the value chain' and 'offshoring outsourcing'. For a comprehensive survey of the related literature, see Helpman 2011, Chapter 6.

discrete activities/tasks which are then allocated across countries) and its growing importance in global economic integration of the Southern economies.

International production sharing is not an entirely new phenomenon.[4] What is new about the contemporary process of global production sharing is its wider and ever increasing product coverage, and its rapid global spread from mature industrial countries to developing countries (from the developed North to developing South). With a modest start in clothing and electronics industries in the late 1960s, international production networks encompassing the South have gradually evolved and spread to many industries such as sport footwear, automobile, televisions and radio receivers, sewing machines, office equipment, electrical machinery machine tools, cameras, watches, light emitting diodes, solar panel, and surgical and medical devices. At the beginning, developing countries' engagement in North-South production sharing was predominantly a two-way exchange between the home and host countries; parts and components were exported to the low-cost, host country for assembly, and the assembled components were re-imported to the home country for final sale or further processing (Helleiner 1973, Finger 1975). As supply networks of parts and components have become firmly established, producers in advanced countries have begun to move the final assembly of an increasing range of consumer durables (for example, computers, cameras, TV sets and motor cars) to Southern locations (Athukorala 2011, Hansen 2012, Krugman 2008).

Global production sharing opens up opportunities for countries to specialize in different slices (tasks) of the value chain in accordance with their comparative advantage. Therefore, in a context in which trade within global production networks (which we call here 'network trade') is growing rapidly, the standard trade flow analysis can lead to misleading inferences as to the nature and extent of trade integration among developing (Southern) countries, for two reasons. First, parts and components cross international borders several times before being embodied in the final products, resulting in possible double counting of trade flows as reported in the standard (official) trade data. Second, and perhaps more importantly, trade shares calculated using reported data can lead to wrong inferences as to the relative importance of the Southern countries and the rest of the world for the expansion of Sothern trade, even controlling for double-counting in trade. This is because trade in parts

[4] For instance, by the late 1950s, when the national trade data reporting systems of mature industrial countries had begun to produce disaggregated data to warrant some tentative estimation, components of machinery accounted for nearly 15% of manufacturing exports of these countries (Calculation based on the data appendix of Maizels 1963).

and components and related final goods ('final trade') are unlikely to follow the same geographic patterns. There is ample evidence that the demand for the final products exported from the South comes predominantly from the rest of the world, particularly from North America and countries in the European Union and hence Southern component trade can't be sustained purely as a regional phenomenon.The degree of distortion in South-South trade patterns depicted by the standard trade data analysis is likely to increase over time as more complex production networks are created with an ever-increasing number of participant countries (Jones and Kierzkowski 2004).

This paper aims to fill this gap in the literature by examining emerging trends and patterns of South-South trade from a broader global perspective while paying particular attention to the on-going process of global production sharing and developing countries' role within global production networks. To our knowledge, this is the first paper to explicitly take into account global production sharing in analysing patterns and determinants of South-South trade.

The paper is structured as follows. Section 2 describes the procedure followed in delineating network trade from data extracted from the United Nations (UN) trade data reporting system (*Comtrade* database). Section 3 provides an overview of the patterns of trade taking place within global production networks (network trade). Section 4 examines emerging trends and patterns of South-South trade with emphasis on the role of network trade. Section 5 reports the results of an econometric exercise undertaken to shed lights on the determinants of trade flows, distinguishing between the conventional (horizontal) and network trade. The final part summarizes the key findings and policy implications.

2. Trade data compilation

Previous studies have used two alternative approaches to quantifying the magnitude and pattern of global production sharing.[5] The first approach relies on records kept by OECD

[5]A number of recent studies have used imported input content of industrial production, estimated using input-output tables, to measure the growth of global production sharing in world trade at the industry/country level. Growth in the measured degree of imported-input dependence between two time points is interpreted as an indicator of the growth of global production sharing (Dean et al., 2008; Hummels et al., 2001; Johnson and Noguera 2012). This approach is not relevant for the present study, which aims to examine the patterns and determinants of production-sharing-driven trade flows.

countries (in particular the United States and the European Union [EU] in connection with special tariff provisions on overseas processing and the assembly of domestically produced components (outward processing trade [OPT] statistics) (Helleiner 1973; Sharpton 1975; Gorg 2000). The OPT records provide data on parts and components exported from source countries and assembled goods received in turn. However, the OPT schemes only cover a limited range of products, and the actual product coverage has varied significantly, both within and among countries over time. Perhaps more importantly, recent trends in unilateral trade and investment liberalization, and the proliferation of bilateral and regional economic integration agreements, have significantly reduced the importance of such tariff concessions in promoting global sourcing and, therefore, the actual utilization of these schemes. Moreover, by their very nature, these administrative records leave out cross-border transitions among third countries within global production networks.

The second approach, pioneered by Yeats (2001) and pursued in a number of subsequent studies (Kaminski and NG 2008; Athukorala and Yamashita 2008; Ando and Kimura 2010) involves delineating trade in parts and components by using individual country trade statistics extracted from the UN trade data reporting system (Comtrade database). Compared to the OPT-based trade flow analysis, this approach provides comprehensive and consistent coverage of the parts and components trade encompassing a large number of countries. However, parts and components are only one facet of network trade. As noted at the outset, there has been a remarkable expansion of network activities from pure component production and assembly to final assembly. Moreover, the relative importance of these two tasks varies among countries and over time in a given country, making it problematic to use data on the parts and components trade as a general indicator of the trends and evolving patterns of network trade over time and across countries. In this study we define network trade to incorporate both parts and components and final assembly.

Parts and components are delineated from the reported trade data using a list compiled by mapping parts and components in the UN Broad Economic Classification (BEC) with the Harmonize System (HS) of trade classification at the 6-digit level. The product list of the Word Trade Organization (WTO) Information Technology Agreement Information gathered from firm-level surveys conducted in Thailand and Malaysia were used to fill gaps in the BEC list of parts and components. Data compiled at the HS 6-digit level were converted to

the Standard International Trade Classification (SITC) (based on the SITC Revision 3) using the UN HS-SITC concordance for the final analysis.[6]

There is no hard and fast rule for delineating products assembled within global production networks from the reported trade data. The only practical way of doing this is to focus on the specific product categories in which network trade is heavily concentrated (Krugman 2008). Once these product categories are identified, assembly trade can be approximately estimated as the difference between parts and components (directly identified based on our list) and total recorded trade in these product categories. Guided by the available literature on production sharing, we identified seven product categories: office machines and automatic data processing machines (SITC 75), telecommunication and sound recording equipment (SITC 76), electrical machinery (SITC 77), road vehicles (SITC 78), professional and scientific equipment (SITC 87), photographic apparatus (SITC 88), clothing (SITC 84), footwear (SITC 85) and travel goods (SITC 86). It is quite reasonable to assume that these product categories contain virtually no products produced from start to finish in a given country. However, admittedly the estimates based on this list do not provide full coverage of final assembly in world trade because outsourcing of final assembly does take place in various miscellaneous product categories such as furniture, sporting goods, and leather products. The UN data system does not also permit accounting for assembly activities in software trade; these are lumped together with "special transactions" under SITC 9.

The conventional North-South categorization of countries is based on the UN Standard Country Classification. According to this classification the South encompasses developing Asia (excluding Japan), Latin America, Africa and the Middle East (WTO 2003, UNCTAD 2005). It is, however, debatable whether the newly industrialised economies (NIEs) in East Asia (Hong Kong, South Korea, Singapore and Taiwan), which have already gained maturity as trading nations, should be treated as belonging to this group. For this reason, some recent studies of South-South trade (eg. OECD 2006, Kowalski and Shepherd 2006) have used the World Bank's income-based country classification. According to this classification all low- and middle-income countries (countries with GNI per capita of US$ 11905 and less (as at 2008)) are grouped as developing (Southern) countries and thus excludes the NIEs from the list of Southern countries. In this study we define the South based on the standard UN classification in order to ensure comparability with the previous WTO

[6] For details on the method of classification and the list of parts and components see Athukorala (2010).

and UNCTAD studies. However, alternative tabulations excluding the NIEs are reported and discussed as an integral part of the analysis to see the sensitivity of the observed patterns to use of the two alternative definitions.

The data for all countries other than Taiwan are compiled from the UN Comtrade database. Data for Taiwan are obtained from the trade database of the Council for Economic Planning and Development, Taipei.

