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Prema-chandra Athukorala
and
Shahbaz Nasir

Arndt-Corden Department of Economics
Crawford School of Economics and Government
AUSTRALIAN NATIONAL UNIVERSITY

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Prema-chandra Athukorala* **and Shahbaz Nasir**

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* Professor in Australian National university, An earlier version of this paper was presented in a South Centre Conference, "State of the Global Economy and Reflections on Recent Multilateral Negotiations", held in Palais des Nations, Geneva, 2-3 February 2012. To contact please email to: premachandra.athukorala@anu.edu.au; shahbaz.nazir@anu.edu.au

Global Production Sharing and South-South Trade

Prema-chandra Athukorala [*] ***and Shahbaz Nasir***

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] This debate, which remained dormant for over two decades, has regained new impetus following the onset of the global financial crisis in late 2008. 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 and have continued to maintain their pre-crisis growth momentum, consolidating their position in the world economy. These countries now account for a substantial (and rapidly expanding) share of world output and have become major drivers of global trade expansion. 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 have also 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.

The available literature on the extent, patterns and determinants of South-South trade is based on the conventional notion of horizontal specialization, in which trade takes place in the form of final goods

[*] Professor in Australian National university, An earlier version of this paper was presented in a South Centre Conference, "State of the Global Economy and Reflections on Recent Multilateral Negotiations", held in Palais des Nations, Geneva, 2-3 February 2012. To contact please email to: premachandra.athukorala@anu.edu.au; shahbaz.nazir@anu.edu.au

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

(goods that are produced from start to finish in a given country).[2] It has largely ignored the ongoing process of global production sharing—the breakup of the production processes into geographically separated stages.[3] Global production sharing opens up opportunities for countries to specialize in different slices (tasks) of the production process depending on their relative cost advantage and other relevant economic fundamentals. Decisions about how much to produce and for which market have to be combined with decisions about whether to produce and with what degree of intra-product specialisation. Therefore intra- and extra-regional patterns of trade in parts and components and the related final goods (referred to as 'final trade') are unlikely to follow the same geographic patterns. Consequently, trade flow analysis based on data coming from a reporting system designed at a time when countries were trading predominantly only in final goods naturally distorted values of exports and imports, lead to a falsification of the nature of emerging trade patterns (Jones and Kierzkowski 2001a and b). And the degree of falsification is likely to increase over time as more complex production networks are created with an ever-increasing number of participants.

This paper aims to redress 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. The paper begins with a discussion on the procedure followed in delineating network trade from data extracted from the United Nations (UN) trade data reporting system (*Comtrade* database) (section 2). Section 3 provides an overview of the process of global production sharing. The next three sections examine in turns trends and patterns of global production sharing, South-South trade, and the role of global production sharing in the expansion of South-South trade. Section 6 reports the results of an econometric exercise undertaken to shed lights on the determinants of netwrok trade. The final part summarizes the key findings and policy implications.

[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.

2. Data

Following the seminal paper by Yeats (2001), it has become common practice to use data on trade in parts and components extracted from the US trade data reporting system to measure the intensity and patterns of fragmentation-based specialization. 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.

The data for all countries other than Taiwan are compiled from the UN Comtrade database. Data for Taiwan (used in Section 5) are obtained from the trade database of the Council for Economic Planning and Development, Taipei. The time coverage is from 1990 to 2010.

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)[4] with the Harmonize System (HS) of trade classification at the 6-digit level. The product list of the World 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.[5] 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.

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

[4] The BEC registry can be found at http:/www. unstats.un.org/unsd/cr/registry.
[5] For details on the method of classification and the list of parts and components see Athukorala 2010.

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 87). 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. It is not possible to meaningfully delineate parts and components and assembled goods in reported trade in these product categories because they contain a significant (yet unknown) share of horizontal trade. Likewise, the UN data system does not permit accounting for assembly activities in software trade; these are lumped together with "special transactions" under SITC 9. However, the magnitude of the bias resulting from the failure to cover these items is unlikely to be substantial because network trade in final assembly is heavily concentrated in the product categories covered in our decomposition.

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 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.

3. Global Production Sharing

International production sharing is not entirely a new phenomenon. For instance, Sidney Pollard (1981) tells a fascinating story about how British textile and clothing manufactures at the height of the

industrial revolution began to shift labour intensive sediment of the production process to countries in the European mainland in face of domestic labour shortages and mounting wage pressure. In the late 1930s Allyn Young observed that 'over a large part of the field of industry, an increasingly intricate nexus of specialized undertakings has inserted itself between the production of raw materials and the consumer of the final product' (Young 1928, 527). Kindleberger (1967) used the example of growing trade in 'semifinished material' (parts and components) between the Ford plants at Limburg in Belgium and Cologne in Germany in the mid-1960 to illustrate that 'the world division of labour [had become] more finely articulated'. On that basis he questioned the validity of the conventional approach to analysing trade-growth nexus which was 'developed almost entire on the basis of trade in final products – that is, goods wholly produced in one country and consumed in another '(p. 108-9). 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 (Maizels 1963).[6]

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, North-South exchange within international production networks 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 (LED), solar panel, and surgical and medical devices.

In its infancy, 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 (as in the case of electronics) (Helleiner 1973, Finger 1975, Sharpton 1975) . Over the years, production networks have evolved to encompass multiple countries involved in different stages of the assembly process. Today, product fragments go through multiple-border crossings before getting incorporated in the final product.

Two recent developments have set the stage for a rapid expansion in the share of fragmentation-based trade in world trade. First, some fragments of the production process in certain industries have become 'standard fragments' which can be effectively used in a number of products. For instance, long-

[6] Calculation based on the data appendix of Maizels (1963)

lasting cellular batteries, which were originally developed by computer producers, are now widely used in cellular phones and electronic organizers; transmitters which were originally designed for radios are now also used in personal computers and missiles; and the use of electronic chips has spread beyond the computer industry to sectors such as consumer electronics and motor vehicle production (Brown and Lindent 2005, Johns and Kierzkowski 2001b). Second, as international 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 overseas locations, in order to be physically closer to their final users and/or to take advantage of cheap labour.

In the case of standard consumer goods such as garments and footwear, global production sharing normally take place through arm's length relationships, with international buyers playing a key role in linking the producers and the sellers in developed countries. Global production sharing in electronics and other high-tech industries, on the other hand, has evolved in a different manner. In the beginning, the process essentially involved a multinational enterprise (MNE) building an overseas subsidiary to perform some of the functions that it once did at home (Helleiner 1973, Gereffi, Humphrey and Sturgeon 2005). As production operations in the host countries became firmly established, production fragmentation in these industries eventually began to spread beyond the MNEs. MNE subsidiaries began to subcontract some activities to local (host-country) firms, providing the latter with detailed specifications and even fragments of their own technology. At the same time, many firms which were not part of MNE networks began to procure components globally through arm's-length trade. These new developments suggest that an increase in fragmentation-based trade may or may not be accompanied by an increase in the host-country's stock of FDI (Brown et al. 2004).

However, the bulk of global production sharing within global high-tech industries still takes place under the aegis of MNEs. This is because the production of final goods require highly customized and specialized parts and components whose quality cannot be verified or assured by a third party (and it is not possible to write a contract between the final producer and input supplier which would fully specify product quality). This is particularly the case when it comes to setting up production units in countries that are newcomers to global production networks. As the production unit becomes well established in the country and it forges business links with private- and public-sector agents, arm's length subcontracting arrangements for components procurement could develop, but this would depend very much on the domestic business climate.

4. Production Sharing and Trade Patterns

Over the past four decades, the nature of world trade has been transformed by the emergence of developing countries as major exporters of manufactured goods. In the early 1970s developing countries (broadly defined using the standard UN country classification) accounted for about 8 percent of world manufacturing trade (Balassa and Bauwens 1988). This figure had more than doubled by 1990-91 and increased further to 30.8% by 2009-10 (Table A-1)[7]. Over the past two decades, global production sharing has contributed disproportionately to this transformation in world trade, with a notable shift in the source country composition of network trade away from mature industrial economies and towards developing countries.

World network trade increased from US$ 988 billion (about 44% percent of total manufacturing exports) in 1990-91 to US$ 4557 billion (51%) in 2009-10, accounting for over 60% of the total increment in world manufacturing exports during this period (Appendix Table A-1, Figure 1).[8] The share of final assembly within network trade has increased over time reflecting the expansion of global production networks to encompass final assembly, in particular the emergence of China as the main assembly centre. In the last decade, on average parts and components (henceforth referred to as 'components' for brevity) and final assembly accounted for 56% and 44% of total network trade. Following the onset of the global financial crisis in late 2008, both world manufacturing trade and non-network (conventional) trade contracted more or less at the same rate (21%), but the latter rebound at slightly faster rate (15% as against 12%) in 2010.

The share of developing countries in total world network trade increased from 18.5% to 47.3% between 1990-91 and 2009-10 (Figure 1). These countries continued to account for a relatively larger share of components exports compared to that of final assembly, but the latter seems to have increased at a faster rate in recent year. Developing countries' share in world non-network ('horizontal') manufacturing trade too recorded impressive growth during this period, but at a much slower rate, from 19.7% in 1990-91 to 37.3% in 2009-10.

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[7] 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.

[8] It is important to note that 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.

Table 1 presents summary data on world manufacturing trade disaggregated by the major country-group in the developing world. It is clearly evident that 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 33.8% in 2009-10 (amounting to an increase in Asia's share in developing country exports from 68% to 76%). Until the mid-1990s, the four NIEs 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 NIE4 has remained virtually unchanged around about 12% during this period. Notwithstanding the notable export expansion in recent years, South Asia (a country group dominated by 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 accounts for a much larger share in developing Asian trade than in all other regions of the world. In 2009-10, Developing Asia accounted for 26.5% of total world network exports (77% of total developing country network exports), with China alone is accounting for 17.3% (57% of the developing countries total). China's share in world final assembly exports is larger (18.0%) compared to that in components (14.4%). The share of NIEs in world final assembly exports has declined over the years as some of their assembly plants were relocated in China. Within developing Asia South Asia is still a negligible player in network trade, accounting for a mere 0.8% of total world exports. The combined share of the non-Asian developing(???) countries in world assembly exports amounted to 6.2% in 2009-10, up from 5.7% in 1996-97. The increase in this share has predominantly come 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 are relatively smaller compared to the comparable figures on the export side. China, accounts for only 4.5% of total final assembly imports but for 13.8% of component imports, reflecting its role as the premier assembly base in the South.

5. South-South Trade

The time pattern of South-South trade over the three decades up to the mid-1980s was rather erratic. **T**here was a mild, but continuous increase in both the value (in current $) and share in total world 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. According to data compiled by the GATT Secretariat, this declining trend, which largely reflected the lingering effect of the debt crisis that erupted in the 1982, seems to have continued in the second half of 1980s (Ventura-Dias 1989, GATT 1986-90, annual).[9]

In a significant departure from the patterns in the 1980s, South-South trade has grown faster than total world trade (measured on either import or export side) since the early 1990s, with the differentials in growth rates widening over the past decade or so.[10] The average annual growth rate (in current $ terms) of South -South trade increased from 14% during 1990-1999 to 16% during 2000-10. The Southern share in world trade increased from 7.4% in 1990-91 to 10.2% in 2000-01 and then to 15.4% in 2009-10 (Table 3, Figure 3). During the 1990s, the share of South-South exports in total merchandise exports of developing countries varied in the range of 33.7% to 39.0% without showing any clear trend. But it has increased steadily since then, from 33.6% in 2000 to 46% in 2009-10. On the import side the increase has been even faster, from 38.6% to 50.7%.

A common pattern observed in the studies conducted in the 1980s was that the South-South share in total exports of developing countries was generally higher than that on the import side (Amsden 1976, Lall 1984). The usual interpretation was that these countries relied disproportionately on developmental imports coming from developed countries in the growth process while directing their exports to 'easy' markets in other southern countries. But, interestingly, the gap has narrowed rapidly over the years as a result of faster increase in the Southern share in imports (Figure 3). One obvious explanation seems to be the increase in import demand resulting from faster growth of Sothern economies (WTO 2003). As we will see below, another, and perhaps more important, reason is the inter-country division of labour within production networks, in particular among, that has contributed significantly to strengthening trade complementarity among developing countries, in particular among the high-performing Asian economies.

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[9] According to GATT data, the share of South-South share in total world trade reached a historical low of 5.1% in 1985 and increased marginally to 5.4% in 1989. .

[10] 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.

Table 4 presents data on South-South trade disaggregated by the major Southern regions, focussing on three key aspects of trade performance: the regional composition, the share in total trade, and the share of intra-regional share in total Southern trade. Notwithstanding some regional diversification, 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 86.8% and 89.8% respectively in 1990-91. Between 1990-91 and 2009-10, China's share in total South-South exports increased from 45.2% to 50.0 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 1990-01 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.