3. Global Production Sharing and Trade Patterns

Data on the role of trade based on global production sharing (network trade) in world manufacturing trade and the relative position of developing countries in this new form of international exchange are summarised in Table 1. In the early 1970s developing countries accounted for about 8% of world manufacturing trade. This figure had more than doubled by early 1990 and increased further to over 30% by the turn of the first decade in the new millennium.[7] Global production sharing has contributed disproportionately to this transformation in world trade. World network exports increased from US$ 2060 billion (about 44% of total manufacturing exports) in 1996-97 to US$ 4557 billion (51%) in 2009-10, accounting for over 60% of the total increment in world manufacturing exports during this period (Table 1).[8] The share of developing countries in total world network trade increased from 15.5% to 37.3% between these two time points.

Table 1 about here

Manufacturing trade of developing countries is heavily concentrated in developing Asia. Developing Asia's share in world manufacturing exports increased from 11.1% in 1996-97 to 23.1% in 2009-10 (amounting to an increase in Asia's share in developing

[7] Data reported in this paper, unless otherwise stated, are based on the UN *Comtrade* database.

[8] In order to minimise the effect of possible random shocks and measurement errors, two-year averages are used in inter-temporal comparison throughout this paper. The data (in current prices) reported here presumably understate the growing importance of network trade. There is evidence that increased participation of developing countries have accompanied by a decline in unit values of the network products, in particular that of final assembly.

country exports from 68% to 76%). Until the mid-1990s, the four newly industrialised economies (NIEs) (Hong Kong, South Korea, Taiwan and Singapore) were the dominant players. Since then China has played the dominant role: China's share increased from 3.6% to 15.7% (accounting for 22.1% and 47.6% of total developing country exports). The share of NIEs has remained virtually unchanged around about 12% during this period. Notwithstanding the notable export expansion in recent years, India still accounts for a mere 1.5% of total world manufacturing exports, equivalent to less than 5% of the Developing Asian total. The shares of Middle-East, Africa and Latina America and the Caribbean too have recorded a modest increase during this period, but these regions combined accounted for 7.7% of world manufacturing exports (24% of developing country manufacturing exports) in 2009-10.

Network trade is relatively more concentrated within developing Asia compared to total manufacturing trade. Within developing Asia, the share of NIEs in world final assembly exports has declined over the years as some of their assembly plants were relocated in China. China's share in world final assembly exports is larger (18.9%) compared to that in components (14.4%), reflecting China's role as the premier final assembly centre within global production networks (Athukorala 2011; Dean et al 2011). India remains a minor participant in global production networks even though it has great potential to benefit from this new form of international specialisation, given the abundance of relatively low-cost and trainable labour and the location in a region that has become the global centre of production networks. In 2009-10, India accounted for a mere 0.3% of component exports. Given that network trade has grown at a much faster rate in world trade compared to total manufacturing trade, failure to engage in global production networks is an issue central to (but yet unexplored) explaining India's relative export performance in the Asian context (Athukorala 2008; Krueger 2010).

The combined share of the non-Asian developing countries in world network exports amounted to 6.2% in 2009-10, up from 5.7% in 1996-97, with the increase coming predominantly from Latin America and the Caribbean. The country-level data (not reported here for want of space) show that Mexico and Brazil together accounts for over 80% of total assembly trade within that region. On the import side, developing Asia's share in world assembly imports is relatively smaller compared to the comparable figures on the export side.

Data reported in Table 2 show the relative importance of Southern markets for network exports from the Southern countries. In the mid-1990s, less than 40% of both components and final (assembled) goods originating in the South found markets within the Southern countries. These shares have increased continuously during the ensuing period, as production networks in the South (predominantly in developing East Asia) gained maturity and China emerged as global assembly centre. However, there has been a persistent 'Northern bias' in final assembly exports compared to components exports. In 2009-10, about 52% of total exports of final (assembled) goods destined to the Northern markets.

Table 2 about here

Table 3 about here

The data point to a greater concentration of Southern component exports in developing Asia (95.2%) compared to final assembly (79.4%) (Table 3). China alone accounts for 43.6% and 42.1% of Southern network exports and imports, respectively. The comparable figures for India are 7.1% and 6.8%. Africa and Latin America too are still minor players in Southern network trade, accounting for 2.2% and 7.0% respectively of total exports. In both regions, unlike in developing Asia, final assembly accounts for a much larger share of network exports.

The Northern bias in final assembly is far greater in China's exports compared to both overall and regional average: in 2009-10, 56% of China's final assembly found markets in the North. The time series data for the past one-and-half decades (not reported here), however, point to a notable decline in this figure over time. In the mid-1990s, exports to the North accounted for over 70% of Chinese final assembly. Interestingly, South-South exports accounts for a much larger share of NIEs' network trade (65%) compared to China and the regional average. Network exports in Africa and Latin America are heavily biased towards Northern market.

In sum, network trade in the South is predominantly a developing-Asian (more-specifically, an East Asian) phenomenon. The small-scale production networks in the other regions in the South operate quite independently of the East-Asia centered dynamic production networks. The growth dynamism of the East-Asia centered production networks depends crucially on exports of finally assembly to the Northern markets, suggesting that

production-sharing based international specialization cannot be sustained purely as a Southern phenomenon.

4. South-South Trade

The time pattern of South-South trade during the three decades up to the mid-1980s was rather erratic (Ventura-Dias 1989). There was a mild, but continuous increase in both the value (in current $) and share in total world trade of South-South trade during the period from 1970 to 1982, followed by a mild contraction in the ensuing three years. In 1985, South-South trade amounted to 7.8% of total world trade and about a third of total exports of developing countries. This declining trend, which largely reflected the lingering effect of the debt crisis that erupted in 1982, seems to have continued in the second half of 1980s (GATT 1986-90, annual).

According to recent studies, the share of South-South trade in world trade has recorded a persistent increase (measured on either import or export side) from about the early 1990s, in a significant departure from the patterns observed in the 1980s (WTO 2003, OECD 2006, ADB 2010). The data reported in Table 4 show that the South-South share had increased at faster rate over the past decade or so, from 11.2% in 2000-01 to 20.2% in 2009-10.[9] In the second half of 1990s, the share of South-South exports in total merchandise exports of developing countries remained around 40% without showing any clear trend. But it has increased steadily since then reaching 52.5 % in 2009-10. On the import side the increase has been even faster, from 38.6% in 2000-01 to 50.7% in 2009-10.

Table 4 about here

Table 5 about here

Table 5 presents data on South-South trade disaggregated by the major Southern regions, focussing on three key aspects of trade performance: the regional composition, the

[9]In order to ensure inter-regional comparability here we focus solely on non-fuel trade. However, inclusion or exclusion of fuel (products which come under category 3 of the International Standard Trade Classification (SITC 3)) does not significantly alter the overall patterns. The only notable difference is that, when fuel is excluded, Southern share in world exports has continued to remain about one percentage point higher than the Southern share in imports.

share in total trade, and the share of intra-regional trade in total Southern trade. Notwithstanding some regional diversification among the Southern countries, developing Asia accounts for the lion's share of South-South trade. In 2009-10 developing Asia accounted for 80.1% and 65.2% of intra-Southern non-oil exports and imports compared to 83.2.8% and 85.3% respectively in 1996-97. Between 1996-97 and 2009-10, China's share in total South-South trade increased from 31% to 39.1% on the export side, while its Southern import share declined marginally from 34.7% to 33.1%, reflecting its increasingly important role as an exporter of final assembly within the region. China's growing importance in South-South trade within the region has accompanied by a notable decline in Southern market shares of the NIEs. The share of South-South exports in total Southern exports increased from 40.2% in 1990-91 to 49.7% in 2009-10. On the import side the increase was from 29.8% to 48.4%. At the regional level, all Sothern regions have recorded notable increases in south-south trade shares, with developing Asia recording a relatively faster increase. In 2009-10, exports to and imports from the Sothern countries accounted for 53.2% and 47.0% of total exports and imports respectively of developing Asian countries; the relatively larger share on the export side points to the rapid expansion of final manufactured goods from China and NIEs in Southern markets at the expense of imports coming from the traditional Northern sources.

The commodity composition of South–South trade is dominated by manufactured goods, although there are notable differences among Southern countries/regions, reflecting differences in resource endowments, and the stage of development (Table 6). Manufactured goods account for the lion's share of developing Asia's Southern exports, 91.2% in 2009-10, compared to 77.8% in the Middle East, 59.0% in Africa and 58.4% in Latin America. Interestingly, manufacturing share in exports to developed countries from all four regions is closely comparable to, or slightly higher than, their exports to the Southern countries. Overall these patterns run counter to the hypothesis that developing countries have a tendency to rely heavily on 'easy' regional markets for manufacturing export expansion.

Table 6 about here

In the previous section**,** we observed that within the Southern manufacturing trade network trade has been growing much faster than the conventional horizontal trade, with a heavy concentration of component trade within developing Asia. In this context, given the peculiarities of network work trade emphasised at the outset of this paper, how robust are the

inferences we have made so far in this section about the degree and patterns of South-South trade based on an analysis of the standard trade data?

To address this issue we recalculated South-South trade shares after purging parts and components from the trade data (Table 7). Comparison of these estimates with those in Table 4 shows that when components are netted out from the trade data, the share of South-South trade in world manufacturing exports is systematically smaller in every year over the past decade. For instance, in 2009-10, the South-South share in total manufacturing exports based on unadjusted and adjusted data is 20.2% and 18.0% respectively. For the period 2000-2010 the average discrepancy is around 3.5 percentage points. However, the overall trend in South-South shares is remarkably insensitive to the inclusion/exclusion of parts and components in our calculations.

Table 7 about here

Table 8 about here

At the regional level, there are notable differences between the adjusted and unadjusted estimates (Table 8). For instance, according to the un-adjusted (original) data, in 2009-10 Asia accounted for 85.2% of total South-South manufacturing exports. Once the parts and components are excluded, this figure drops to 78.8%. Naturally, South-South shares of the other regions become larger when the adjusted data are used given the heavy concentration of components in exports from developing Asia. However, the overall regional rankings in a given year or over time remain unchanged.

5. Determinants of Trade Flows

This section reports the results of an econometric exercise undertaken to examine whether there is significant difference between South-South and South-North trade in terms of the key determinants commonly considered important in determining trade flows. The key issue is whether there is untapped potential in South-South trade, or more specifically is trade among developing countries too little compared to what we would expect in terms of the standard determinants of trade flows. This issue is particularly important for trade in final assembly given its role in determining the dynamism of network trade, which accounts for a rapidly growing share of South-South trade.

The analytical tool used here is the gravity model, which has become the 'workhorse' for modelling bilateral trade flows. The standard gravity model postulates that trade between two countries, like the gravitational force between two masses, is a function of their economic size and the geographic distance between them.[10] After augmenting the basic model by adding a number of explanatory variables which have found in previous studies to improve the explanatory power, the estimation equation is specified as,

$$Ln\ TRD_{ijt} = \alpha + \beta_1 lnGDP_{it} + \beta_2 lnGDP_{jt} + \beta_3 lnLPI_{it} + \beta_4 lnDST_{ijt} + \beta_5 lnRER_{ijt} + \beta_6 RTA_{ijt} + \beta_7 ADJ_{ijt} + \beta_8 COML_{ijt} + \beta_9 lnCLNK_{i,jt} + \beta_{10} EAD + \beta_{11} GFC + \gamma T + \varepsilon_{ij}$$

where, *TRD* is bilateral trade, the subscripts *i* and *j* refer to the reporting (exporting) and the partner (importing) country, and *ln* denotes natural logarithms. The explanatory variables are listed and defined below, with the postulated sign of the regression coefficient in brackets.

GDP	Real gross domestic product (GDP), a measure of the economic size (+)
LPI	Logistic performance index (+)
DST	The distance between the economic centres of *i* and *j*(-)
RER	Real bilateral exchange rate (+)
RTA	A binary dummy which is unity if both *i* and *j* belong to the same Regional trade agreements (*RTA*) and 0 otherwise (+)
ADJ	A binary dummy variable which takes the value one if *i* and *j* share a common land border and zero otherwise (+)
COML	A dummy variable which takes the value one if *i* and *j* have a common language (a measure of cultural affinity) and zero otherwise (+)
CLNK	Colonial economic link dummy which takes the value one for country pairs with colonial links and zero otherwise (+)

[10] The gravity model originated in Tinbergen (1962), which still remains one of the best available non-technical expositions of the model and its economic underpinnings. For recent methodological and theoretical advances in its applications to trade flow modelling see various contributions in Bergeijk and Brakman (2010).

EAD East Asian dummy (which takes the value one for countries in East Asia and zero for the other countries), to capture the East Asian countries dominant position in manufacturing (and network) trade.

GFC A binary dummy (1 for 2008 and 2009 and zero otherwise) included to capture trade disruption caused by the global financial crisis (+).

α A constant term

T A set of time dummy variables to capture year-specific 'fixed' effects

ε A stochastic error term, representing the omitted other influences on bilateral trade

The trade equation is estimated using annual data compiled from the exporter records in the UN trade data system (*Comtrade* database) during the period 1996-2009. Our data set covers 45 countries each of which accounted for 0.01% or more of total world manufacturing exports in 2004-05. The trade data in nominal US$ are converted into real terms using US trade price indices extracted from the US Bureau of labour Statistics database. Data on real *GDP* and per capita *GDP* are extracted from the World Bank *World Development Indicators* database. Data on *LPI* come from the *Logistics Performance Index* database of the World Bank (Arvis et al., 2007), which provides the first in-depth, cross-country assessment of trade-related logistic provisions. The data on bilateral distance come from the trade patterns database of the French Institute for Research on the International Economy (CEPII). The CEPII distance measure is a composite measure of the bilateral great-circle distance between major cities of each economy compiled by taking into account the trading significance of each city in each economy. For a complete listing of variables and data sources see Appendix Table A-1.

Of the three standard panel data estimation methods (pooled OLS, random-effects, and fixed-effects estimators), the fixed effect estimator is not appropriate in this case because the model contains a number of time-invariant explanatory variables which are central to our analysis. In experimental runs, we used both pooled OLS and random-effects (RE) estimators. The Hausman test rejected the null hypothesis of random effects, favouring the use of random effects estimator (REE) over the OLS counterpart. However the simple RE estimators can yield bias and inconsistent coefficient estimates if one or more explanatory variables are endogenous (that is, if they are jointly determined together with the dependent variable). In our case, there are reasons to suspect that FTA and reporting-country GDP are

potentially endogenous for a number of reasons (Brun et al 2005; Baier and Bergstrand 2007). The endogeneity problem is particularly important in estimating the impact of FTA on bilateral trade flows because the trade agreements are normally signed between the countries that already have achieved certain level of bilateral trade. Unobserved characteristics of some country pairs that may facilitate FTAs such as political links and security concerns can also result in the correlation of FTA dummies with the error term. There can also be reverse causation running from trade to GDP, even though the potential endogeneity problem may not be as important as in the case of the FTA variable in the context of a cross-country gravity model.[11] Given these concerns, we re-estimated the model by the instrumental variable estimator proposed by Hausman and Tayler (henceforth HTE estimator). The HTE redresses the endogeneity problem in cross-section gravity models by using instruments derived exclusively from inside the model to capture various dimensions of the data. Its superiority over REE in generating consistent coefficient estimates of the gravity model has been demonstrated by a number of recent studies.[12]

The preferred HT estimates for total (non-oil), manufacturing, non-network product[13], and network products disaggregated into components and final assembly are reported in Table 9.[14] In terms of the overall fit, all equations perform well with adjusted R^2s of closer to 0.70 in all cases. The coefficients of the two standard gravity variables (GDP and *DST*) in all equations and those of most of the other variables are statistically significant with the expected signs. A number of interesting patterns emerge from a comparison of estimated trade equations for South-South trade with those for total Southern trade and South-North trade.

Table 9 about here

In all three equations relating to network trade (for parts and components, final assembly and total), the coefficient of the reporter GDP is relatively larger for network trade compared to total non-oil trade and manufacturing trade. The GDP variable in the model is an

[11] In the dataset, the trade variable is on a bilateral basis whereas the GDP varies only in the country dimension.

[12] See Egger (2005) and Serlenga and Shin (2007) and the works cited therein.

[13] Total manufacturing minus network products.

[14] The alternative RE estimates are reported in the Appendix Table A-2 for comparison.

indication of a given country's economic size and also of its degree of diversification of its production base. These results are, therefore, consistent with our earlier observation that Southern network trade is heavily concentrated in relatively advanced and dynamic economies in this country group.