There is a striking difference between developing Asia and the other Southern regions in terms of the degree of regional concentration of South-South trade. In developing Asia about four-fifths of South-South trade (both exports and imports) are intra-regional. In Latin America the intra-regional share has declined rapidly over the past decade, reaching 52% on the export side and 43% on the import side in 2009-10. The intra-regional shares of Middle-East and Africa too have fallen during this period starting from a much lower level compared to Latin America.

The commodity composition of South–South trade is dominated by manufactured goods, a pattern strikingly similar to that of the total world trade of the Southern countries. However, there are notable differences among Southern countries/regions, reflecting differences in resource endowments, the stage of development, and the nature/patterns of integration within global production networks. 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 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.

6. Global production sharing and South-South trade

We have observed that the growth of South-South trade over the past two decades has been heavily concentrated in manufacturing trade and that network trade has grown much faster than the conventional horizontal trade. In this section we specifically focus on the role of network trade in the expansion of South-South trade. Our working hypothesis based on the existing literature on global production sharing that the conventional approach to trade flow analysis which lump together horizontal and vertical trade tends to exaggerate emerging trends in South-South trade; production-sharing based international specialization can't be sustained purely as a regional phenomenon because of the importance of extra-regional (global) markets for final products. To shed light on this issue we recalculated the share of South-South trade in world non-fuel manufacturing trade and the geographic profile of South-South non-fuel trade separately for network trade and non-network (horizontal) trade, with the former separated into parts and components and final assembly.

Data reported in Table 6 depict the relative importance of Southern markets for total network exports from the Southern countries. The same data at the regional level are reported in Table 7. The Southern share in total network trade shows a persistent increase during the past one-and-a-half decades, from 37% in the mid-1990s to over 50% in 2009-10. This pattern is remarkably insensitive to the exclusion of the NIEs from the Southern country coverage. In the mid-1990s, less than 40% of both components and final (assembled) goods originating in the South found markets within the South 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. There has been a persistent 'Northern bias' (or a bias against the Southern markets) in final assembly exports compared to components exports, but it is not large. In 2009-10, about 52% of total exports of final (assembled) goods destined to the Northern markets where as about 53% of components produced/assembled in the South was used as inputs to final assembly in production networks within the South.

In 2009-10 developing Asia accounted for 85.2% of total south-south network export (compared to 77.2% of total manufacturing trade, as already noted) (Table 7). There is even a greater concentration

of Southern component exports in developing Asia compared to final assembly (79.4%). China alone accounts for 46.6% (or 57% of the regional total) of Southern network trade. Africa and Latin America 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 exports is far greater in China 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 (both components and final assembly) 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 dependence of the growth dynamism of the East-Asia centered production networks on the Northern markets has significantly reduced over time, even though the general inference that production-sharing based international specialization cannot be sustained purely as a regional phenomenon still remains valid (because nearly 50% of final assembly within Asian production networks is still destined to the Northern markets).

We have seen that compared to final assembly components account for a larger share of network exports in developing Asia and the component trade is heavily concentrated within the region. How robust are the inferences we have made about the degree and patterns of South-South trade based on an analysis of the standard trade data to this unique pattern of developing Asia's engagement in network trade ? This is a pertinent empirical issue because trade in parts and components within global production networks naturally leads to double counting of trade flows as reported in the standard (official) trade data, because each country is engaged in particular segment (task) in the production process and consequently the production process involved multiple border crossing of components before they get embodied in a specific final product. To address this issue we recalculated the share of South-South exports in manufacturing trade and the geographic profile of South-South manufacturing trade after purging parts and components from the trade data. These estimates are compared with the original (component-inclusive) estimates in Tables 8 and 9.

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 after components are netted out from the trade data. However, the differences are not very large (Table 8). For instance, in 2009-10, the South-South share in total manufacturing exports based on unadjusted and adjusted data are18.3 and 15.2% respectively. For the period 2000-2010 the average discrepancy is around 3.5 percentage points. Moreover, this discrepancy notwithstanding the overall trends in South-South shares is remarkably insensitive to the inclusion/exclusion of parts and components in our calculations.

At the regional level, there are notable differences between the two estimates (Table 9). For instance, according to the un-adjusted (original) data, in 2009-10 Asia accounted for 85.2% of total South-South manufacturing exports. 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.

In sum, global production sharing seems to infuse an upward bias into the estimates of both the share of South-South trade in world trade and in particular into Asia's share in South-South trade. However, the general inference relating to growth of South-South trade in world trade and Asia's dominance in South-South trade still remain valid.

7. **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 total South-North trade in terms of the key determinants commonly considered important in determining trade flows. The analytical tool used for this purpose 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.[11] 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,

[11] 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 Bergeijk and Brakman (2010).

$$Ln\ TRD_{ij} = \alpha + \beta_1 lnGDP_i + \beta_2 lnGDP_j + \beta_3 lnLPI_i + \beta_4 lnDST_{ij} + \beta_5 lnRER_{ij} + \beta_6 RTA_{ij} + \beta_7 ADJ_{ij} + \beta_8 COML_{ij} + \beta_9 lnCLNK_{i,j} + \gamma T + \varepsilon_{ij}$$

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*) (+)
ADJ	A binary dummy variable assuming the value 1 if *i* and *j* share a common land border and 0 otherwise (+)
COML	A dummy variable which is unity if *i* and *j have* a common language (a measure of cultural affinity) (+)
CLNK	Colonial economic link (+)
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 data compiled from the exporter records in the UN trade data system (*Comtrade* database) during the period 1996-2009. The data set covers trade of all countries which accounted for 0.01% or more of total world manufacturing exports in 2000-01. Bilateral trade flows for which data are available for at least 5 consecutive years during the period under study are covered in the dataset. 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 newly-developed *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. It is based on a worldwide survey of global freight forwarders and express carriers, complemented by a number of qualitative and quantitative indicators of the domestic logistics environment, institutions, and performance

of supply chains. 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-2.

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 estimators. The Hausman test rejected the null hypothesis of random effects, favouring the use of RE estimator over the OLS counterpart.

The preferred RE estimates for total (non-oil), manufacturing, and network products disaggregated into components and final assembly are reported in Table 10. Estimates are reported for both the South based on the standard UN country classification and the South excluding the NIEs for the purpose of comparison. The discussion below focuses only on the former estimates; the inferences are robust to the inclusion or exclusion of the NIEs.

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.

In all the three equations for network trade (for total, components and final assembly), the coefficient of the reporter GDP is relatively larger compared to total non-oil and manufacturing trade. The GDP variable in the model is an indication of the country's economic size and also of its degree of diversification of production. These results are, therefore, consistent with our earlier observation that network trade is heavily concentrated in relatively advanced and dynamic economies in the South. The results for the partner country GDP variable in the equation for final assembly in South-South exports is consistent with the view that the growth of Southern network exports to Southern markets have lagged behind the trade potential in these markets as measured by these countries' economic size. The coefficient of this variable (0.95) is 0.22 percentage points smaller compared to that of the comparable equation for final assembly exports to the Northern markets (1.46).