The coefficient of the partner (importer) GDP variable in equation for total South-South network trade (1.95) is 0.19 percentage points smaller compared to that in the South-North trade (2.14), and the difference lies well beyond two standard errors from the two coefficients. This result is consistent with the view that the rate of growth of Southern network exports to Southern markets has lagged behind the trade potential in these markets as measured by these countries' economic size.

The demand for component within global production networks depends largely on the expansion of assembly activities in exporting countries within production networks rather than on the final demand in importing countries. For this reason, partner country GDP may not be an appropriate activity variable for explaining component trade (Baldwin and Taglioni 2011). However, interestingly our inference remains valid (and become stronger) even when we focus specifically on the coefficient of the partner-country GDP variable in the equation for final assembly, ignoring that for components. The coefficient of partner country GDP in South-South final assembly exports (2.12) is 0.47 percentage point smaller than the comparable coefficient in the South-North final assembly export equation (2.59).

The results for the real exchange rate variable (RER) suggest that international competitiveness of traded goods production has a significantly larger effect on South-South final goods exports (and hence on total network exports): one percentage point depreciation of the real exchange rate from the mean level is associated with an expansion in final assembly exports by 0.40 percentage points. The estimated coefficient of the real exchange variable in the parts and components equation is much smaller (0.20) and statistically significant only at the 20% level presumably because the demand for component is determined largely by factors specific to the production process rather than by relative prices. Also, procurement of parts and components is mostly 'relation specific', based on long-term supply links between final assemblers and component suppliers.

The quality of trade related logistics as measured by the World Bank logistic performance index is found to be a significant determinant of Southern network trade, with a significantly greater impact on final goods exported to Southern markets.

The coefficient of the RTA variable is highly significant in the South-South final goods equation. This result is consistent with the fact that tariffs on final electrical and electronics goods still remain high in most developing countries, notwithstanding significant liberalisation of electronics trade under the WTO Information Technology Agreement which came into effect in 1996 (WTO 2003). Also, trade within global production networks is believed to be more sensitive to tariff changes compared to non-network trade (or total trade as captured in published trade data) (Yi 2003). This is because normally a tariff is incurred each time a good-in-process crosses a border. Consequently, a one percentage point reduction in tariff leads to a decline in the cost of production of a vertically integrated good by a multiple of this initial reduction, in contrast to a 1 per cent decline in the cost of a regular traded good. Tariff reduction may also make it more profitable for goods that were previously produced entirely in one country to become vertically specialized. Consequently, the trade-stimulating effect of FTAs would be higher for network trade than for normal trade, other things remaining unchanged. The coefficient of RTA variable in the parts and component equation in all three sub-tables is not statistically significant. This is consistent with the fact that almost all countries (both Southern and Northern) permit duty free entry of parts and components as part of their export promotion policy package.

There is a striking defence between South-North and South-South trade relating to the result for the real exchange rate variable. It is statistically significant at the one-percent level in all six equations relating to South-South trade. By contrast it is significant only for non-network trade (and insignificant with the perverse sign in the other four case) for South-North trade. This contrasting results strongly support the hypothesis that macroeconomic policy regimes in most developing countries which results in persistent appreciation of the real exchange rate is a significant constraint on the expansion of South-South trade. On average, a one percentage point appreciation in the real exchange rate seem to reduce total non-oil South-South trade by 0.27 percentage point and network trade by 0.47 percentage point.

Finally, the coefficient of the East Asian country dummy variable (*EAD*) is highly significant with a positive sign in all equation for South-South trade. The magnitude of this coefficient is much larger in the equation for parts and components: after controlling for the other explanatory variables the level of component trade from East Asia is fifteen times

larger than the average level for the other countries covered.[15] This finding is consistent with the heavy regional concentration of East Asia parts and component trade.

6. Conclusion and policy inferences

South-South trade has been a dynamic component of global trade over the past two decades. There has been a clear upward trend in the share of South-South trade in world trade since the early 1990s, with a notable increase in the rate of increase over the past decade. Developing Asia, in particular East Asia dominates the scene with China playing a pivotal role. There is some evidence of expansion in South-South trade in other parts of the world, but this has not yet made a notable difference to the dominance of developing Asia in South-South trade. The growth of South-South trade over the past two decades has been heavily concentrated in manufacturing trade. Rapid global spread of production sharing from the mature industrial countries to developing countries has played an important role in the expansion of South-South manufacturing trade.

The rapid expansion of global production sharing in the South is predominantly an East Asian phenomenon. The small-scale production networks in the other regions in the South operate quite independently of the East-Asia centered dynamic production networks. The dependence of the growth dynamism of the East-Asia centered production networks on the Northern markets has significantly reduced over time. However, the general inference that production-sharing based international specialization cannot be sustained purely as a regional phenomenon still remains valid: over nearly 50% of final assembly within Asian production networks is still destined to the Northern markets.

Our comparative analysis of export performance clearly illustrates that India still remains a minor player in global production sharing, notwithstanding its intrinsic comparative advantage and geographical proximity to the dynamic East Asian economies. Why India has failed to benefit from this new form of international exchange is an important issue for further research. Almost all available studies of India's export performance in the reform era have solely focussed on comparative performance in traditional labour intensive

[15] Note that as the model is estimated in logs, the percentage equivalent for any dummy variable coefficient is [exp (dummy coefficient)- 1]*100.

products (such as clothing and footwear), ignoring the pivotal role played by network-related products in the export success of China and other East Asian countries.

East Asia's unique role within global production networks and the growing cross-border trade in parts and components, seems to have somewhat inflated the estimates of South-South share in world trade, and Developing Asia's dominance in South—South trade. But netting out of parts and components does not seem to significantly alter either overall trends in South-South trade or Asia's pre-eminence in South-South exchange. South-South trade seems to be complementary to, rather than competitive with, South-North trade.

There is some evidence from our trade flow modelling exercise that South-South trade in final assembly has lagged behind the rate of expansion in market opportunities in the South. The experience of the East Asian success in exploiting gains from global production sharing suggest that exploiting this untapped potential requires creating a policy climate to facilitate global integration of national economies, including concurrent liberalisation of trade and investment regimes and reducing the cost of services links involved in global production sharing through the development of necessary infrastructure and improving the quality of trade-related logistics. The global spread of production networks has been predominantly driven by natural economic forces associated with structural changes in trade and production structures of countries as part of their integration into the global economy. However, there is strong empirical evidence that real exchange rate appreciation act as a constraint on the expansion of South-South trade. Why South-South trade flows are much more sensitive to real exchange rate changes compared to South-North trade is an important empirical issue for further research.

There is also evidence that RTAs have a significant positive effect on the expansion of South-South final assembly trade. However, this finding does not warrant the inference that entering into RTA is a superior alternative to multilateral (WTO) or unilateral MFN approach to trade liberalisation. Given the paucity of data on tariff and non-tariff protection, we were not able to capture the impact of changes in the level of overall trade protection on network trade. What our results for the RTA variable simply imply is that market opening in general has a significant positive effect of network trade. There are strong reasons to argue that multilateral (WTO) or unilateral MFN approach to market opening could yield a superior outcome.

In reality, trade effect of any FTA would depend very much on the nature of rules of origin (ROOs) built into it. Trade-distorting effects of rules of origin are presumably more detrimental to network trade than to conventional final-goods trade, because of the inherent difficulties in defining the 'product' for duty exemption and the transaction costs associated with the bureaucratic supervision of the amount of value added in production coming from various sources. Even small differences in ROOs among criss-crossing FTAs can raise business costs and divert trade and associated investment. Those costs are much more onerous for small and medium-size trading firms in developing countries than they are for large corporations. There are two other complications involved in bringing network trade under FTAs (or other preferential trading arrangements).

First, formulating ROOs for network-related trade is rather complicated business. The conventional value-added criterion is not virtually applicable to this trade because the products involved are low-value added by very nature. The only viable option is to go for 'change in tariff lines based' ROOs, but this leads to insurmountable administrative problems because electrical and electronics goods and the related parts and components belong to the same tariff codes (at the HS-6 digit level, which is the normal base for designing this type of ROOs).

Second, the process of international production fragmentation and the network-based international production is characterized by continuous emergence of 'new' products. Given the obvious administrative problems involved in revising ROOs in tandem, product invention/innovation naturally opens up room for unnecessary administrative delays and/or tweaking of rules as a means of disguise protection. Moreover, given the importance of extra-regional market for final goods for the growth dynamism of production networks in Asia, maintaining barriers to trade against non-members (while allowing free trade among members) can thwart 'natural' expansion of fragmentation-based trade across countries.

The experience to-date with FTA negotiation in the region (and beyond) clearly attests to the political power of producer interests in insulating a few heavily protected sectors against any attempt to cut tariffs through FTAs. The same sensitive products, which are proving hard to liberalise in the Doha Development Agenda of the WTO, or among APEC economies, are also routinely exempted from "free trade" deals. Furthermore, any marginal liberalisation of border barriers to these products tends to be negated by product-specific rules of origin and by retaining the right to impose less transparent forms of protection, such as anti-dumping actions.

There is also the possibility that authorities use ROOs as a means of protecting import-competing industries in a context where a country pursues both export-promoting and import-substitution industrialization strategies simultaneously (as is the case with a number of countries in the East Asian region). Twisting ROOs for this purpose become easier when the production process involves procuring parts and components from a number of sources: tightening ROOs on the procurement of one critical input would suffice to protect competing domestic producers of the final (assembled) product.

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Appendix Table A-1 about here

Appendix Table A-2 about here

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Table A- 1: Variables construction and data sources for gravity model estimation

Label	*Definition*	*Data Source/variable construction*
TRD	Value of bilateral trade (imports and exports) in US$ measured at constant (2000) price.	Exports (at CIF price, US$): compiled from importer records of UN-COMTRADE, online database Exports and import values are deflated by US import and export price indices extracted from the US Bureau of labour Statistics data base (http://www.bls.gov/ppi/home.htm).
GDP	Real GDP (at 2000 price)	World Development Indicator, The World Bank
DST	Weighted distance measure of the French Institute for Research on the International Economy (CEPII), which measures the bilateral great-circle distance between major cities of each country	French Institute for Research on the International Economy (CEPII) database
RER	Real exchange rate: $RER_{ij} = NER_{ij} * \frac{P_J^D}{P_i^W}$ where, NER is the nominal bilateral exchange rate index (value of country j's currency in terms of country i's currency) currency), PW in price level of country j measured by the producer price index and PD is the domestic price index of country i measured by the GDP deflator. An increase (decrease) in RER_{ij} indicates an improvement (a deterioration) in country i's international competitiveness relative to country j.	Constructed using data from World bank, World development Indicators database. The mean-adjusted RER is used in the model. This variable specification assumes that countries are in exchange rate equilibrium at the mean.
LPI	World Bank logistic performance index	LPI database, World Bank (Arvis et al. 2007)
RTA	A binary dummy variable which is unity if both country *i* and country *j* are signatories to a given regional trading agreement (RTA)	CEPII database
COML	A dummy variable which is unity if country *i* and country *j* have a common language and zero otherwise.	CEPII database
ADJ	A binary dummy variable which is unity if country *i* and country *j*share a common land border and 0 otherwise	CEPII database

Appendix Table A-2: Determinants of Bilateral Trade Flows (1996-2009) – Random Effects Estimates

(a) Total Southern Trade

	Non-oil	Manufacturing	Non-network products	Parts and components	Final assembly	Total network products
Log GDP exporter	1.01***	1.02***	1.24***	0.95***	1.33***	1.18***
	(26.02)	(25.01)	(29.17)	(18.10)	(27.26)	(24.59)
Log GDP importer	1.11***	1.09***	1.05***	1.13***	0.99***	1.05***
	(33.17)	(32.43)	(30.34)	(25.51)	(23.44)	(23.83)
Log distance	-1.26***	-1.31***	-1.65***	-1.57***	-1.37***	-1.27***
	(-17.93)	(-19.60)	(-22.78)	(-16.10)	(-15.52)	(-13.06)
Log real exchange rate	0.17***	0.22***	0.27***	0.28***	0.24***	0.32***
	(3.58)	(3.90)	(4.95)	(3.71)	(2.95)	(3.90)
Log logistic index	0.90***	1.17***	1.87***	2.63***	3.93***	3.20***
	(3.44)	(4.20)	(6.11)	(6.24)	(9.82)	(8.27)
RTA Dummy	0.10*	0.11	0.07	0.16	0.25**	0.25**
	(1.70)	(1.61)	(1.21)	(1.62)	(2.21)	(2.49)
Colony	0.43	0.30	0.28	0.28	0.55	0.49
	(1.35)	(0.85)	(0.84)	(0.86)	(1.37)	(1.38)
Contiguity	0.07	-0.19	-0.17	-0.39	-0.04	-0.10
	(0.27)	(-0.70)	(-0.64)	(-0.93)	(-0.10)	(-0.26)
Common language	0.46***	0.64***	0.76***	0.90***	0.32**	0.60***
	(3.87)	(5.32)	(6.14)	(5.33)	(2.09)	(3.66)
GFC Dummy	-0.18***	-0.23***	-0.16***	-0.28***	-0.31***	-0.35***
	(-7.87)	(-8.83)	(-4.85)	(-7.07)	(-5.41)	(-8.18)
East Asia Dummy	1.05***	1.47***	0.26**	2.83***	1.94***	2.56***
	(10.46)	(14.62)	(2.47)	(20.16)	(16.18)	(20.64)
Constant	-26.37***	-26.39***	-29.85***	-28.85***	-37.29***	-34.08***
	(-18.82)	(-18.85)	(-20.03)	(-15.49)	(-20.23)	(-18.55)
R2-within	0.42	0.37	0.27	0.23	0.22	0.31
R2-between	0.72	0.75	0.73	0.70	0.72	0.71
R2-overall	0.71	0.72	0.70	0.65	0.65	0.66
RMSE	0.53	0.62	0.65	0.93	1.08	0.97
Chi^2	4280.37	4604.18	3450.43	3127.75	3055.50	4123.52
N	11905	11881	11774	10460	9952	11597

Note: Statistical significant is denoted as ***1percent, **5percent, and *10percent. Statistical significance is based on standard errors (SEs) derived using the Huber-While consistent variance-covariance ('sandwich') estimator. Results for the time dummies are not reported.

Source: Author's estimations based on data sources detailed in the text

(b) South – North Trade

	Non-oil	Manufacturing	Non-network products	Parts and components	Final assembly	Total network products
Log GDP exporter	0.88***	0.86***	1.11***	0.84***	1.29***	1.11***
	(17.02)	(15.18)	(18.79)	(13.02)	(19.00)	(18.97)
Log GDP importer	1.15***	1.16***	1.22***	1.21***	1.13***	1.13***
	(27.16)	(28.85)	(28.32)	(23.31)	(18.62)	(20.45)
Log distance	-1.01***	-1.16***	-1.40***	-1.41***	-1.47***	-1.13***
	(-7.79)	(-9.24)	(-9.90)	(-9.50)	(-7.82)	(-6.75)
Log real exchange rate	0.01	0.01	0.03	0.28**	-0.04	0.09
	(0.20)	(0.11)	(0.36)	(2.35)	(-0.35)	(0.80)
Log logistic index	0.56*	1.09***	1.95***	2.77***	4.05***	3.68***
	(1.71)	(2.96)	(4.69)	(4.89)	(7.12)	(7.23)
RTA Dummy	0.05	0.03	0.05	0.06	0.11	0.14
	(0.76)	(0.35)	(0.67)	(0.50)	(0.76)	(1.13)
Colony	0.46	0.26	0.38	0.19	0.43	0.45
	(1.55)	(0.76)	(1.15)	(0.62)	(0.95)	(1.26)
Contiguity	1.13*	0.53	0.55	1.09**	1.12***	1.39***
	(1.91)	(1.41)	(0.79)	(2.19)	(2.85)	(3.59)
Common language	0.31**	0.51***	0.61***	0.87***	0.29	0.46*
	(2.01)	(3.07)	(3.34)	(3.96)	(1.21)	(1.96)
GFC Dummy	-0.21***	-0.28***	-0.21***	-0.28***	-0.27***	-0.39***
	(-8.42)	(-8.41)	(-4.38)	(-5.64)	(-3.68)	(-7.06)
East Asia Dummy	1.11***	1.52***	0.18	2.83***	2.14***	2.59***
	(8.67)	(11.02)	(1.28)	(15.50)	(11.77)	(15.43)
Constant	-25.82***	-25.49***	-33.62***	-29.63***	-39.26***	-36.21***
	(-12.24)	(-12.27)	(-14.95)	(-10.87)	(-12.21)	(-12.74)
R2-within	0.40	0.35	0.23	0.23	0.19	0.30
R2-between	0.78	0.78	0.76	0.74	0.72	0.75
R2-overall	0.75	0.74	0.72	0.69	0.65	0.69
RMSE	0.49	0.59	0.65	0.90	1.13	0.96
Chi^2	2325.44	2440.50	1763.90	1890.57	1480.40	2362.39
N	6520	6509	6448	5764	5507	6371

Note: Statistical significant is denoted as ***1percent, **5percent, and *10percent. Statistical significance is based on standard errors (SEs) derived using the Huber-While consistent variance-covariance ('sandwich') estimator. Results for the time dummies are not reported.