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 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 the distance variable in the equations for South-South component exports (1.47) is larger compared to South-South final assembly exports (1.25) (and the difference is statistically significant). This suggests that the magnitude of negative impact of distance-related trade cost is larger in magnitude on South-South component trade compared to final (assembly) trade. This finding is consistent with the heavy concentration of parts and components assembly in East Asia where distance related trade costs are generally lower because of efficient air-transport facilities. A large and increasing percentage of trade in parts and components of electronics and electrical goods (which accounts for over two-thirds of parts and component trade) takes the form of air cargo.

The results for the real exchange rate variable (RER) suggest that exchange rate change has a significantly larger effect on South-South final assembly 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 by0.34 percentage points. The estimated coefficient of the real exchange variable in the parts and components equation is not statistically significant 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 trade flows, with a significantly greater impact on network product exports to both Southern and Northern markets.

Results for the RTA variable suggest that RTAs have a statistically significant and large impact on South-South exports, and in particular on network products. This result is consistent with the fact that tariffs on electrical goods and some 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 (Table 11).

Trade within global production networks (both trade in parts and components and final assembly) is generally more sensitive to tariff changes than is final trade (or total trade as captured in published trade data) (Yie 2003). 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.

8. 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 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 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: nearly 50% of final assembly within Asian production networks is still destined to the Northern markets.

Developing 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.

There is also evidence that RTAs have a significant positive effect on the expansion of South-South network 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: World Trade, 1990-2010 (US$ in billions)

(a) World

	Exports (FOB)						Imports (CIF)					
	Total	Non-oil total	Manufacturing				Total	Non-oil total	Manufacturing			
			Total	Network products					Total	Network products		
				P&C	Final assembly	Total				P&C	Final assembly	Total
1990	2833	2670	2211	460	507	967	2995	2677	2164	450	507	958
1991	2948	2747	2273	477	532	1009	3087	2786	2257	474	538	1012
1992	3479	3254	2685	588	630	1218	3581	3273	2662	583	627	1210
1993	3468	3250	2673	612	625	1237	3495	3202	2612	598	616	1214
1994	3955	3731	3084	722	730	1452	3997	3705	3034	710	721	1431
1995	4732	4487	3709	883	869	1751	4800	4470	3670	874	867	1740
1996	5031	4682	3871	1040	918	1958	5113	4700	3859	997	959	1956
1997	5214	4895	4075	1227	910	2138	5315	4888	4045	1199	912	2111
1998	5190	4921	4148	1262	932	2194	5275	4961	4152	1262	936	2198
1999	5389	5029	4286	1368	963	2331	5531	5153	4347	1383	983	2366
2000	6142	5537	4675	1602	1012	2613	6325	5698	4778	1610	1051	2661
2001	5940	5395	4533	1478	1000	2478	6145	5561	4659	1500	1044	2544
2002	6244	5698	4789	1532	1059	2591	6404	5830	4890	1546	1091	2637
2003	7272	6601	5524	1748	1224	2972	7447	6715	5629	1769	1253	3022
2004	8837	7959	6673	2093	1454	3548	9073	8108	6783	2127	1488	3615
2005	9970	8784	7396	2322	1595	3917	10278	8937	7520	2363	1619	3982
2006	11651	10116	8467	2630	1802	4432	11893	10231	8535	2662	1823	4485
2007	13262	11645	9701	2826	2183	5009	13618	11785	9785	2916	2184	5100
2008	15323	12944	10576	2993	2309	5302	15715	13107	10624	3082	2306	5389
2009	11934	10463	8364	2391	1845	4236	12031	10408	8392	2481	1838	4319
2010	13746	12024	9594	2756	2123	4879	13948	11973	9744	2960	2148	5108

(b) Developing countries: UN classification (including newly industrialised countries (NIEs) in East Asia)

	Exports (FOB)						Imports (CIF)					
	Total	Non-oil total	Manufacturing				total	Network products	Manufacturing			
			Total	Network products					Total	Network products		
				P&C	Final assembly	Total				P&C	Final assembly	Total
1990	547	472	383	70	92	162	536	492	425	115	92	207
1991	670	556	473	85	119	204	653	604	557	154	118	272
1992	833	702	576	107	145	251	808	759	658	157	157	314
1993	910	784	651	124	169	292	902	850	746	180	178	358

1994	1063	933	773	163	208	371	1032	982	858	219	195	413
1995	1298	1155	952	223	238	461	1267	1204	1045	291	243	533
1996	1399	1213	1003	237	353	590	1347	1270	1109	324	253	576
1997	1460	1309	1068	305	275	580	1408	1324	1148	365	292	657
1998	1421	1277	1072	310	282	592	1348	1282	1128	370	293	663
1999	1571	1355	1162	381	289	670	1436	1355	1196	436	354	790
2000	2001	1634	1408	506	323	829	1776	1645	1443	573	478	1051
2001	1879	1561	1337	457	318	775	1695	1575	1376	532	436	968
2002	2028	1713	1455	508	340	848	1819	1697	1481	591	486	1077
2003	2411	2030	1719	609	398	1007	2159	2000	1746	707	587	1294
2004	3038	2535	2155	772	489	1261	2731	2505	2176	892	748	1640
2005	3623	2951	2520	899	572	1470	3160	2841	2481	1036	867	1903
2006	4435	3492	2991	1059	689	1747	3717	3303	2857	1194	1002	2197
2007	4975	4057	3472	1189	851	2039	4323	3835	3302	1349	1103	2452
2008	5977	4587	3852	1295	890	2185	5153	4429	3680	1482	1214	2696
2009	4767	3905	3242	1129	771	1900	4198	3726	3090	1280	1031	2311
2010	5932	4932	4138	1455	971	2425	5388	4770	3963	1649	1337	2986