Source: Author's estimations based on data sources detailed in the text

(c) South – South Trade

	Non-oil	Manufacturing	Non-network products	Parts and components	Final assembly	Total network products
Log GDP exporter	1.12***	1.15***	1.36***	1.05***	1.33***	1.23***
	(20.82)	(21.02)	(25.51)	(12.10)	(19.82)	(15.45)
Log GDP importer	1.01***	0.95***	0.85***	1.03***	0.75***	0.96***
	(18.78)	(17.29)	(17.72)	(12.32)	(12.91)	(12.14)
Log distance	-1.37***	-1.38***	-1.71***	-1.62***	-1.25***	-1.32***
	(-15.82)	(-16.64)	(-22.00)	(-11.73)	(-12.79)	(-10.14)
Log real exchange rate	0.30***	0.38***	0.45***	0.30***	0.48***	0.48***
	(4.73)	(5.01)	(6.60)	(3.08)	(4.33)	(4.04)
Log logistic index	1.72***	1.72***	2.08***	3.05***	4.41***	3.11***
	(4.19)	(4.28)	(4.97)	(4.87)	(8.03)	(5.19)
RTA Dummy	0.25***	0.30***	0.10	0.48***	0.68***	0.52***
	(3.74)	(4.06)	(1.30)	(3.80)	(5.79)	(4.36)
Contiguity	-0.26	-0.41	-0.49*	-0.79*	-0.14	-0.47
	(-0.91)	(-1.34)	(-1.69)	(-1.71)	(-0.38)	(-1.01)
Common language	0.41**	0.62***	0.49***	0.78***	0.28	0.60***
	(2.52)	(3.81)	(2.96)	(3.31)	(1.55)	(2.70)
GFC Dummy	-0.15***	-0.18***	-0.09**	-0.29***	-0.38***	-0.32***
	(-3.71)	(-4.36)	(-2.10)	(-4.60)	(-4.17)	(-4.70)
East Asia Dummy	0.82***	1.26***	0.27*	2.67***	1.62***	2.37***
	(4.84)	(7.90)	(1.73)	(11.80)	(9.81)	(11.71)
Constant	-26.44***	-26.01***	-27.19***	-28.76***	-32.27***	-32.46***
	(-13.07)	(-12.77)	(-14.51)	(-9.65)	(-13.96)	(-11.49)
R2-within	0.43	0.39	0.31	0.24	0.28	0.32
R2-between	0.70	0.74	0.75	0.69	0.77	0.69
R2-overall	0.69	0.72	0.73	0.64	0.69	0.65
RMSE	0.58	0.65	0.65	0.97	1.02	0.98
Chi^2	2792.69	3236.62	2650.71	1710.33	2201.08	2141.13
N	5385	5372	5326	4696	4445	5226

Note: Statistical significant is denoted as ***1percent, **5percent, and *10percent. Statistical significance is based on standard errors (SEs) derived using the Huber-While consistent variance-covariance ('sandwich') estimator. Results for the time dummies are not reported.

Source: Author's estimations based on data sources detailed in the text

Table 1: Developing countries in world manufacturing trade, 1996-97, 2006-07 and 2009-10[1](Percentage share in world exports and imports by country groups)

EXPORTS	Total manufacturing			Parts and components			Final assembly			Total network products		
	1996-97	2006-07	2009-10	1996-97	2006-07	2009-10	1996-97	2006-07	2009-10	1996-97	2006-07	2009-10
Developing countries UN[2]	16.2	26.1	30.8	10.8	25.7	32.7	21.1	30.2	35.0	15.5	27.6	33.7
Developing countries WB[3]	13.4	23.6	28.1	7.9	22.1	26.4	18.5	28.2	32.7	12.7	24.7	30.1
Developing Asia	11.1	189.0	23.1	7.1	20.6	27.2	15.4	21.7	25.6	10.8	21.1	26.5
NIE4[4]	2.8	2.5	2.6	3.0	3.6	6.2	2.6	2.0	2.2	2.7	2.9	3.6
China	3.6	11.4	14.7	2.1	11.0	14.4	4.9	16.2	18.9	3.4	13.2	17.3
ASEAN[5]	3.7	3.6	3.9	1.8	5.7	5.9	7.7	2.9	3.3	4.5	4.5	4.8
South Asia	0.9	1.4	1.8	0.2	0.3	0.64	0.6	0.8	1.1	0.3	0.5	0.8
India	0.6	1.2	1.5	0.1	0.2	0.4	0.5	0.7	1.0	0.3	0.3	0.6
Middle-East	1.1	2.1	2.5	0.6	0.9	1.2	0.5	1.9	2.43	0.6	1.3	1.7
Africa	0.4	1.0	1.1	0.0	0.4	0.5	0.2	0.6	0.63	0.1	0.5	0.6
Latin America [6]	3.6	4.1	4.1	3.2	3.8	3.9	5.0	6.0	6.33	4.0	4.7	5.0
World	100	100	100	100	100	100	100	100	100	100	100	100
US$ billion	3973	9084	8979	1134	2728	2573	926	1992	1984	2060	4720	4557

I**MPORTS**	Total manufacturing			Parts and components			Final assembly			Total network products		
	1996-97	2006-07	2009-10	1996-97	2006-07	2009-10	1996-97	2006-07	2009-10	1996-97	2006-07	2009-10
Developing countries UN[2]	18.2	23.6	27.9	14.9	28.9	33.4	18.1	20.6	25.5	16.4	25.4	30.1
Developing countries WB[3]	15.8	21.8	26.1	12.6	27.0	31.4	16.6	19.1	23.9	14.4	23.7	28.2
Developing Asia	10.9	14.0	17.0	8.1	19.4	22.9	10.2	10.0	12.9	9.0	15.5	18.7
NIE[4]	11.9	9.4	9.9	12.9	14.5	15.9	11.1	6.8	7.0	12.1	11.3	12.1
China	2.6	7.2	9.1	2.8	11.1	13.8	0.8	4.5	6.34	1.9	8.3	10.7
ASEAN[5]	4.6	3.1	3.7	2.5	5.0	5.4	6.3	1.1	1.7	4.2	3.4	3.8
South Asia	1.0	1.5	2.0	0.5	1.2	1.5	1.3	2.3	2.7	0.9	1.7	2.0
India	0.5	1.4	1.4	0.2	0.5	0.7	0.2	0.4	0.6	0.2	0.5	0.7
Central Asia	0.1	0.4	0.4	0.0	0.2	0.2	0.2	0.6	0.6	0.1	0.4	0.3
Middle-East	2.1	3.9	3.9	1.2	2.5	2.0	3.0	5.1	5.8	2.0	3.6	3.6
Africa	1.2	2.0	2.7	0.2	1.3	1.9	2.0	2.9	3.7	1.0	2.0	2.7
Latin America[6]	4.0	3.7	4.2	5.4	5.6	6.6	3.0	2.6	3.2	4.3	4.4	5.2
World	100	100	100	100	100	100	100	100	100	100	100	100
US$ billion	3952	9160	9068	1098	2789	2720	935	2004	1993	2033	4793	4713

Note: 1. Two-year averages. 2. Based on the UN classification (including NIEs)

3. Based on the World Bank classification (excluding NIEs)

4. Hong Kong, Taiwan, South Korea, Singapore

5. Excluding Singapore 6. Including the Caribbean countries.

Source: Compiled from the UN Comtrade database.

Table 2: South-South share in network trade, 1996-2010 (percent)

	Total manufacturing	Parts and components	Final assembly
1996	40.5	37.5	36.9
1997	40.5	37.6	37.6
1998	37.4	37.2	37.5
1999	35.7	36.9	35.0
2000	36.8	38.5	35.9
2001	38.0	41.0	36.5
2002	39.2	44.1	36.5
2003	41.6	47.1	38.5
2004	42.0	47.6	39.0
2005	43.9	50.0	40.5
2006	44.9	51.2	41.6
2007	46.9	53.8	43.5
2008	48.1	54.6	45.1
2009	50.7	57.7	47.3
2010	51.4	56.9	48.7

Source: Compiled from UN Comtrade database

Table 3: South-South network trade by region, 2009-10[1]

	Regional composition of network trade			South-South share in network trade		
	Total	Parts and components	Final assembly	Total	Parts and components	Final assembly
Export						
Developing Asia	85.2	95.2	79.4	54.9	62.3	51.1
NIE[4]	21.9	27.3	18.8	65.0	64.5	65.3
China	46.6	51.8	43.6	50.1	62.6	44.0
ASEAN[5]	11.2	14.9	9.1	54.2	58.2	50.9
Southern Asia	5.1	1.3	7.4	56.8	51.0	57.5
Pacific	0.0	0.0	0.0	14.2	10.3	29.0
Central Asia West Asia	0.3	0.0	0.5	49.2	43.6	49.4
Middle East	5.6	1.3	8.1	43.9	31.9	45.6
Africa	2.2	0.6	3.1	40.8	33.3	41.9
Latin America and the Caribbean	7.0	2.8	9.5	34.1	18.7	39.9
Total	100	100	100	51.1	57.3	48.0
Imports						
Asia	84.1	94.8	78.2	49.3	54.7	46.8
NIE	22.9	28.6	19.7	61.1	59.1	62.8
China	45.8	52.4	42.1	44.4	55.3	39.0
Southeast Asia	9.7	12.5	8.1	42.3	42.8	41.9
Southern Asia	5.4	1.3	7.6	53.3	45.4	54.2
Pacific	0.0	0.0	0.0	12.8	7.1	28.2
Central Asia West Asia	0.3	0.0	0.5	47.5	43.0	47.8
Middle East	6.0	1.4	8.6	42.7	28.8	44.7
Africa	2.3	0.7	3.3	39.4	30.7	40.7
Total	100	100	100	42.8	47.2	40.9

Note: 1 Two-year average.

Source: Compiled from UN Comtrade database.

Table 4: South-South trade in world non-oil trade, 1990-2010

	S-S share in world exports	S-S share in Southern exports	S-S share in world imports	S-S share in Southern imports
1996	10.6	45.0	9.6	32.8
1997	10.9	44.8	10.1	34.3
1998	9.9	41.3	9.3	34.9
1999	9.9	39.9	9.6	35.9
2000	11.2	41.2	11.3	38.2
2001	11.4	42.1	11.4	38.9
2002	12.0	42.7	12.2	41.0
2003	12.8	44.2	13.0	43.2
2004	13.4	44.6	14.1	44.9
2005	14.7	46.1	15.3	46.9
2006	15.4	47.0	16.0	47.8
2007	16.3	48.8	16.5	48.8
2008	17.1	50.0	17.5	49.2
2009	18.7	51.7	18.6	49.7
2010	20.2	53.2	20.1	51.4

Source: Compiled from UN Comtrade database.

Table 5: South-South non-fuel trade by major regions, 2009-10

		Exports			Imports		
		Share in total Exports (%)	Share in S-S exports (%)	Intra-regional share	Share in total imports	Share in S-S imports (%)	Intra-regional share
Developing Asia	1996-97	44.7	83.2	83.2	37.1	85.3	89.2
	2006-07	48.6	80.5	80.1	48.8	71.1	88.4
	2009-10	53.2	80.1	77.2	47.0	65.2	84.5
NIEs	1996-97	47.2	33.5	37.0	35.5	26.3	31.0
	2006-07	52.3	24.7	25.3	45.3	16.5	56.5
	2009-10	57.3	22.9	21.9	31.9	9.8	76.1
China	1996-97	46.0	31.0	24.2	44.1	31.7	
	2006-07	46.8	38.5	31.0	51.6	32.6	
	2009-10	50.0	39.1	33.9	50.8	33.1	
Southeast Asia	1996-97	39.9	15.0	20.3	32.4	23.1	39.0
	2006-07	47.9	12.4	23.9	49.5	16.3	35.9
	2009-10	54.9	12.1	23.8	51.7	15.2	34.4
South Asia	1996-97	36.2	3.4	13.5	34.5	3.8	12.9
	2006-07	48.6	4.4	13.6	46.2	5.1	9.6
	2009-10	58.9	5.5	12.7	55.7	6.4	7.4
Pacific	1996-97	67.2	0.0	7.3	24.8	0.0	59.0
	2006-07	25.3	0.0	36.0	27.0	0.0	14.7
	2009-10	14.2	0.0	36.3	28.3	0.0	21.8
Central Asia	1996-97	34.5	0.4	29.1	25.8	0.4	21.7
	2006-07	41.7	0.5	24.3	27.3	0.6	13.4
	2009-10	48.4	0.4	25.3	32.6	0.6	9.6
Middle East	1996-97	28.8	3.0	34.3	16.9	3.7	28.5
	2006-07	39.4	6.2	42.3	35.3	9.1	21.2
	2009-10	37.9	5.9	34.0	37.6	9.0	19.1
Africa	1996-97	26.4	1.6	52.6	21.5	3.0	18.9
	2006-07	34.1	2.7	56.2	38.6	5.2	24.9
	2009-10	44.5	3..3	47.7	44.1	6.2	20.3
Latin America	1996-97	27.9	12.1	71.8	23.4	12.9	71.6
and the	2006-07	31.9	10.5	60.4	37.8	12.5	48.5
Caribbean	2009-10	38.4	10.7	52.7	43.6	13.1	42.6
Total South	1996-97	40.6	100	100	31.2	100.0	100
	2006-07	44.9	100	100	45.9	100.0	100
	2009-10	49.7	100	100	48.4	100.0	100

Source: Compiled from UN Comtrade database.

Table 6: The share of manufacturing in developing-countries non-fuel trade, 2009-10 (percent)

	South-South trade	South – North trade
(a) EXPORTS		
Developing Asia	*91.2*	92.5
NIEs	94.7	93.6
China	96.5	96.2
Southeast Asia	83.2	83.2
Southern Asia	71.7	89.2
Central Asia West Asia	55.1	62.7
Pacific	23.8	30.1
Middle East	77.8	84.8
Africa	59.0	68.7
Latin America	58.4	69.1
World	84.9	83.8
(b) IMPORTS		
Developing Asia	85.7	85.2
NIEs	88.6	89.4
China	87.7	85.3
Southeast Asia	87.4	88.5
Southern Asia	71.9	73.9
Central and West Asia	83.2	87.4
Pacific	74.4	65.5
Middle East	77.6	83.8
Africa	76.7	79.8
Latin America	84.0	88.1
World	84.7	83.7

Source: Compiled from UN Comtrade database.

Table 7: South-South trade in world non-oil trade net of parts and components, 1990-2010

	S-S share in world exports	S-S share in Southern exports	S-S share in world imports	S-S share in Southern imports
1996	12.4	40.9	7.6	30.1
1997	11.2	40.6	7.0	31.0
1998	10.2	37.5	6.5	31.7
1999	9.7	35.0	6.4	32.4
2000	10.5	35.9	7.4	34.9
2001	10.6	36.5	7.9	35.7
2002	10.6	36.5	8.0	36.7
2003	11.1	38.5	8.3	37.7
2004	11.6	39.0	8.8	38.9
2005	12.7	40.5	9.8	41.2
2006	13.4	41.6	10.3	42.1
2007	14.2	43.5	10.8	43.4
2008	15.2	45.1	11.7	44.0
2009	16.4	47.3	12.6	44.6
2010	18.0	48.7	13.5	45.6

Source: Compiled from UN Comtrade database

Table 8: Regional composition of South-South non-oil trade, 1996-97, 2006-07 and 2009-10[1]

	Total			Net of parts and components		
	1996-97	2006-07	2009-10	1996-97	2006-07	2009-10
Developing Asia	85.2	84.4	85.2	82.7	77.3	78.8
NIEs	28.4	22.7	21.9	26.1	17.8	18.9
China, PRC	38.1	45.6	46.5	36.8	44.2	43.5
Southeast Asia	15.2	11.8	11.2	15.9	9.5	9.1
South Asia	3.2	3.9	5.1	3.8	5.8	7.4
Central Asia	0.3	0.3	0.3	0.4	0.5	0.5
Middle East	3.4	6.0	5.6	3.8	8.7	8.1
Africa	1.2	1.9	2.2	1.5	2.9	3.1
Latin America and the Caribbean	10.2	7.7	7.0	11.7	10.5	9.5
	100	100	100	100	100	100

Note: 1 Two year average.