(c) Developing countries excluding NIEs

	Exports (FOB)						Imports (CIF)					
	Total	Non-oil	Manufacturing				Total	Non-oil	Manufacturing			
			Total	Network products					Total	Network products		
				P&C	Final assembly	Total				P&C	Final assembly	Total
1990	309	245	172	31	31	62	298	265	214	51	39	90
1991	393	292	215	36	43	79	377	341	300	74	57	130
1992	491	372	268	42	60	102	466	429	351	83	73	156
1993	533	419	309	48	72	121	524	485	403	89	92	180
1994	624	507	373	63	92	155	593	556	458	105	104	210
1995	768	637	468	85	110	195	736	686	561	141	121	261
1996	846	676	503	95	143	238	794	733	609	172	124	296
1997	887	753	562	118	165	283	835	768	642	178	138	316
1998	891	762	585	128	176	304	818	768	641	188	143	331
1999	1,014	815	648	175	179	353	880	815	682	229	128	357
2000	1,337	991	796	251	188	439	1111	1002	830	318	136	454
2001	1,289	991	796	238	196	435	1105	1005	835	314	142	456
2002	1,403	1,107	880	268	213	481	1194	1091	905	350	152	503
2003	1,678	1,321	1,049	318	257	575	1426	1291	1077	415	186	601
2004	2,138	1,671	1,339	396	331	727	1831	1641	1360	516	245	761
2005	2,619	1,999	1,616	476	402	878	2155	1890	1576	614	279	893
2006	3,291	2,416	1,964	567	501	1068	2573	2227	1830	703	349	1052
2007	3,708	2,870	2,327	639	623	1262	3056	2648	2157	800	417	1218
2008	4,591	3,321	2,644	691	705	1396	3767	3163	2472	877	492	1369
2009	3,600	2,816	2,211	593	607	1200	3031	2638	2059	745	417	1162
2010	4,462	3,565	2,842	766	772	1539	3918	3403	2667	961	536	1497

Table A- 2: 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 (http://www.bls.gov/ppi/home.htm). Exports and import values are deflated by US import and export price indices extracted from the US Bureau of labour Statistics data base.
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	CEPII database

	language and zero otherwise.	
ADJ	A binary dummy variable which is unity if country *i* and country *j* share a common land border and 0 otherwise	CEPII database

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	16.22	26.14	30.75	10.8	25.69	32.66	21.1	30.22	34.96	15.5	27.60	33.66
Developing countries WB	13.40	23.62	28.14	7.9	22.11	26.42	18.5	28.20	32.76	12.7	24.68	30.05
Developing Asia[2]	11.11	18.99	23.05	7.1	20.58	27.19	15.4	21.73	25.56	10.8	21.07	26.48
NIE4[2]	2.82	2.51	2.62	3.0	3.57	6.24	2.6	2.02	2.20	2.7	2.92	3.61
China	3.62	11.39	14.65	2.1	10.96	14.44	4.9	16.16	18.90	3.4	13.16	17.25
ASEAN[3]	3.66	3.59	3.87	1.8	5.66	5.86	7.7	2.92	3.33	4.5	4.50	4.76
South Asia	0.93	1.37	1.79	0.2	0.37	0.64	0.2	0.59	1.09	0.2	0.46	0.84
Central Asia	0.08	0.13	0.12	0.0	0.02	0.01	0.0	0.04	0.04	0.0	0.03	0.02
Middle-East	1.13	2.12	2.52	0.6	0.92	1.05	0.5	1.91	2.43	0.6	1.34	1.65
Africa	0.37	0.96	1.07	0.0	0.36	0.48	0.2	0.58	0.63	0.1	0.45	0.55
Latin America [4]	3.61	4.07	4.11	3.2	3.82	3.93	5.0	6.00	6.33	4.0	4.74	4.98
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

IMPORTS	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	18.23	23.60	27.86	14.9	28.92	33.44	18.1	20.58	25.50	16.4	25.43	30.08
Developing countries WB	15.83	21.76	26.06	12.6	26.95	31.36	16.6	19.12	23.91	14.4	23.68	28.21
Developing Asia	10.90	13.96	16.99	8.1	19.42	22.90	10.2	9.98	12.91	9.0	15.47	18.68
NIE4[2]	11.88	9.38	9.93	12.9	14.46	15.93	11.1	6.84	6.97	12.1	11.28	12.14
China	2.85	7.16	9.13	2.8	11.12	13.81	0.8	4.46	6.34	1.9	8.34	10.65
ASEAN[3]	4.58	3.14	3.72	2.5	4.95	5.36	6.3	1.13	1.70	4.2	3.35	3.81
South Asia	0.95	1.46	1.98	0.5	1.17	1.49	1.3	2.31	2.69	0.9	1.65	2.00
Central Asia	0.12	0.36	0.36	0.0	0.21	0.16	0.2	0.62	0.58	0.1	0.38	0.34
Middle-East	2.14	3.92	3.89	1.2	2.54	1.99	3.0	5.06	5.75	2.0	3.60	3.58
Africa	1.21	2.04	2.71	0.2	1.34	1.90	2.0	2.92	3.67	1.0	2.00	2.65
Latin America[4]	3.99	3.68	4.27	5.4	5.62	6.64	3.0	2.62	3.17	4.3	4.36	5.17
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. Hong Kong, Taiwan, South Korea, Singapore
3. Excluding Singapore 4. Including the Caribbean countries.

Table 2: Network products in developing countries manufacturing trade, 1996-07, 2006-07 and 2009-10

	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
(a) EXPORTS									
Developing countries UN	19.1	29.5	30.4	30.3	25.4	25.1	49.4	54.9	55.6
Developing countries WB	16.9	28.1	26.9	32.2	26.2	27.3	49.0	54.3	54.2
Developing Asia	18.1	32.6	33.8	32.3	25.1	24.5	50.4	57.6	58.3
NIE4	29.4	47.9	52.6	28.4	19.1	15.6	57.8	67.1	68.2
China	16.8	28.9	28.2	31.3	31.1	31.5	48.1	60.0	59.7
ASEAN	14.3	47.4	43.4	48.8	17.8	19.1	63.1	65.2	62.5
South Asia	5.3	8.2	10.3	4.8	9.4	13.5	10.0	17.6	23.8
Central Asia	0.4	3.8	2.2	13.5	7.3	6.4	13.8	11.1	8.6
Middle-East	15.2	13.0	12.0	11.2	19.8	21.3	26.4	32.8	33.2
Africa	0.3	11.4	13.0	9.7	13.3	13.1	10.0	24.7	26.1
Latin America	25.1	28.2	27.4	32.4	32.3	34.1	57.6	60.5	61.5
World	28.5	30.0	28.7	23.3	21.9	22.1	51.8	52.0	50.8
(b) IMPORTS									
Developing countries UN	22.7	37.3	36.0	23.5	19.1	20.1	46.3	56.4	56.1
Developing countries WB	22.2	37.7	36.1	24.7	19.2	20.2	46.9	56.9	56.3
Developing Asia	20.6	42.4	40.4	22.0	15.6	16.7	42.7	58.0	57.1
NIE4	30.2	47.0	48.2	22.0	16.0	15.4	52.3	62.9	63.6
China	27.5	47.3	45.4	6.4	13.6	15.3	33.9	60.9	60.6
ASEAN	14.9	48.0	43.2	32.5	7.9	10.1	47.4	55.9	53.3
South Asia	15.9	24.3	22.6	32.5	34.5	29.9	48.3	58.9	52.5
Central Asia	1.6	17.4	13.1	44.4	37.7	35.7	46.0	55.1	48.9
Middle-East	15.4	19.8	15.4	33.1	28.3	32.5	48.6	48.0	47.9
Africa	4.8	20.0	21.0	39.7	31.2	29.8	44.5	51.2	50.8
Latin America	37.8	46.5	46.7	17.5	15.6	16.3	55.3	62.1	63.0
World	27.8	30.4	30.0	23.7	21.9	22.0	51.5	52.3	52.0

Note: Two-year average. Source: Compiled from UN Comtrade database.