Source: Compiled from UN Comtrade database

Table 9: Determinants of Bilateral Trade Flows (1996-2009) – Hausman Taylor Estimations

(a) Total Southern Trade

	Non-oil	Manufacturing	Non-network products	Parts and components	Final assembly	Total network products
Log GDP exporter	1.42***	1.46***	1.44***	1.69***	1.58***	1.81***
	(24.82)	(23.05)	(23.20)	(18.84)	(17.88)	(19.60)
Log GDP importer	1.77***	1.71***	1.57***	1.92***	1.58***	1.67***
	(28.66)	(24.16)	(21.20)	(17.09)	(12.66)	(15.62)
Log distance	-1.52***	-1.58***	-1.88***	-1.90***	-1.67***	-1.52***
	(-14.74)	(-14.60)	(-19.69)	(-12.13)	(-12.05)	(-11.03)
Log real exchange rate	0.18***	0.24***	0.27***	0.32***	0.26***	0.35***
	(7.77)	(8.65)	(9.41)	(7.37)	(4.86)	(8.13)
Log logistic index	0.30	0.31	1.60***	0.37	1.72***	1.06**
	(1.11)	(1.02)	(5.23)	(0.81)	(3.55)	(2.37)
RTA Dummy	0.10***	0.10**	0.10**	0.07	0.13*	0.12*
	(2.96)	(2.51)	(2.33)	(1.14)	(1.73)	(1.91)
Colony	-0.37	-0.45	-0.37	-0.67	-0.22	-0.26
	(-0.82)	(-0.97)	(-0.91)	(-0.99)	(-0.38)	(-0.44)
Contiguity	-0.58	-0.88**	-0.65*	-1.32**	-0.63	-0.90*
	(-1.43)	(-2.07)	(-1.77)	(-2.18)	(-1.25)	(-1.71)
Common language	0.21	0.42**	0.54***	0.74***	0.24	0.48*
	(1.08)	(2.08)	(3.14)	(2.59)	(0.99)	(1.91)
GFC Dummy	-0.56***	-0.52***	-0.58***	-0.51***	-0.25***	-0.42***
	(-12.06)	(-10.00)	(-11.05)	(-6.32)	(-2.89)	(-5.44)
East Asia Dummy	1.01***	1.47***	0.25*	3.00***	2.33***	2.75***
	(6.96)	(9.60)	(1.87)	(13.59)	(12.17)	(14.15)
Constant	-50.72***	-50.61***	-46.28***	-63.22***	-54.31***	-61.95***
	(-23.29)	(-20.93)	(-19.98)	(-17.70)	(-15.52)	(-18.46)
chi2	8755.42	7324.90	4930.59	3862.37	3590.33	5847.08
N	11905	11881	11774	10460	9952	11597

Note: Statistical significant is denoted as ***1percent, **5percent, and *10percent. Statistical significance is based on standard errors (SEs) derived using the Huber-While consistent variance-covariance ('sandwich') estimator. Results for the time dummies are not reported.

Source: Author's estimations based on data sources detailed in the text

(b) South – North Trade

	Non-oil	Manufacturing	Non-network products	Parts and components	Final assembly	Total network products
Log GDP exporter	1.37***	1.45***	1.40***	2.06***	1.84***	2.00***
	(17.85)	(15.39)	(14.79)	(14.19)	(11.76)	(14.06)
Log GDP importer	1.89***	2.21***	1.83***	2.59***	1.88***	2.14***
	(18.32)	(17.58)	(15.37)	(13.04)	(9.19)	(11.69)
Log distance	-1.07***	-1.48***	-1.61***	-2.18***	-2.13***	-1.74***
	(-4.89)	(-5.33)	(-7.16)	(-4.75)	(-5.50)	(-5.15)
Log real exchange rate	0.02	0.01	0.03	0.33***	-0.03	0.13*
	(0.59)	(0.16)	(0.71)	(5.01)	(-0.35)	(1.92)
Log logistic index	-0.23	-0.23	1.46***	-0.79	-0.71	-0.24
	(-0.67)	(-0.55)	(3.38)	(-1.23)	(-0.93)	(-0.37)
RTA Dummy	0.10***	0.07	0.10**	0.05	0.03	0.08
	(2.68)	(1.47)	(2.04)	(0.70)	(0.29)	(1.03)
Colony	0.03	-0.40	-0.01	-0.57	-0.11	-0.12
	(0.05)	(-0.60)	(-0.02)	(-0.55)	(-0.13)	(-0.16)
Contiguity	0.43	-0.64	-0.08	-1.56	-0.83	-0.75
	(0.37)	(-0.45)	(-0.07)	(-0.70)	(-0.45)	(-0.45)
Common language	-0.45	-0.51	-0.01	-0.32	-0.12	-0.20
	(-1.24)	(-1.13)	(-0.02)	(-0.46)	(-0.19)	(-0.38)
GFC Dummy	-0.50***	-0.54***	-0.73***	-0.57***	-0.09	-0.19
	(-7.92)	(-7.08)	(-9.49)	(-4.51)	(-0.65)	(-1.64)
East Asia Dummy	1.09***	1.64***	0.23	3.28***	3.11***	3.17***
	(4.76)	(5.79)	(1.02)	(7.47)	(8.12)	(9.30)
Constant	-56.43***	-63.95***	-54.40***	-87.06***	-62.69***	-73.67***
	(-15.19)	(-14.20)	(-13.41)	(-12.36)	(-9.05)	(-12.32)
chi2	4458.59	3675.26	2147.92	1961.19	1523.10	2976.47
N	6520	6509	6448	5764	5507	6371

Note: Statistical significant is denoted as ***1percent, **5percent, and *10percent. Statistical significance is based on standard errors (SEs) derived using the Huber-While consistent variance-covariance ('sandwich') estimator. Results for the time dummies are not reported.

Source: Author's estimations based on data sources detailed in the text

(c) South – South Trade

	Non-oil	Manufacturing	Non-network products	Parts and components	Final assembly	Total network products
Log GDP exporter	1.61***	1.73***	1.66***	1.74***	1.54***	1.94***
	(17.15)	(17.33)	(18.37)	(12.55)	(12.60)	(13.52)
Log GDP importer	2.04***	1.86***	1.58***	2.12***	1.34***	1.95***
	(17.95)	(14.60)	(12.40)	(10.57)	(6.41)	(10.22)
Log distance	-1.79***	-1.78***	-2.01***	-2.11***	-1.48***	-1.76***
	(-12.48)	(-12.26)	(-16.62)	(-9.69)	(-8.79)	(-9.22)
Log real exchange rate	0.27***	0.36***	0.43***	0.29***	0.47***	0.47***
	(7.72)	(9.09)	(10.73)	(4.69)	(6.86)	(7.79)
Log logistic index	0.94**	0.79	1.69***	0.75	2.59***	1.23*
	(2.12)	(1.64)	(3.73)	(1.05)	(3.88)	(1.76)
RTA Dummy	-0.00	0.05	-0.05	0.08	0.37***	0.11
	(-0.03)	(0.60)	(-0.57)	(0.60)	(2.61)	(0.85)
Contiguity	-1.47***	-1.58***	-1.31***	-2.13***	-0.70	-1.77***
	(-2.98)	(-3.19)	(-3.23)	(-2.99)	(-1.32)	(-2.77)
Common language	0.20	0.45	0.33	0.69*	0.34	0.47
	(0.75)	(1.64)	(1.49)	(1.76)	(1.20)	(1.34)
GFC Dummy	-0.69***	-0.66***	-0.57***	-0.65***	0.05	-0.55***
	(-8.24)	(-7.12)	(-6.40)	(-4.62)	(0.34)	(-4.02)
East Asia Dummy	0.72***	1.16***	0.19	2.77***	1.90***	2.43***
	(2.99)	(4.79)	(0.94)	(7.97)	(7.25)	(7.70)
Constant	-60.79***	-59.85***	-50.20***	-67.88***	-49.55***	-70.34***
	(-16.58)	(-15.02)	(-13.63)	(-11.46)	(-9.01)	(-12.28)
chi2	4250.05	3662.28	2829.96	1828.60	2129.34	2768.53
N	5385	5372	5326	4696	4445	5226

Note: Statistical significant is denoted as ***1percent, **5percent, and *10percent. Statistical significance is based on standard errors (SEs) derived using the Huber-While consistent variance-covariance ('sandwich') estimator. Results for the time dummies are not reported.

Source: Author's estimations based on data sources detailed in the text

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