Table 3: South-South trade in world non-oil trade, 1990-2010

(1) Exports

	Total S-S export, US$ billion		S-S share in world exports		S-S share in Southern exports	
	South including NIEs	South excluding NIEs	South including NIEs	South excluding NIEs	South including NIEs	South excluding NIEs
1990	211	145	7.9	5.4	41.5	28.3
1991	243	158	8.9	5.8	43.7	30.1
1992	273	164	8.4	5.1	44.0	33.3
1993	304	174	9.4	5.4	43.4	31.4
1994	373	207	10.0	5.6	44.3	31.5
1995	470	258	10.5	5.8	45.1	31.9
1996	492	268	10.6	5.8	45.0	31.4
1997	533	300	10.9	6.2	44.8	31.8
1998	485	292	9.9	6.0	41.3	30.9
1999	495	283	9.9	5.7	39.9	28.4
2000	617	353	11.2	6.4	41.2	29.3
2001	611	371	11.4	6.9	42.1	31.1
2002	681	417	12.0	7.3	42.7	31.5
2003	840	521	12.8	7.9	44.2	33.2
2004	1060	661	13.4	8.4	44.6	33.8
2005	1282	823	14.7	9.4	46.1	35.6
2006	1552	1013	15.4	10.1	47.0	36.7
2007	1883	1262	16.3	10.9	48.8	38.8
2008	2190	1495	17.1	11.6	50.0	40.1
2009	1941	1333	18.7	12.8	51.7	41.9
2010	2491	1723	20.2	13.9	53.2	43.6

(b) Imports

	Total S-S export, US$ billion		S-S share in world exports		S-S share in Southern exports	
	South including NIEs	South excluding NIEs	South including NIEs	South excluding NIEs	South including NIEs	South excluding NIEs
1990	94	47	3.5	1.8	29.5	23.8
1991	123	63	4.5	2.3	30.1	22.3
1992	244	161	7.5	4.9	30.8	24.2
1993	276	176	8.7	5.5	30.6	23.2
1994	334	209	9.1	5.7	31.7	24.0
1995	419	257	9.4	5.8	32.2	24.0
1996	448	277	9.6	5.9	32.8	24.7

1997	491	303	10.1	6.2	34.3	25.4
1998	460	298	9.3	6.0	34.9	25.9
1999	495	308	9.6	6.0	35.9	26.0
2000	639	398	11.3	7.0	38.2	27.8
2001	634	412	11.4	7.4	38.9	29.0
2002	710	459	12.2	7.9	41.0	30.4
2003	872	565	13.0	8.4	43.2	32.1
2004	1133	734	14.1	9.1	44.9	33.3
2005	1353	890	15.3	10.0	46.9	35.2
2006	1623	1070	16.0	10.5	47.8	36.0
2007	1936	1313	16.5	11.2	48.8	37.6
2008	2278	1585	17.5	12.2	49.2	38.6
2009	1914	1339	18.6	13.0	49.7	39.0
2010	2469	1708	20.1	13.9	51.4	40.0

Source: Compiled from UN Comtrade database.

Table 4: South-South non-fuel trade by major regions, 1990-91, 1996-97, 2006-07 and 2009-10

		Exports				Imports			
		US$ billion	Share in total Exports (%)	Share in S-S exports (%)	Intra-regional share	US$ billion	Share in total imports	Share in S-S imports (%)	Intra-regional share
Developing Asia	1990-91	161.5	45.0	86.8	84.7	154.2	38.2	94.3	89.8
	1996-97	426.4	44.7	83.2	83.2	399.9	37.1	85.3	89.2
	2006-07	1,382.0	48.6	80.5	80.1	1,256.6	48.8	71.1	88.4
	2009-10	1,776.5	53.2	80.1	77.2	1,427.9	47.0	65.2	84.5
NIEs	1990-91	60.6	32.6	32.5	42.4	50.4	28.8	30.7	25.9
	1996-97	171.3	47.2	33.5	37.0	123.0	35.5	26.3	31.0
	2006-07	422.6	52.3	24.7	25.3	284.4	45.3	16.5	56.5
	2009-10	508.6	57.3	22.9	21.9	214.2	31.9	9.8	76.1
China	1990-91	67.0	45.2	36.1	25.2	56.2	43.8	34.7	
	1996-97	158.9	46.0	31.0	24.2	148.7	44.1	31.7	
	2006-07	662.6	46.8	38.5	31.0	580.5	51.6	32.6	
	2009-10	867.3	50.0	39.1	33.9	727.8	50.8	33.1	
Southeast Asia	1990-91	26.7	34.7	14.3	12.6	39.8	27.4	24.2	34.4
	1996-97	77.0	39.9	15.0	20.3	108.4	32.4	23.1	39.0
	2006-07	213.3	47.9	12.4	23.9	289.1	49.5	16.3	35.9
	2009-10	268.1	54.9	12.1	23.8	331.3	51.7	15.2	34.4
South Asia	1990-91	7.2	26.7	3.9	17.3	7.7	28.4	4.7	10.6
	1996-97	17.3	36.2	3.4	13.5	18.0	34.5	3.8	12.9
	2006-07	75.1	48.6	4.4	13.6	91.4	46.2	5.1	9.6
	2009-10	123.1	58.9	5.5	12.7	141.7	55.7	6.4	7.4
Pacific	1990-91	0.1	14.6	0.0	38.1	0.1	20.6	0.1	8.2
	1996-97	0.0	67.2	0.0	7.3	0.0	24.8	0.0	59.0
	2006-07	0.2	25.3	0.0	36.0	0.5	27.0	0.0	14.7
	2009-10	0.1	14.2	0.0	36.3	0.3	28.3	0.0	21.8

Central Asia	1990-91								
	1996-97	1.9	34.5	0.4	29.1	1.7	25.8	0.4	21.7
	2006-07	8.2	41.7	0.5	24.3	10.6	27.3	0.6	13.4
	2009-10	9.3	48.4	0.4	25.3	12.7	32.6	0.6	9.6
Middle East	1990-91	7.4	25.1	3.9	38.2	8.6	14.3	5.1	29.2
	1996-97	15.4	28.8	3.0	34.3	17.2	16.9	3.7	28.5
	2006-07	107.6	39.4	6.2	42.3	162.5	35.3	9.1	21.2
	2009-10	129.5	37.9	5.9	34.0	197.2	37.6	9.0	19.1
Africa	1990-91	1.7	19.8	0.9	62.4	1.8	13.3	1.1	26.5
	1996-97	8.4	26.4	1.6	52.6	14.1	21.5	3.0	18.9
	2006-07	46.4	34.1	2.7	56.2	93.5	38.6	5.2	24.9
	2009-10	72.9	44.5	3..3	47.7	135.6	44.1	6.2	20.3
Latin America	1990-91	15.6	23.2	8.4	61.7	12.0	16.0	7.3	77.9
and the	1996-97	62.3	27.9	12.1	71.8	60.9	23.4	12.9	71.6
Caribbean	2006-07	181.2	31.9	10.5	60.4	222.7	37.8	12.5	48.5
	2009-10	237.0	38.4	10.7	52.7	286.2	43.6	13.1	42.6
Total South	1990-91	186.3	40.2	100	100	163.7	29.8	100.0	100
	1996-97	512.5	40.6	100	100	469.4	31.2	100.0	100
	2006-07	1,717.4	44.9	100	100	1,779.4	45.9	100.0	100
	2009-10	2,215.9	49.7	100	100	2,191.6	48.4	100.0	100

Source: Compiled from UN Comtrade database.

Table 5: Commodity composition of developing countries non-fuel trade, 2009-10 (percent)

	South-South trade		South – North trade	
	Non-fuel primary	Manufactures	Non-fuel primary	Manufactures
(a) EXPORTS				
Developing Asia	8.8	91.2	7.5	92.5
NIEs	5.3	94.7	6.4	93.6
China	3.5	96.5	3.8	96.2
Southeast Asia	16.8	83.2	16.8	83.2
Southern Asia	28.3	71.7	10.8	89.2
Central Asia West Asia	44.9	55.1	37.3	62.7
Pacific	76.2	23.8	69.9	30.1
Middle East	22.2	77.8	15.2	84.8
Africa	41.0	59.0	31.3	68.7
Latin America	41.6	58.4	30.9	69.1
World	15.1	84.9	16.2	83.8
(b) IMPORTS				
Developing Asia	14.3	85.7	14.8	85.2
NIEs	11.4	88.6	10.6	89.4
China	12.3	87.7	14.7	85.3
Southeast Asia	12.6	87.4	11.5	88.5
Southern Asia	28.1	71.9	26.1	73.9
Central and West Asia	16.8	83.2	12.6	87.4
Pacific	25.6	74.4	34.5	65.5
Middle East	22.4	77.6	16.2	83.8
Africa	23.3	76.7	20.2	79.8
Latin America	16.0	84.0	11.9	88.1
World	15.3	84.7	16.3	83.7

Source: Compiled from UN Comtrade database.

Table 6: South-South share in network trade, 1996-2010 (percent)

	Total		Parts and components		Final assembly	
	South including NIEs	South excluding NIEs	South including NIEs	South excluding NIEs	South including NIEs	South excluding NIEs
1996	40.5	38.1	37.5	38.7	36.9	38.0
1997	40.5	38.2	37.6	39.7	37.9.6	37.8
1998	37.4	35.3	37.2	35.8	37.5	35.2
1999	35.7	33.3	36.9	35.3	35.0	32.6
2000	36.8	34.6	38.5	37.7	35.9	33.2
2001	38.0	35.7	41.0	39.6	36.5	34.0
2002	39.2	36.8	44.1	42.7	36.5	34.1
2003	41.6	38.7	47.1	44.3	38.5	36.1
2004	42.0	39.2	47.6	45.0	39.0	36.6
2005	43.9	41.1	50.0	47.0	40.5	38.3
2006	44.9	42.2	51.2	47.9	41.6	39.5
2007	46.9	44.3	53.8	51.2	43.5	41.3
2008	48.1	45.4	54.6	52.1	45.1	42.6
2009	50.7	47.7	57.7	55.6	47.3	44.3
2010	51.4	48.6	56.9	54.5	48.7	46.0

Source: Compiled from UN Comtrade database

Table 7: South-South network exports by region, 2009-10[1]

	Regional composition			South-South share		
	Total	Parts and components	Final assembly	Total	Parts and components	Final assembly
South including NIEs						
Developing Asia	85.2	95.2	79.4	54.9	62.3	51.1
NIE	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
Southeast Asia	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
South excluding NIEs						
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 8: South-South share in world manufacturing exports:

	Total manufacturing		Manufacturing net of parts and components	
	South including NIEs	South excluding NIEs	South including NIEs	South excluding NIEs
1996	9.4	6.6	10.9	6.3
1997	9.6	7.0	9.9	6.7
1998	8.7	6.4	9.0	6.3
1999	8.8	6.4	8.5	5.9
2000	10.1	7.4	9.5	6.6
2001	10.3	7.8	9.6	6.9
2002	11.0	8.4	9.7	7.0
2003	12.0	9.0	10.5	7.5
2004	12.7	9.5	11.0	7.9
2005	14.1	10.7	12.2	8.8
2006	14.9	11.5	13.0	9.5
2007	15.8	12.3	13.7	10.1
2008	16.6	13.0	14.8	10.8
2009	18.7	14.6	16.4	12.0
2010	20.0	15.7	17.9	13.2

Source: Compiled from UN Comtrade database

Table 9: Regional composition of South-South manufacturing 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 10: Determinants of bilateral trade flows, 1996-2009

(A) SOUTH INCLUDING NIEs

	GDP Exporter	GDP_ importer	Distance	RER	Logistics	RTA	Colony	Contiguity	Common language	R2-within	R2-between	R2-overall	RMSE	N
A1 Total Southern exports														
Non-oil	0.72***	1.01***	-1.22***	0.17***	5.85***	0.14***	0.34***	0.79***	0.03	0.49	0.86	0.69	1.61	51200
Manufacturing	0.85***	1.01***	-1.43***	0.09***	6.17***	0.05	1.38***	0.75***	0.04	0.52	0.85	0.69	1.69	52752
Parts and components	0.85***	1.06***	-1.50***	0.04	8.20***	0.36***	1.93***	1.02***	0.02	0.44	0.85	0.61	2.06	30452
Final assembly	1.22***	0.85***	-1.38***	0.25***	8.05***	0.50***	1.50***	0.85***	-0.08	0.46	0.69	0.53	2.03	25744
Network products	1.00***	0.97***	-1.24***	0.11***	9.25***	0.73***	1.57***	0.96***	0.06*	0.51	0.83	0.62	1.99	45585
A2 South-North exports														
Non-oil	0.60***	1.28***	-0.78***	0.56***	5.35***	-0.49***	0.55***	0.56***	0.24***	0.61	0.93	0.81	1.08	10939
Manufacturing	0.66***	1.31***	-1.43***	0.28***	6.383***	-1.00***	0.47***	1.62***	0.15**	0.61	0.92	0.77	1.29	11444
Parts and components	0.63***	1.24***	-1.56***	0.013	10.13***	-0.91***	0.44**	2.78***	0.39***	0.51	0.89	0.65	1.88	7431
Final assembly	1.11***	1.06***	-1.74***	-0.17	10.04***	-0.59***	0.47***	2.18***	-0.35***	0.54	0.76	0.60	1.92	6793
Network products	0.84***	1.14***	-1.20***	0.04	11.37***	-0.47***	0.60***	2.80***	-0.06	0.60	0.87	0.67	1.86	10708
A3 South-South exports														
Non-oil	0.78***	0.95***	-1.27***	0.13***	6.01***	0.98***	-0.05	0.52***	-0.05	0.48	0.80	0.64	1.71	40261
Manufacturing	0.92***	0.96***	-1.41***	0.06*	6.19***	0.89***	1.98***	0.42***	0.02	0.52	0.80	0.63	1.77	41308
Parts and components	0.93***	1.02***	-1.47***	0.02	7.79***	1.43***	2.61***	0.54***	-0.04	0.44	0.80	0.58	2.08	23021
Final assembly	1.25***	0.83***	-1.25***	0.29***	7.57***	1.34***	2.06***	0.54***	0.01	0.44	0.62	0.49	2.04	18951
Network products	1.06***	0.95***	-1.22***	0.10***	8.73***	1.59***	2.20***	0.54***	0.10**	0.50	0.78	0.59	1.99	34877

(B) SOUTH EEXCLUDING NIEs

	GDP Exporter	GDP importer	Distance	RER	Logistics	RTA	Colony	Contiguity	Common language	R2-within	R2-between	R2-overall	RMSE	N

B1 Total Southern exports														
Non-oil	0.72***	1.01***	-1.246***	0.196***	5.348***	0.138**	0.444***	0.848***	-0.183***	0.46	0.86	0.68	1.66	4299
Manufacturing	0.85***	1.00***	-1.475***	0.129***	5.277***	0.073	1.502***	0.785***	-0.175***	0.50	0.85	0.67	1.74	4455
Parts and components	0.81***	1.00***	-1.457***	0.066	7.738***	0.475***	2.037***	1.125***	-0.087	0.41	0.83	0.57	2.15	2472
Final assembly	1.14***	0.83***	-1.443***	0.293***	7.737***	0.558***	1.674***	0.863***	-0.357***	0.44	0.66	0.49	2.13	2031
Total network products	0.96***	0.93***	-1.253***	0.147***	8.599***	0.812***	1.744***	1.028***	-0.167***	0.47	0.82	0.59	2.07	3746
B2 South-North exports														
Non-oil	0.58***	1.28***	-0.799***	0.549***	5.604***	-0.552***	0.695***	0.581***	0.077	0.57	0.93	0.80	1.10	922
Manufacturing	0.66***	1.31***	-1.496***	0.305***	5.945***	-1.004***	0.725***	1.408***	-0.058	0.58	0.92	0.76	1.33	972
Parts and components	0.64***	1.24***	-1.633***	-0.075	9.975***	-0.988***	0.671***	2.557***	0.206	0.44	0.90	0.62	1.98	620
Final assembly	1.00**	1.10***	-1.871***	-0.132	11.129***	-0.671***	0.907***	2.097***	-0.750***	0.51	0.75	0.57	2.01	557
Total network products	0.79***	1.14***	-1.258***	0.062	11.640***	-0.513***	0.909***	2.697***	-0.313***	0.54	0.88	0.64	1.96	899
B3 South-South exports														
Non-oil	0.78***	0.94***	-1.295***	0.164***	5.418***	1.058***	-0.064	0.566***	-0.270***	0.46	0.81	0.62	1.76	3376
Manufacturing	0.92***	0.94***	-1.441***	0.097***	5.296***	0.967***	1.868***	0.492***	-0.183***	0.50	0.79	0.61	1.82	3482
Parts and components	0.87***	0.97***	-1.369***	0.057	7.556***	1.673***	2.504***	0.711***	-0.113*	0.42	0.78	0.54	2.17	1852
Final assembly	1.18***	0.80***	-1.279***	0.335***	7.067***	1.437***	1.971***	0.619***	-0.219***	0.42	0.59	0.46	2.14	1474
Total network products	1.01***	0.91***	-1.211***	0.137***	8.024***	1.714***	2.130***	0.663***	-0.116**	0.46	0.77	0.55	2.07	2846

Note: Statistical significant is denoted as ***1 percent, **5 percent, and *10 percent. 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. RMSE: root mean square error

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

Table 11: Tariff of Manufacturing Goods (unweighted average %), 2008

	All manufactures			Final Electronics[1]	Final electrical appliances[2]
	Total (1)	Parts and Components (2)	Finished goods (3)	**(4)**	(5)
Thailand	7.5	7.6	7.5	**5.3**	21.6
China	9.6	8.2	9.8	**4.3**	17.8
India	11.1	10.6	11.2	**13.4**	12.5
Korea	7.5	6.5	7.6	**1.4**	8.0
Taiwan	4.6	3.5	4.7	**0.5**	6.2
Indonesia	7.3	3.9	7.7	**8.5**	13.7
Philippines	6.0	3.3	6.3	**1.2**	10.0
Malaysia	8.7	5.2	9.1	**2.5**	23.6
Mexico	5.3	3.2	7.2	**5.3**	14.2
Brazil	7.4	3.5	10.2	**7.5**	13.2
South Africa	5.7	2.5	8.2	**7.8**	10.2

1. Finished goods in SITC 75 and 76.
2. Electrical appliances here consist of finished goods in SITC 77.

Source: Compiled using data extracted from the WTO website at http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm.