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Arndt-Corden Department of Economics
Crawford School of Public Policy
ANU College of Asia and the Pacific

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Prema-chandra Athukorala

Arndt-Corden Department of economics
Crawford School of Public Policy
Australian National University

Corresponding author:
Professor Prema-chandra Athukorala
Arndt-Corden Department of Economics
Crawford School of Public Policy
Australian National University
Coombs Building 9
CANBERRA ACT 0200
Prema-chandra.athukorala@anu.edu.au

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Prema-chandra.athukorala@anu.edu.au

Abstract

Global production sharing—the break-up of the production process into geographically separated stages—is an increasingly important facet of economic globalization that opens up opportunities for countries to specialize in different slices (tasks) of the production process depending on their relative cost advantage. This paper examines India's role in global production sharing from a comparative East Asian perspective in order to contribute to the contemporary policy debate in India on the link between export performance and 'jobless growth' in domestic manufacturing in India. The analysis reveals that India has so far failed fitting into global production networks in electronics and electrical goods, which have been the prime movers of export dynamism in China and the other high-performing East Asian countries. Further reforms to improve the overall investment climate is even more important for reaping gains from this new form of international exchange than for promoting the standard labour intensive exports. There is also a strong case, based on the experiences in East Asia and elsewhere, for combining further reforms with a proactive investment promotion campaign to attract multinational enterprises (MNEs) engaged in global production networks.

Key words: global production sharing, production fragmentation, foreign direct investment, export performance

JEL Codes: F21, F23, F53, O33

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How India fits into global production sharing: Experience, prospects and policy options

1. Introduction

Global production sharing—the break-up of the production process into geographically separated stages—has been an increasingly important facet of economic globalization over the past four decades.[1] This process of international division of labour opens up opportunities for countries to specialize in different slices (tasks) of the production process in line with their relative cost advantages. Economic theory postulates and the East Asian experience illustrates that, in a labour abundant economy, assembly activities within global production networks tend to be relatively more labour intensive (and hence 'pro poor') compared to conventional manufacturing (that is, production of a good from start to finish in just one country). This is the case even within industries which are commonly classified as high-tech and capital intensive, such as electronics, electrical goods and transport equipment.

The purpose of this paper is to examine India's role in global production sharing from a comparative East Asian perspective, with a view to broadening our understanding of why India is lagging behind China and other emerging East Asian economies in benefitting from this new form of international exchange. The paper is motivated by the growing emphasis in the contemporary policy debate in India on the link between emerging export patterns and 'jobless growth' of domestic manufacturing (Joshi 2008, Panagariya 2008 and 2013, Panagariya and Bhagwati 2013, Srinivasan 2011). Although the rate of export growth has been much faster during the past two decades, India still remains a small player in world manufacturing trade, and the composition of manufacturing exports has continued to exhibit a bias towards capital- and skill-intensive products (Veeramani 2012). Recent studies of India's export performance and the failure of emerging export patterns to reflect the country's comparative advantage in labour-intensive production have largely focused on the country's relative performance in the standard

[1] In the recent international trade literature an array of alternative terms have been used to describe this phenomenon, including international production fragmentation, intra-process trade, vertical specialization, slicing the value chain, and offshoring.

labour intensive manufactured goods such as clothing and footwear. The implications of the ongoing process of global production sharing for effective integration of the Indian economy into global manufacturing networks and the related policy issues have not been systematically explored. This paper aims to fill this gap, focussing specifically on merchandise exports.[2]

The paper is structured as follows: Section 2 provides a stage-setting analytical overview of the process of global production sharing, patterns and determinants of network trade, and emerging opportunities for countries to specialize in line with their relative cost advantage. Section 2 surveys India's export performance during the reform period in order to provide the context for the ensuing analysis. Section 3 examines emerging patterns of world network trade and India's comparative performance, paying particular attention to complementarities in production sharing between India and the East Asian countries. An econometric analysis is undertaken in Section 4 using the standard gravity modeling framework to examine the determinants of inter-country differences in the degree of involvement in network trade. Section 5 summarizes the key findings, followed by a discussion on policy options for India to effectively link domestic manufacturing into global production networks. The procedure followed in compiling data form the UN *Comtrade* database is described in the Appendix.

2. Global Production Sharing

Global production sharing is not an entirely new phenomenon.[3] What is new about the contemporary process of global production sharing is its wider and ever increasing product coverage, and its rapid spread from mature industrial countries to developing countries. With a modest start in clothing and electronics industries in the late 1960s, international production networks have gradually evolved encompassing developing countries and spreading 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. In general, industries that have the potential to

[2] India's role in production sharing in the global software services industry has been extensively studies. See Arora (2008) and the works cited therein.

[3] 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 in Maizels 1963).

break up the production process to minimize the transport cost involved are more likely to move to peripheral countries than other heavy industries. Cost competitiveness and scale economies achieved through global production sharing have provided the setting for the emergence of many new products leading to growth in world trade at a much faster rate than world production.[4]

The expansion of global production sharing has been driven by three mutually reinforcing developments (Jones and Kierzkowski 2001 and 2004, Helpman 2010). First, rapid advancements in production technology have enabled the industry to slice up the value chain into finer, 'portable', components. As an outcome of advances in modular production (fixed-position automation) technology, some fragments of the production process in certain industries have become 'standard fragments' which can be effectively used in a number of products.[5] Second, technological innovations in communication and transportation have shrunk the distance that once separated the world's nations, and improved speed, efficiency and economy of coordinating geographically dispersed production process. This has facilitated establishing 'service links' needed to combine various fragments of the production process across countries in a timely and cost efficient manner. There is an important two-way link between improvement in communication technology and the expansion of production sharing (fragmentation-based specialisation) within global industries. The latter results in lowering cost of production and rapid market penetration of the final products through enhanced price competitiveness. Scale economies resulting from market expansion in turn encourage new technological efforts, enabling further fragmentation of production processes (Jones 2000). Third, liberalisation policy reforms across the world over the past four decades have considerably removed barriers to trade and foreign direct investment (FDI) (Yi 2003).

At the formative stage of production networks spreading to developing countries (in the 1960s and 1970s), production sharing was a two-way exchange between the home and host countries; parts and components were exported to the low-cost, host country for assembly, and

[4] Many products such as small lap-top computers, hand phones, and various entertainment devices (such as iPod) could not have been produced at prices that assure commercial viability if it were not for the cost reduction achieved through the global spread of various slices of the production process.

[5] Examples include long-lasting cellular batteries originally developed by computer produces and now widely used in cellular phones and electronic organizers; transmitters which are now used not only in radios (as originally designed) but also in PCs and missiles; and electronic chips which have spread beyond the computer industry into consumer electronics, motor vehicle production and many other product sectors (Sturgeon 2002).

the assembled components were re-imported to the home country for final sale or further processing (Helleiner 1973, Gruwald and Flamm 1985). As supply networks of parts and components became 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 developing country locations (Brown and Linden 2005, Krugman 2008). Many of the MNEs in electronics and related industries now undertake final assembly in developing-country locations, retaining only design and coordination functions at home.

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 in developing countries wiht the sellers in developed countries.[6] However, in electronics and other high-tech industries, the bulk of production sharing takes place under the aegis of multinational enterprises (MNEs). This is because the production of final goods requires 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). MNE participation is, therefore, a *sine quo non* for developing countries to enter this most dynamic area of export growth. As production operations in the host countries became firmly established, MNE subsidiaries tend to subcontract some activities to local (host-country) firms, providing the latter with detailed specifications and even fragments of their own technology, but the overall production process is continued to be governed by the lead firm.

At the early stage of global production sharing, some observers were sceptical about prospects for developing countries to rely on this form of international specialisation for export expansion. They predicted that the process would be reversed because of rapid automation of production processes in developed countries (e.g., Frobel *et al*. 1980, Cantwell 1994). However, in many high-tech industries (notably electronics and electrical products) rapid innovation and continuous technical change, which bring about a constant cycle of change and obsolescence, are formidable constraints to rapid automation as an alternative to offshore assembly. Therefore, the

[6] For instance the Swedish furniture firm Ikea has for years outsourced the actual manufacture of items to subcontracting-firms in countries like Poland and Vietnam, retaining the design tasks in Sweden. The US based sportswear producer Nike undertakes its design work and advertising at home carries out most of its actual production in a number of Asian countries through arm's length relations.

indications are that this form of internationalisation of production will continue to expand, providing countries with the opportunity to find new niches for labour intensive, export-oriented production (depending of course on their ability to provide an enabling domestic economic environment). Thus, international product fragmentation presents a challenge to those who believe in the so-called 'fallacy of composition' argument against export-led industrialisation in developing countries.

There is evidence that trade based on global production sharing (trade in parts and components, and final assembly; henceforth referred to as 'network trade') has grown at a much faster rate than total world manufacturing trade over the past four decades. In a pioneering attempt to quantify global production sharing using trade data for the OECD countries, Yeats (2001) found that parts and components accounted for 30% of total trade in machinery and transport equipment[7] of these countries in 1996, compared to around 15% in the mid-1980s. Following Yeast's approach, but with broader commodity coverage, Athukorala (2011a) estimated the share of parts and components in total world manufacturing trade in 2007 at 32.1%, up from 23.6% in 1992. According to his estimates total network trade (parts and components and final assembly) accounted for a half of total manufacturing trade in 2007. A number of studies have used the input-output technique to measure the degree of dependence of manufacturing production and trade of selected countries on global production sharing (Hummels et al. 2001, Johnson and Noguera 2012, Dean *et al* 2010, Koopman *et al.* 2010). Hansen *et al*. (2005) have measured the extent of production sharing using trade flows between US multinational enterprises and their foreign affiliates. All these studies, regardless of the yardstick used, point to the growing importance of production sharing in world trade and increasing cross-border interdependencies in the world economy.[8]

Global production sharing open up new opportunities for developing countries and transition economies to participate in a finer international division of labour. The nature of factor intensity of the given segments and the relative prices of factors in comparison with their productivity jointly determine which country produces what components. However, several

[7] These are the products belonging to Section 7 of the Standard International Trade Classification (SITC 7). They roughly account for more than one-half of all trade in manufactures.

[8] In addition to these direct quantifications, there is a large number of case studies of the nature and growing importance of production sharing in industries such as electronics and electrical goods, apparel, and motor vehicle (Kugman 2008 provides a summary). The popular press is also replete with relevant stories.

preconditions need to be satisfied for a country to effectively participate in international production networks. First, assembly processes within production networks requires middle-level supervisory manpower (in addition to the availability of trainable low-cost unskilled labour) much more than what is required in the traditional labour intensive manufacturing (Feenstra and Hanson 2003).[9] Second, successful participation in global production sharing will not occur if the extra costs of service links associated with production fragmentation outweigh the gain from the lower costs of the activity abroad. These extra costs include transportation, communication, and other costs involved in coordinating the activity in a given countries with what is done in other countries. Third, the policy regime and the domestic investment climate need to be conducive for MNE involvement in domestic manufacturing.

3. India's Export Performance: An Overview

During the first four decades of the post-independence era India continued to remain an underperformer in world export markets, relative to both her own potential and the performance of many other developing countries. The overriding aim of the Indian development policy from the inception was across-the-board import substitution in the context of a foreign trade regime, which relied extensively on quantitative restrictions (QRs). Until about the mid-1970s the overall policy trend was towards tightening controls on both foreign trade and domestic industry. The pull of resources into import-substitution industries by the high level of protection, plus overvaluation of the real exchange rate resulting from upwards shift in demand for imports and a rate of domestic inflation above that of trading partners, discouraged production for export. Also, the inflexibilities created by the pervasive controls on domestic manufacturing handicapped the ability of firms to penetrate export markets (Singh 1964, Srinivasan 1998, Panagariya 2008).

India's share of world non-oil exports[10] fell continuously from 2.3% in the 1950s to 0.6% per cent in the 1970s (Figure 1). Notwithstanding some selective measures introduced to ameliorate the anti-export bias, India's world market share fell further to an average level of

[9] See also Steve Jobs' discussion with President Obama on Apple's assembly operations in China in Isaacson (2011), p. 546. 'At that time, Apple had 700,000 factory worker employed in China, and that was because it needed 30,000 engineers on-site to supervise those workers. If you could educate these engineers, he said, we could move more manufacturing plants here'.

[10] Merchandise exports net of oil and gas (products classified under commodity code 32 of the Standard International Trade Classification, SITC).

0.5% by the mid-1980s. The degree of export orientation of the economy, measured by exports to GDP ratio, remained virtually unchanged around 6% throughout the 1970s and 1980s. The fall in India's share in total exports from developing countries during this period was much sharper, from 3.2% in the 1960s to 1.5% during the 1980s. Moreover, India's failure to keep up with overall export performance of other developing countries[11] was much more clearly visible in manufacturing trade: India accounted for 2.6% of manufacturing exports from developing countries in the late 1980s, compared to 10.2% in the early 1960s. In 1962 (the earliest years for which comparable country-level data are available) India was the second largest exporter of manufactured goods in the developing world (accounting for 14.2% of exports from developing countries after Hong Kong (19.8%). By the time the liberalization reforms began in the early 1990, India was the tenth largest exporter (2.6%) after the Philippines (2.9%), and China's share (25.6%) was 10 times of that of India.[12]

India's overall export performance has improved significantly following the liberalisation reforms. Its share in total world non-oil exports recovered to the level of the early 1960s (about 1.2%) by 2002 and increased further to 1.8% in 2011. However, as yet there has not been any noticeable improvement in India's relative export performance among developing countries. Its share in total exports from developing countries has not yet surpassed the levels of the early 1960s (about 3.8%). India has so far failed to cash in the 'the great transformation of world trade' (Krugman 2008, p. 103), the dramatic shift in manufacturing exports from developed to developing countries, that has occurred over the past four decades.

Tables 1 and 2 compare India's export performance with the East Asian developing countries by broad commodity categories.[13] India share in world manufacturing exports increased from 0.6% in 1990-91 to 1.6% in 2010-11. Over the same period, China's share jumped from 2.5% to 15.3%. By 2010-11 China was accounting for 38.5% of total manufacturing exports from developing countries compared to India's share of 4.2%. The share

[11] In this paper the standard United Nations country classification is used to identify developing countries. According to this classification 'developing countries' encompasses developing Asia (the member countries of the Asian Development Bank), Latin America, Africa and the Middle East.
[12] The data reported in this paper, unless otherwise stated, are based on the UN *Comtrade* database.
[13] In order to minimise the effect of possible random shocks and measurement errors, henceforth two-year averages are used in inter-temporal comparison throughout this paper. All data are calendar-year based.

of manufactured goods in total non-oil exports has continued to remain low (around 80%) in India compared to China and most other countries in East Asia.

India's world market shares in all commodity categories have increased over the past three decades, but no particular commodity category stands out for markedly rapid world market penetration in a comparison with the East Asian countries. During this period, India export expansion has been heavily concentrated in two product categories: resource-based products (products classified by material, SITC 6)[14], miscellaneous product (SITC 8, clothing, footwear and other standard labour intensive products). A starling difference in India's export patterns compared to China and the other East Asian countries is the rather small share accounted for by the product group of machinery and transport equipment (SITC 7), which accounts for nearly a third of world merchandise trade and over 40% of total manufacturing trade. In 2010-11 machinery and transport equipment accounted for only 17.2% of total merchandise exports of India, compared to 59.2% in that of China and even larger shares in Korea, Taiwan, Malaysia and Singapore. As we will see in the next section, the on-going process of global production sharing is heavily concentrated within this product group.

4. India in Network Trade

Between 1990-91 and 2010-11 world exports taking place within global production network (network exports) recorded an almost five-fold increase, from US$12803 billion to US$59070, with the share of developing countries in the total increasing from 11.9% to 45.1% (Figure 2). This has contributed disproportionally to the shift in the geographic profile of manufacturing trade from developed to developing countries. The share of network products in exports from developing countries increased from 41.4% in 1990-91 to 60.1% in 2010-11. These exports accounted for over 60% of the total increment in manufacturing exports from developing countries over these two decades.[15]

[14] Gems and jewelry, which constitute over 15% of Indian exports, are included in this category.
[15] The data on the share of network products, in particular electronics and electrical goods in total manufacturing reported here (which are based on nominal manufacturing value added) need to be interpreted with care because during this period the prices of these products, in particular electronics and electrical goods, grew at a slower rate compared to those of most other manufactured products (Krugman 2008)

Data on the contribution of global production sharing to the expansion of manufacturing exports from India and East Asian countries are summarised in Table 3. On average network products have accounted for over a half of total manufacturing exports from all East Asian countries (except Indonesia)[16] over the past two decades, with this share recording a notable increase in the past decade. Network-products exports from India, too, have increased during this period, but these products accounted for only 23.4% of total Indian manufacturing exports in 2010-11. Network product accounted for nearly 70% of the total increment in manufacturing exports from East Asia between 1990-01 and 2010-11; the comparable figure for India was 22%.

As regards the composition of network products, a striking common feature of East Asian countries' engagement in global production sharing is the heavy concentration of production within the broader commodity group of machinery and transport equipment (SITC 7). Within this product group telecommunication and sound recording equipment, semiconductors and other electrical machinery and equipment account for the lion's share of total network exports (Tables 4 and 5). By contrast, these dynamic products still account for a much small share (26%) of network- product exports from India.

A notable difference in the commodity composition of network exports from India compared to that of the East Asian countries is the relatively larger share accounted for by transport equipment. Road vehicles and other transport equipment accounted for 28% of total Indian network exports in 20010-11, compared to an East Asian regional average of 13.2% (Table 4). Interestingly, the total volume of transport equipment exports from India is rapidly approaching the level of Thailand, which is the most successful second-tier automotive exporting country (after Japan and Korea) in Asia. India's total transport equipment exports increased from US$1.3 billion in the early 1990s to neatly US$19 billion in 2010-11. Thailand's transport equipment exports in 2010-11 were US$21.0 billion.

A number of leading automakers and auto part suppliers have established assembly plants in India and some of them have already begun to use India as an export platform witin their global production networks (Humphrey 2003, Sen and Srivastava 2012). For example, Toyota Kirloskar Auto Parts, a joint venture between Toyota and a local manufacturer is

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[16] Indonesian 'outlier' status within East Asia in relation to its role in global production sharing is discussed below.

exporting gearboxes from India to assembly plants in various countries including Thailand, South Africa and Argentina. Toyota Indonesia, which is specialising in multipurpose vehicles has integrated its production system with its operations in India, importing engine components from Indonesia and exporting gearboxes and auto parts. Suzuki India has developed a two way sourcing network encompassing its plants in China, India and Indonesia. Almost all companies now export assembled cars (completely built units) to both regional and extra-regional markets. Until about the early 2000, parts and components accounted for the bulk of automotive exports from India. Since then exports of completely built units (CBUs) have increased at a much faster rate. In 2010-11 CBUs accounted for nearly three quarters of total automotive exports of over US$19 billion (Figure 3).

In sharp contrast to automobile, as yet no signs of Indian manufacturing linking to production networks in electronics, electrical goods and other related products. A number of large electronics and electrical goods producing MNEs (eg Nokia, Samsung, LG) have set up production bases in India, but they are predominantly involved in production for the domestic market.

East Asian countries have successfully used setting up of Special Economic Zones (SEZs) (until recently known as free trade zones (FTZ) or export processing zones EPZ) as a key policy instruments for integrating domestic manufacturing into global production networks. In these countries SEZs have proved to be an effective vehicle for providing MNEs operating in electronics and other vertically integrated global industries with an investment climate, characterised by free trade conditions, a liberal regulatory framework and high-quality infrastructure. In India the first SEZ (in Kandla, Gujarat) was set up in 1965. A second FTZ was set up in Santacruz (Mumbai) in 1973, with a specific focus on attracting electronics firms. During the 1980s five more zones were set up. But these SEZs never took off because of several reasons, such as their relatively limited scale; the government’s general ambivalence about attracting FDI, and the unclear and changing incentive packages attached to the zones (Bajpai and Sachs 2000, Kumar 1989). Moreover, unlike in the East Asian countries where SEZs were an integral part of an overall export-led industrialisation strategy, in India SEZs had to operate in the context of a highly restrictive trade and investment policy regime. It was difficult to insulate the zones from this unfavourable external investment climate (Aggarwal 2013).

Inspired by the notable success of SEZs in China, the Indian government announced a revamped approach to SEZs as part of the Foreign Trade Policy of 2000-01 (Panagariya 2008). This was followed by the enactment of the SEZ Act of 2005 to provide the overall legal framework within which the SEZs operate. The Act which became operational in February 2010 provides for setting up of SEZs by the private sector, in addition to state governments and the central government, and gives the Indian States some flexibility for the relaxation of labour laws and offer specific incentives to the investors.

The past five years have seen a rapid proliferation of SEZs in India: by the end of 2010 580 SEZs had been formally approved and, of them, 122 had begun operations (Aggarwal 2013). The share of exports by SEZ enterprises in total exports from the country increased from 9.1% in 2007/08 to 27.4% in 2009/10 (Table 6). However, so far there has not been significant presence of foreign firms in electronics and other vertically integrated global industries. Electronics and electrical goods account for only tiny share of exports (2.3% in 2009/10). It could be that, despite significant recent reforms, in the eyes of foreign investors, India's foreign investment regime still reflects the tension between the traditional aversion to foreign investment and the current recognition of its importance to economic development. Smooth functioning of SEZs has also been constrained by the controversial issue of land acquisition and unresolved issues relating to the relaxation of labour laws for the SEZ firms (Panagariya 2008, 271-73).

What explains the rapid growth of automotive exports compared to electronics and other machinery exports?

Unlike electronics and electrical goods, automotive are bulky and 'low-value-to weight' goods, and hence transport cost is a key determinant of market price. There is also a need to design the product to suit the taste and affordability of the consumer. Therefore there is a natural tendency for finally assembly plants to be located in countries with large domestic market. Once auto makers choose to set up assembly plants in a gives country, parts and component producers follow them because of two reasons. First, and perhaps more importantly, most auto parts are also low value-to-weight products and it is too costly to use air transport for timely delivery to meet the requirements of just-in-time production schedules of the final assembler (Hummels 2007).[17] Second, there is an asymmetrical market power relationship between component makers and auto makers within the global automobile industry; products of many auto part manufacturers are used in the vehicles made by a handful of car makers. This is different from electronics parts like integrated circuits and semiconductors that are used in many industries. Thus there is incentive for the part makers to set up factories next to the assemblers in order to secure their position in the market (Kohpaiboon and Jongwanich 2013, Klier and Rubenstine 2008, Chapter 3). Once a production base (involving both final assemblers and component assembly/production) is established in a given (large) country, exporting to third countries becomes a secondary focus of the global operations of automakers. Scale economies gained from domestic expansion makes exporting of both parts and components and assembled vehicles profitable as part of their global profit maximisation strategy. Adaptation of products to suit domestic demand conditions and lower transportation cost compared to exporting from the home base also become important drivers of exporting to regional markets from the new production base.

An important aspect of the performance of Indian auto industry is the coexistence of high tariff protection (which implies an anti-export bias) and rapid export growth. In spite of some reductions in recent years, tariffs on completely built automotive continued to remain much higher (60% on average) than tariffs on other imports (average tariff of 8.5%) (WTO 2011). Moreover, given the cascading nature of the tariff structure (parts and components tariffs of about 21%), the rate of effective protection for domestic automotive assembly is presumably even higher than the average applied nominal rate. Viewed from the standard (mainstream) policy advocacy for designing export promotion policy, an interesting issue here is why continuing anti-export bias has not been a deterrent to rapid export growth. A possible explanation is that export expansion has been predominantly driven by MNEs, which have set up production plants in India to produce for the global market, not just for the Indian market. The conventional advocacy for removing anti-export bias as a precondition for export expansion is based on the implicit assumption that exporting is an act of domestically owned firms whose marketing decision is driven by the relative profitability of exporting compared to selling in the

[17] Air shipping is the mode of transport for over two-thirds of electronics exports from Singapore, the Philippines, Thailand, and Malaysia to the USA (estimate based on U.S. Trade Commission data on trade by mode of transport between 2000 and 2005).

domestic market. Relative profitability in selling in the domestic market is probably not a binding consideration for a MNEs involved in sourcing and marketing within a global production network.

Relating to the poor export performance record in electronics, the only major East Asian country whose experience resembles that of India is Indonesia. An understanding of why Indonesia, notwithstanding the obvious advantageous position in terms of its location and relative wages, has continued to remain a small player in regional production networks seems to hold lessons for India. Indonesia's engagement has so far been limited only to some low-end assembly activities undertaken mostly by Singaporean subcontracting companies in the Batam economic zone. In the early 1970s two major electronics MNEs, which had already established production bases in Singapore, did set up assembly plants in Indonesia (Fairchild and National Semiconductor, established in 1973 and 1974 respectively), but both plants were closed down in 1986. At that time there was a worldwide slump in semiconductor business. However, it is not clear whether external demand factors played an important role in their departure from Indonesia. Both these MNEs continued their operation in both Singapore and Malaysia with some restructuring and labour shedding in response to demand contraction. The unfavourable business environment in Indonesia, in particular labour market rigidities, that hindered restructuring operations in line with global changes in the semiconductor industry, appears to be the major reason. According to press accounts at the time, in 1985 Fairchild announced a plan to introduce new technology that would have involved some reduction in their workforce, but the Ministry of Manpower opposed any retrenching that would have resulted from automation (Thee and Pangestu 1998).

Recently (in September 2011) the issue of why Indonesia is left behind in global production networks was brought into sharp relief when the Canadian firm, Research in Motion (RIM), the Blackberry producer, decided to set up an assembly plant in Penang, Malaysia bypassing Indonesia (Manning and Purnagunawan 2011). Indonesia is the largest market for the Blackberry in Southeast Asia, accounting for some 75% of its total annual sales in the region, and almost ten times the annual sales of 400,000 units in Malaysia. Therefore, when RIM announced its plan to set up a production base in Southeast Asia, there were high hopes in Indonesian policy circles that Indonesia would be its preferred location. Indonesian authorities were, therefore, perplexed by RIMs decisions to go to Penang and the industry minister even announce the possible introduction of punitive import tariffs on luxury goods such as the BlackBerrys. However, it is not hard to understand the reason behind RIM's decisions in favour of Penang. Penang has been a world centre for electronics for nearly three decades (Athukorala 2011b), whereas, Indonesia has had a chequered record in attracting multinational enterprises involved in global production sharing. There has not been any notable improvement in the investment climate in the country compared to the situation in the 1980s when Fairchild and National Semiconductor closed down their operations (Wells and Ahmed 2007).

It is widely held in some policy circles that India (and Indonesia, for that matter) has 'missed the boat' to join electronics production network given the MNEs' long-stnading attachment to the existing production bases and China's emergence as the premier assembly centre in the world. This view is, however, not consistent with the on-going developments in international production in East Asia. For instance, in recent years, the East Asia production networks have begun to spread to Vietnam and Cambodia.

Following the market-oriented policy reforms started in the late 1980s, a number of Korean, Taiwanese and Japanese firms set up assembly plants in Vietnam, but these ventures were predominantly of the conventional import-substitution variety with little links to the global production networks of the parent companies. From about the late 1990s part and component assembly within regional production networks began to emerge, mostly with the involvement of small- and medium-scale investors from Taiwan and Korea, which only one major global player, Hitachi from Japan. A major breakthrough occurred with the decision made in February 2006 by Intel Corporation, the world's largest semiconductor producer, to set up a $300 million testing and assembly plant (subsequently revised to $1 billion) in Ho Chi Minh City. The Intel plant started commercial operation in early 2011 and is expected to eventually employ over 3,000 workers. The early experience in Singapore, Malaysia, Thailand and the Philippines indicates that there is something of a herd mentality in the site selection process of MNEs in the global electronics industry, particularly if the first entrant is a major player in the industry.

It seems that, following Intel's entry, this process has already begun to replay in Vietnam (Athukorala and Tran 2012). A number of other major players in the electronics industry have already come to Vietnam following in the footsteps of Intel. These include the Taiwanese-based Hon Hai Precision Industry and Compact Electronics (the world's largest and second-largest electronics contract manufacturers) and Nidec Corporation (a Japanese manufacturer of hard disk drive motors and electrical and optical components). In 2009, Samsung Electronics set up a large plant in Hanoi for assembling hand held products (HHPs) (smart phones and tablets). Over the past four years, Samsung has been gradually shifting HHP assembly from its plant in China to the Vietnam plant as part of a strategic production diversification strategy in response to increasing wages and rental cost in China. In 2009, 65% of Samsung's global HHP supply came from China, with Vietnam contributing to a mere 3%; by the end of 2012 these figures had changed to 45% and 33%, respectively. In 2012, Samsung Vietnam's production capacity reached 150 million units, and its total exports (about US$11 billion) amounted to 11% of Vietnam's total merchandise export earnings.[18]

There are also early signs of regional production networks expanding to Cambodia. In 2011, Minebea, a large Japanese MNE which produces a wide range of parts and components for the automotive and electronics industries, set up a plant (Minebea Cambodia) in the Phnom Penh Special Economic Zone to assemble parts for cellular phones using components imported from its factories in Thailand, Malaysia and China. Minebea Cambodia currently employs 1,300 workers and it has plans to expand to a total workforce of 5,000 within two years. The other MNEs which have set up assembly plant in Cambodia include Sumitomo Corporation, Japan (wiring harnesses for cars); Denso, Japan (motorcycle ignition components); Pactics, Belgium (sleeves for sunglasses made by premier eyewear companies); and Tiffany & Company, USA (diamond polishing). There is anecdotal evidence that a number of other Japanese companies which have production based in China and Thailand are planning to relocate some segments of their production process in Cambodia. Rising wages and rental costs in China and the neighbouring Thailand, and production disruption caused by recent floods in Thailand, are considered the drivers working to Cambodia's advantage (*Bangkok Post*, *3 May* 2013).

When China began to emerge as a major trading nation in the late 1980s, there was a growing concern in policy circles in Southeast Asia, and in other Asian countries, that competition from China could crowd-out their export opportunities. Initially, the 'China fear' in the region was mainly related to export competition in the standard light manufactured good

[18] The discussion here on Samsung's operation in Vietnam is based on a conference presentation made by Seokmin Park, Vice President and Head, Corporate Supply Chain Management of Samsung (Park 2013).

(clothing, footwear, sport goods etc.), but soon it turned out to be pervasive as China begun to rapidly integrate into global production networks in electrical and electronics products through an unprecedented increase in foreign direct investment in these industries. The rapid increase in China's share in world exports markets in these product lines, coupled with some anecdotal evidence of MNEs operating in Southeast Asian countries relocating to China, led to serious concern about possible erosion of the role of Southeast Asian countries in global production networks. These concerns gained added impetus from China's subsequent accession to the WTO, which not only provided China with most-favoured nation (MFN) status in major markets but also enhanced China's attractiveness to export-oriented investment by reducing the country risk of investment.

As can been seen in the data reported in Tables 1 and 2, there has been a significant contraction in final assembly of consumer electronics and electrical goods exported from Southeast Asia as an outcome of competitive pressure from China for final assembly[19]. However, this structural shift has not resulted in a 'hollowing out' of production bases in Southeast Asia. On the contrary, the past two decades have seen a close complementarity between China and Southeast Asian countries within global production networks, for two reasons. First, expansion in final assembly in China has created new demand for parts and components assembled in Southeast Asia. Benefitting from this, electronics firms involved in component design, assembly and testing restructured their operations by moving into high-value tasks in the value chain. This process has been greatly aided by the deep-rooted nature of their production bases and the pool of skilled workers developed over the past three decades (Athukorala 2009). Second, a number of large electronics MNEs have shifted regional/global headquarter functions to Singapore and Penang. Manufacturing is only part of their operations. Their activities now encompass corporate and financial planning, R&D, product design and tooling, sales and marketing. Most MNEs that have shifted final assembly of consumer electronics and electrical goods to China perform global headquarter functions of their China operations perform from Singapore and Malaysia (Penang). Some of them now use their Penang affiliates as an integral part of their global training and skill enhancement programs. Some of them now use their affiliates in these locations as an integral part of their global training and skill enhancement programs (Athukorala 2011b).

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[19]Final assembly is generally more labour intensive than component assembly, production and testing.

5. Determinants of Trade Flows

This section reports the results of an econometric exercise undertaken to examine the determinants of inter-country difference export performance, with emphasis on engagement in network trade. The analytical tool used here is the gravity model, which has become the 'workhorse' for modelling bilateral trade flows. [20] After augmenting the basic gravity 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,

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

where 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.

TRD Bilateral trade

GDP Real gross domestic product (GDP), a measure of the economic size (+)

LPI Logistic performance index (+)

INS Institutional quality

DST The distance between the economic centres of *i* and *j*(-)

RER Real bilateral exchange rate (+)

FTA A binary dummy which is unity if both *i* and *j* belong to the same Free trade agreements and 0 otherwise (+)

[20] The gravity model originated in Tinbergen (1962), purely as an attempt to capture empirical regularities in trade patterns. For recent attempt to provide a theoretical justification for its formulation and applications to trade flow modelling, see various contributions in Bergeijk and Brakman (2010).

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 (+)
DIND	A dummy variables for India (which takes the value one for India and zero for the other countries
DDV	A dummy variable for non-East Asian developing countries other than India (which takes the value one for non-East Asian developing countries other than India and zero for the other countries)
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 three variables, *GDP* of the reporting country and the partner countries and the distance *DST* between them, are the standard gravity model arguments. The common reasoning for the use of GDP as an explanatory variable is that larger countries have more variety to offer in international trade than smaller countries (Tinbergen 1962). The use of this variable in our trade equation is also consistent with the theory of international production fragmentation, which predicts that the optimal degree of fragmentation depends on the size of the market, because the scale of production would determine the length to which such division of labour can proceed (Jones, Kierzkowski, & Chen 2004). In other words, the size of GDP can be treated as a proxy for market thickness (the economic depth of trading nations) which positively impacts on the location of outsourcing activity (Grossman & Helpman, 2005).

The geographic distance is a proxy measure of transport (shipping) costs and other costs associated with time lags in transportation such as spoilage. Technological advances during the post-war era have contributed to the ‘death of distance’ when it comes to international communication costs. However, there is evidence that geographical ‘distance’ is still a key factor in determining international transport costs, in particular shipping costs (Hummels, 1999, Evans and Harrigan, 2003). Transport cost could be a much more important influence on vertical trade than on final trade, because of multiple border-crossing involved in the value-added chain.

The real exchange rate *(RER)* is included to capture the impact of the overall macroeconomic climate on international competitiveness of tradable goods production. *LPI* and *INS* included to captures the cost of “service links” involved in connecting “production blocks” within global production networks: *LPI* measures the quality of trade-related logistic provisions, and INS captures government stability and various aspects of governance that directly affect property rights, political instability, policy continuity and other factors which have a bearing on the ability to carry out business transaction. *A*djacency (*ADJ*) and common business language can facilitate trade by reducing transaction cost and through better understanding of each other’s culture and legal systems.

The free trade agreement dummy variable (*FTA*) in included in the model to capture the impact of tariff concessions offered under these agreements. All countries covered in our data set are members of one or more FTAs. In theory, network trade to be relatively more sensitive to tariff changes (under an FTA or otherwise) compared to the conventional horizontal trade (Yi, 2003). Normally a tariff is incurred each time a good in process crosses a border. Consequently, with a one percentage point reduction in tariff, the cost of production of a vertically-integrated goods decline by a multiple of this initial reduction. Moreover, a tariff reduction may make it more profitable for goods previously produced in their entirety in one country to now become vertically fragmented. Consequently, the trade-stimulating effect of an FTA would be higher for network trade than for normal trade, other things remaining unchanged. However, in reality, the trade effect of any FTA would depend very much on the nature of the rules of origin (ROOs) built into it. The trade-distorting effects of ROOs are presumably more detrimental to network trade than to conventional final-goods trade, because of the inherent difficulties involved in delineating the product for duty exemption and because of the transaction costs associated with the bureaucratic supervision of the amount of value-added in production coming from various sources (Krishna 2006). Formulating ROOs for network-related trade is a rather complicated business. The conventional value-added criterion is not virtually applicable to this trade because the products involved are low-value-added by their very nature. The only viable option is to pursue so-called change-in-tariff-lines-based ROOs, but this leads to insurmountable administrative problems because trade in electrical and electronics goods, and their related components, belong to the same tariff codes at the HS-6 digit level, which is the normal base for designing these type of ROOs. Moreover, the process of global production sharing is characterized by the continuous emergence of new products. Given the obvious administrative problems involved in revising ROOs in tandem, the emergence of new products naturally opens up room for unnecessary administrative delays and the tweaking of rules as a means of disguised protection.

Among the other variables *DEA* and *DGFS* are included to control for the trade disruptions during the East Asian financial crisis and the recent global financial crisis. The two country dummy variables, *DIND* and *DDV*, are included (by treating the East Asian countries as the base dummy) to capture various other factors not captured by the other explanatory variables on export performance of India and the other developing countries, respectively.

The export 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 cover export trade of 20 developing countries with 45 partner countries (including the 20 countries). All countries each of which accounted for 0.01% or more of total world manufacturing exports in 2004-05 are included in the country list. 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). This index is based on a worldwide survey of the 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.

Logistic quality of the individual countries covered are assed using seven criteria: (1 for the worst performance and 5 for the best) focusing on seven areas of performance are: (1) efficiency of the clearance process by customs and other border agencies; (2) quality of transport and information technology infrastructure; (3) Ease and affordability of arranging international shipments; (4) Competence of the local logistics industry; (5) ability to track and trace international shipments, (6) domestic logistic costs, (7) timeliness of shipment in reaching destination. Institutional quality (INS) is measured by the International Country Risk Guide (ICRG) index compiled by the Political Risk Services Group, which is the most commonly used variable to measure the quality of governance in the empirical growth and trade literature. It measures the ability of government to carry out its declared programmes, popular support, legislative strength 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 Breusch Pagan 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.[21] Given these concerns, we re-estimated the model by the instrumental variable estimator proposed by Hausman and Tayler (1981) (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.[22]

The preferred HT estimates for total manufacturing, non-network product[23], and network products disaggregated into components and final assembly are reported in Table 9. 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. The magnitude of the coefficient of the distance variables (about 1.5) is consistent with results of previous gravity model applications to modelling trade flows (Bergeijk and Brakman 2010).

To comment specifically on the evidence directly relevant for this paper, the results for the real exchange rate variable (*RER*) the suggest network trade (both parts and components, and final assembly) is relatively more sensitive to international competitiveness traded goods production in a given country: RER elasticity of network trade is 0.30 compared to 0.17 in the case of non-network trade and the difference between the two coefficient falls beyond the standard two-standard error band.

The quality of trade related logistics is statically significant in all equations and the magnitude of the coefficient is much (almost twice) larger in the equations for network trade. This result strongly suggests the importance of the quality of service link cost in determining a country's attraction as a location within global production network. The result for the institutional quality variable is also consistent with this inference.

The coefficient of the *FTA* variable is statistically significant only in the in the final goods equation. This result is consistent with the fact that tariffs on final electrical and transport

[21] In the dataset, the trade variable is on a bilateral basis whereas the GDP varies only in the country dimension.
[22] See Egger (2005) and Serlenga and Shin (2007), and the works cited therein.
[23] Total manufacturing minus network products.

equipment still remain high in most countries (WTO 2011). The failure of the coefficient of *FTA* in the parts and component equation to attain statistical significance 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. Also most countries covered in our dataset have significantly liberalised trade in information technology products as part of their commitments under the WTO Information Technology Agreement which came into effect in 1996 (Menon 2013)

Finally, the coefficient of the India dummy variable (*DIND*) is highly significant with a negative sign in all equation and the magnitude of this coefficient is closely similar in magnitude in the equations for parts and components, and final assembly. Thus after controlling for the other explanatory variables the level of network exports from India is twelve times lower than the average level for the East Asian countries.[24]

There can be many country-specific idiosyncratic effects that lay behind this difference. But one particularly important difference is that, as first comers in this area of international specialization, East Asian countries offer considerable agglomeration advantages for companies that are already located there. Site selection decisions of MNEs operating in assembly activities are strongly influenced by the presence of other key market players in a given country or neighbouring countries. Against the backdrop of a long period of successful operation in the region, many MNEs, particularly the US-based ones, have significantly upgraded the technical activities of their regional production networks in Southeast Asia and assigned global production responsibilities to affiliates located in Singapore and more recently also to those located in Malaysia and Thailand. All in all, the results seems to support the view that MNE affiliates have a tendency to become increasingly embedded in host countries the longer they are present there and the more conducive the overall investment climate of the host country becomes over time (Rangan and Lawrence 1999).

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

6. Conclusions and Policy Implications

Global production sharing has become an integral part of the global economic landscape. Trade within global production networks has been expanding more rapidly than conventional final-good trade. The degree of dependence on this new form of international specialization is proportionately larger in the main East Asian countries compared to the other developing countries. India still remains a minor player in global production sharing, notwithstanding its geographical proximity to the dynamic East Asian economies. India's Export performance during the reform era has been dominated by resource-intensive products (SITC 5) and the standard labour intensive products (SITC 8). So far there are no clear signs of India entering into global and regional production networks in electronics and electrical goods, which have been the prime mover of export dynamism in successful export-oriented economies in East Asia.

Failure to attract MNEs engaged in international production networks has been a key factor behind India's inability to benefit from the thriving production-fragmentation related international specialization in high-tech industries. Given these remaining restrictive elements in the investment regime and the relatively poor overall investment climate, India has continued to remain an under performer in attracting FDI. Much of FDI in the country (other than that in the software and IT sectors) has been in domestic-market oriented production. So far Indian has not been successful in using SEZs as an effective vehicle for proving foreign investors with a suitable investment climate that is insulated from the remaining distortion in the rest of the economy. Smooth functioning of the India SEZs has also been constrained by the controversial issue of land acquisition and unresolved issues relating to the relaxation of labour laws for the SEZ firms.

The findings of this study give credence to the case made in a number of influential studies for further reforms to improve India's export performance (eg. Bhagwati and Panagariya 2013, Joshi 2008, Krueger 2010, Panagariya, 2008 and 201, Srinivasan, 2012). Relative to the first four decades following independence, India's policy reforms since 1991 have certainly achieved a great deal in unshackling the economy and integrated it into the world economy. However, as extensively discussed in this literature there are still many unresolved problems relating to the overall investment climate in general and the anti-export bias in the policy regime in particular. There is also a significant unfinished agenda of 'behind-the-border' reform. Regulations impacting on private sector activities have become less onerous since the start of the reforms, but there are various are sector-specific regulations in abundance. While, the 'the License Raj' (the infamous industrial licensing policy) has been largely eliminated at the centre, it still survives at the state level, along with a pervasive 'Inspector Raj'. Despite recent reforms, India's foreign investment regime still reflects the tension between the traditional aversion to foreign investment and the current recognition of its importance to economic development. Private investors, both foreign and local, require a large number of permissions (for example, electricity and water supply connections, water supply clearance and so on) from state governments to start business and they also have to interact with the state bureaucracy in the course of day-to-day business. Stringent labour laws and restrictive labour market practices are among other prominent issues. These issues are reflected in India's poor ranking among the countries in the region, in particular the dynamic export-oriented economies in East Asia, in terms of various indicators of ease of doing business.

The findings of our econometric analysis shows that completing this unfinished reform agenda is even more important for linking India into global production networks than for the expansion of the standard labour intensive products and other conventional exports. As already discussed, relative weight attached to 'service link' costs compared to labour cost is much more important in this new form of international exchange. This means that the economic base of the host country is the ultimate draw for foreign investors in this area: just offering incentives for investors cannot compensate for the lack of such a base. International vertical integration of manufacturing naturally increases the risk associated with supply delays and disruptions in a given location within the production network, because it can bring the operation of the entire production network to a halt. In the current business climate in India such disruptions could take many forms, including shipping delays, strikes, power outage or political disturbances.

Is there a case for proactive policies to attract FDI, in addition to improving the economic base through further reforms? This is a debatable issue, but there are compelling economic reasons and also evidence from other countries which support the argument that countries may not be able to attract the volume of FDI that their economic base merit without active investment promotion. Despite their size and global reach, MNEs do not always have perfect information on potential sites: 'Most companies consider only a small range of potential investment locations [and] many other countries are not even on their map' (IFC/FIAS 1997). Given this 'market failure in information', the decision making process relating to site selection can be subjective and biased. Moreover, as an increased number of countries embrace liberalisation reforms, there is tense competition in the market for investment sites: many potential host countries compete for attracting big players in global industries to their countries. Therefore, it may be worthwhile for a country to invest in altering the perception of potential investors by improving its 'image', taking economic fundamentals as given (Wells and Wint 2000).

It is important to emphasize that investment promotion is not the same as giving subsidies or financial incentives, although incentives can play a role at the margin when investors choose among alternative location with similar economic fundamentals required for the long term viability of their operations. The focus of the investment promotion campaign can be general (aimed at home countries with potential investors), industry specific (investors in industries in which the host country has an actual or potential competitive edge), or investor specific. Effective investment promotion should go beyond simply 'marketing the country' country into facilitating and coordinating the perquisites for setting up operations and effective functioning when the MNEs decide to set up production plants. This involves addressing potential failures in markets and institutions for skill, technical services or infrastructure in relation to the specific needs of targeted investors.

The experiences of Ireland (Ruwane 2001), Singapore (Lee 2000, Wong 2007), Costa Rica (MIGA 2006, Rodriguez-Clare 2001), Penang (Malaysia) (Athukorala 2011b), and more recently of Vietnam (Altman 2007, Athukorala and Tien 2012) suggest that well-focused investment promotion can be very effective in attracting FDI in line with the development priorities. Investment promotion in Ireland, Singapore and Penang was primarily industry specific, targeting electronics and the related supporting industries. Costa Rica provides an example of targeting a specific MNE (Intel). Vietnams approach is much more broad-based, but in recent years it has been successful in attracting two large players in electronics industry (Intel and Samsung) through targeted promotion. In all these countries investment promotion has gone well beyond the initial marketing stage, to facilitate the operation of the newly established foreign ventures. For instance, in Costa Rica and Vietnam the governments' commitment to invest in training to meet the future skill needs of its local operation was a major factor considered by Intel in its site selection decision. In Singapore, the government went even further and involved MNE managers in designing training and infrastructure programs. The state government of Penang joined hands with MNEs in setting up the Penang Skill Development Centre (to train middle-level technicians) which is now hailed world over as a successful case of public-sector-MNE collaboration in human capital development. The state government of Penang also adopted an innovative approach of engaging managers of MNE affiliates operating in the state in its investment promotion campaign in the respective home countries. The experiences of these countries also show that, in global industries like electronics and electrical goods, initial success in attracting a big player/players to set up operations in a country 'breeds success' because in these industries there is something asking to 'herd mentality' in the site selection process of MNEs.

The remarkable success of the Indian software Industry, a highly visible symbol of India's emergence in the world economy, is perhaps illustrative of India's potential for growing by production sharing through further reforms (Desai 2002, Krueger 2010). The software industry is unique in India in that restrictions on MNE entry have been virtually abolished. Now virtually every major global company in the software industry has a base in India and the entry of MNEs has opened up opportunities for Indian companies to thrive through functional specialization, and to develop niche products and services for large clients abroad. Liberalisation of FDI was also accompanied by the removal of quantitative restrictions on imports of computers and peripherals, and drastic cuts in import tariffs on these products, and significant telecommunication reforms. In addition to these reforms which laid the foundations that made the domestic software industry internationally competitive, there are other product specific features which make software industry immune to trade-retarding effects of the investment climate. For instance, the fact that it was not heavily dependent on Indian infrastructure (being able to transmit services via satellites) certainly gave IT an advantage over manufacturers who might otherwise have had to depend on roads and ports to export their goods. Regulations surrounding the employment of labour were largely not binding because the labour needs of the

IT sector consisted largely of skilled workers. Because it was a start-up industry, most of the behind-the-border controls and regulations affecting firms in other industries were not a binding constraint for IT firms (Krueger 2010). Finally, the powerful Indian diaspora in global software Industry (the 'IIT mafia') played a vital role in 'selling the country', by 'leveraging its own strength with India' comparative advantage' (Kapur 2010, p. 262).[25]

Appendix

(a) Trade data compilation

The data used in this section for all countries other than Taiwan are compiled from the United Nation's *Comtrade* Database, based on Revision 3 of the Standard International Trade Classification (SITC Rev. 3). Data for Taiwan are obtained from the trade database (based on the same classification system) of the Council for Economic Planning and Development, Taipei. (the UN trade data reporting system (Comtrade database).

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.[26]

There is no hard and fast rule applicable to distinguishing between parts/components and assembled products in international 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 have been identified, assembly trade can be approximately

[25] The 'diaspora effect' has not materialised in other industries perhaps because of the absence of favourable domestic policies: 'The well-known infrastructural and policy weaknesses in manufacturing have steered the diaspora's role in IT more towards the software side, rather than developing the hardware sector' (Kapur 2010, p. 262)

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

estimated as the difference between parts and components—directly identified based on our list—and 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), and photographic apparatus (SITC 88). 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. For instance, outsourcing of final assembly does take place in various miscellaneous product categories such as clothing, 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, assembly activities in software trade have recorded impressive expansion in recent years, but these are lumped together in the UN data system 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 (Yeats 2001; Krugman 2008).

Although SITC Rev 3 was introduced in the mod-1980s, a close examination of country-level data shows that data recording systems in many countries has considerable gaps in the coverage of parts and component trade until about 1990. Therefore we use 1992 as the starting years of data disaggregation for the inter-country comparison of trade based on global production sharing.

(B) Variables Used in Estimating the Export Equation: Definitions and Data Sources

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: $RER_{ij} = NER_{ij} * \frac{P_J^W}{P_i^D}$ 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 The original index (1: worst to 5 best scale) converted '1 to 100' .	LPI database, World Bank (Arvis et al. 2007)
INS	Institutional (governance) quality ('1:worst to 100: best' scale	International country risk index RPS Group (http://www.prsgroup.com)

FTA	A binary dummy variable which is unity if both country *i* and country *j* are signatories to a given free trade agreement.	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

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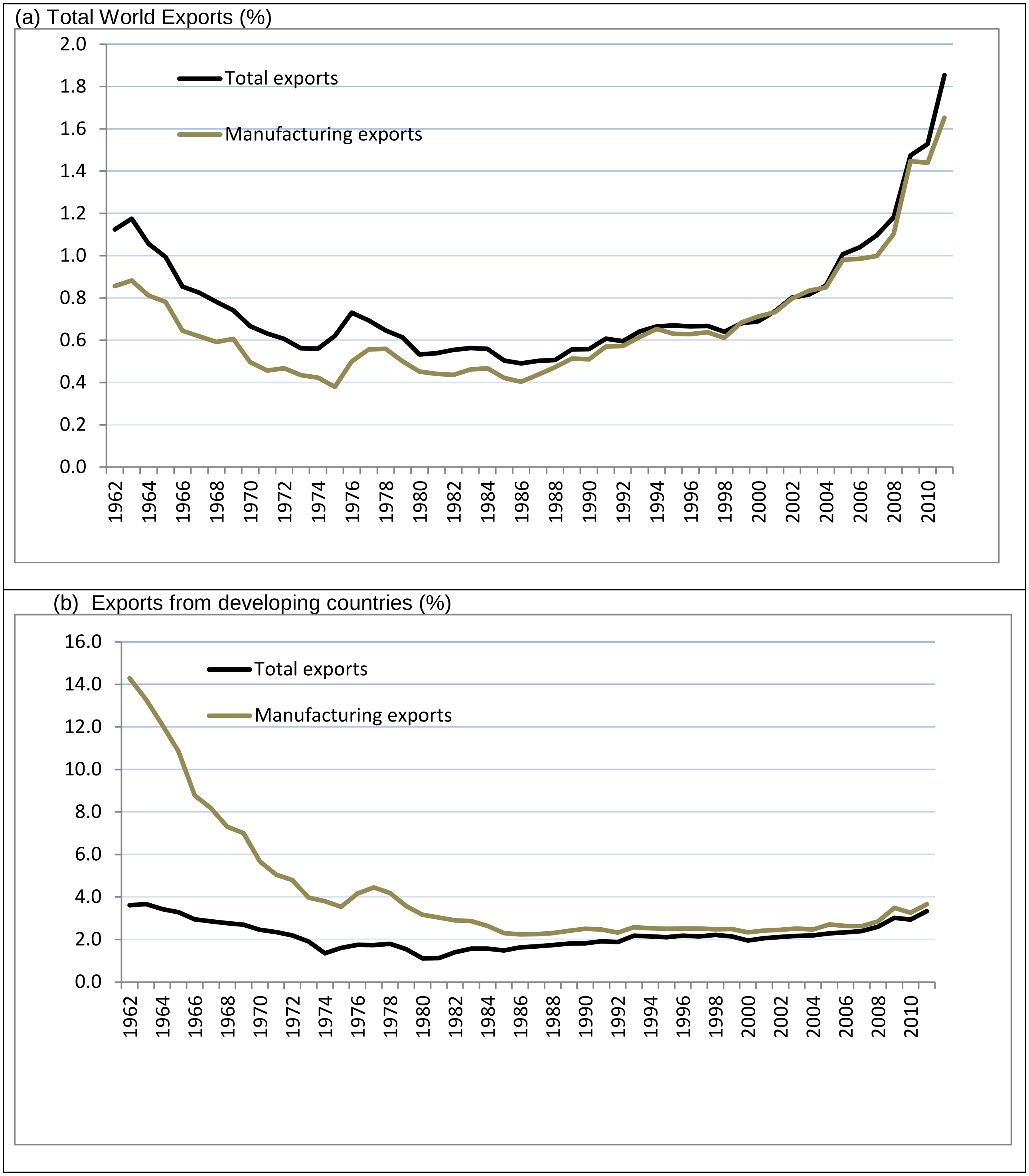
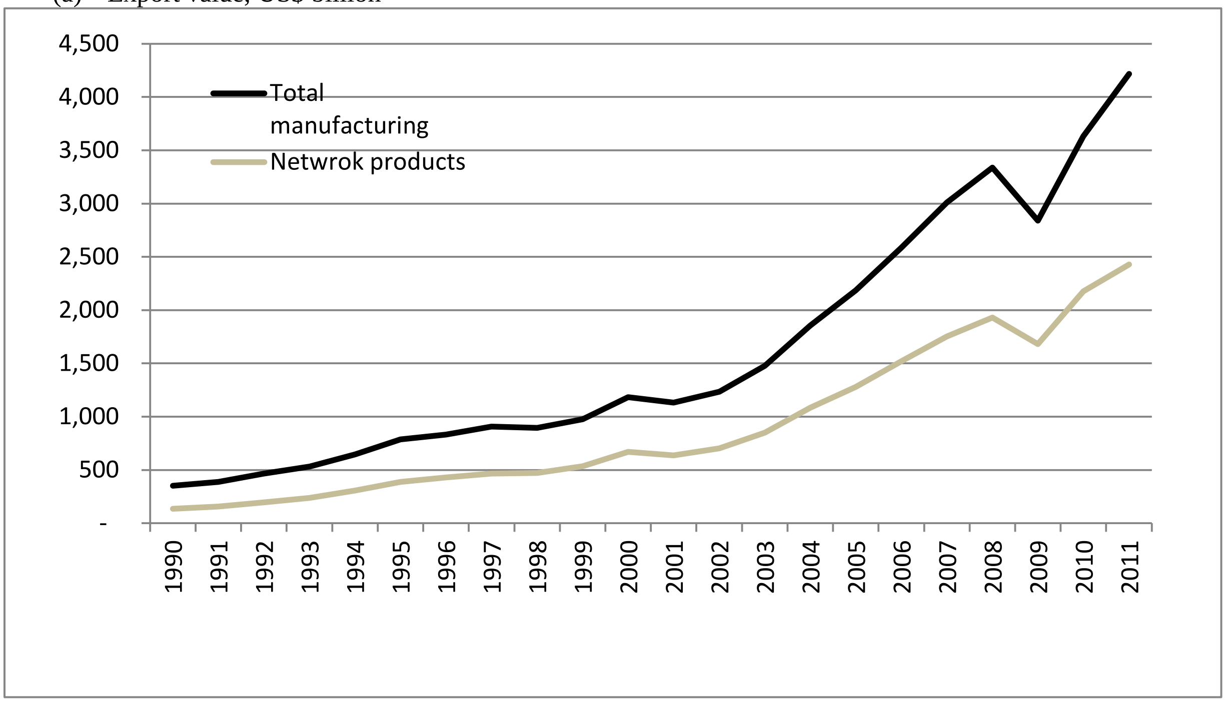
Figure 1: India's Share in Total World Exports and Exports from Developing Countries, 1962-2011[1]



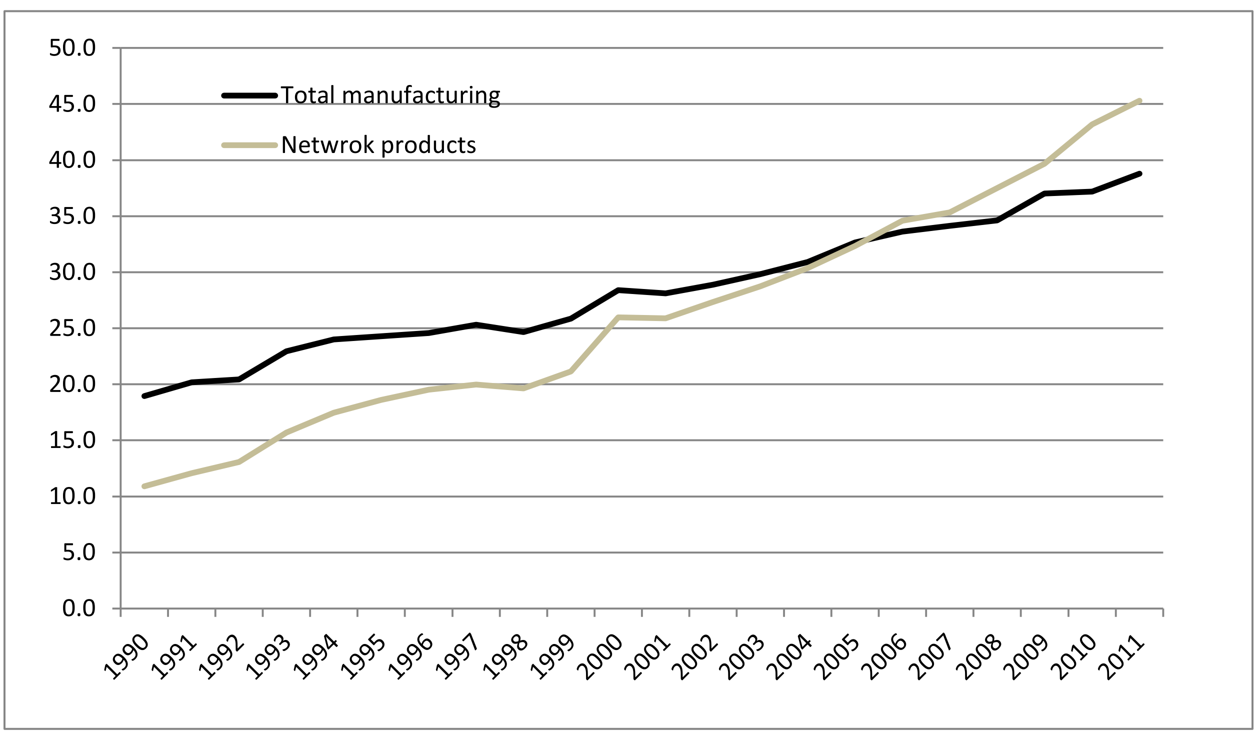
Notes: 1 Total merchandise exports net of oil and gas. 2 Developing countries are identified on the basis of the standard UN definition Figure 2: Manufacturing exports from developing countries, 1990-2011

Figure 2: Manufacturing exports from developing countries, 1990-2011

(a) Export value, US$ billion



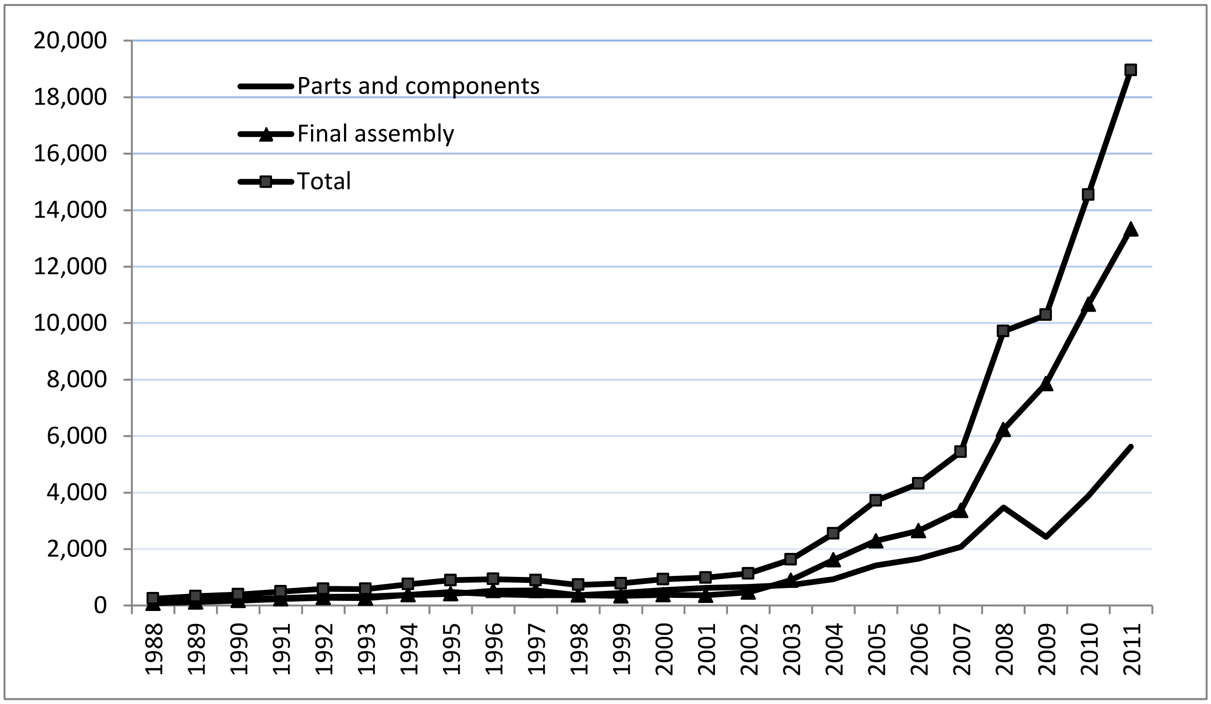
(a) Developing countries' share in world export



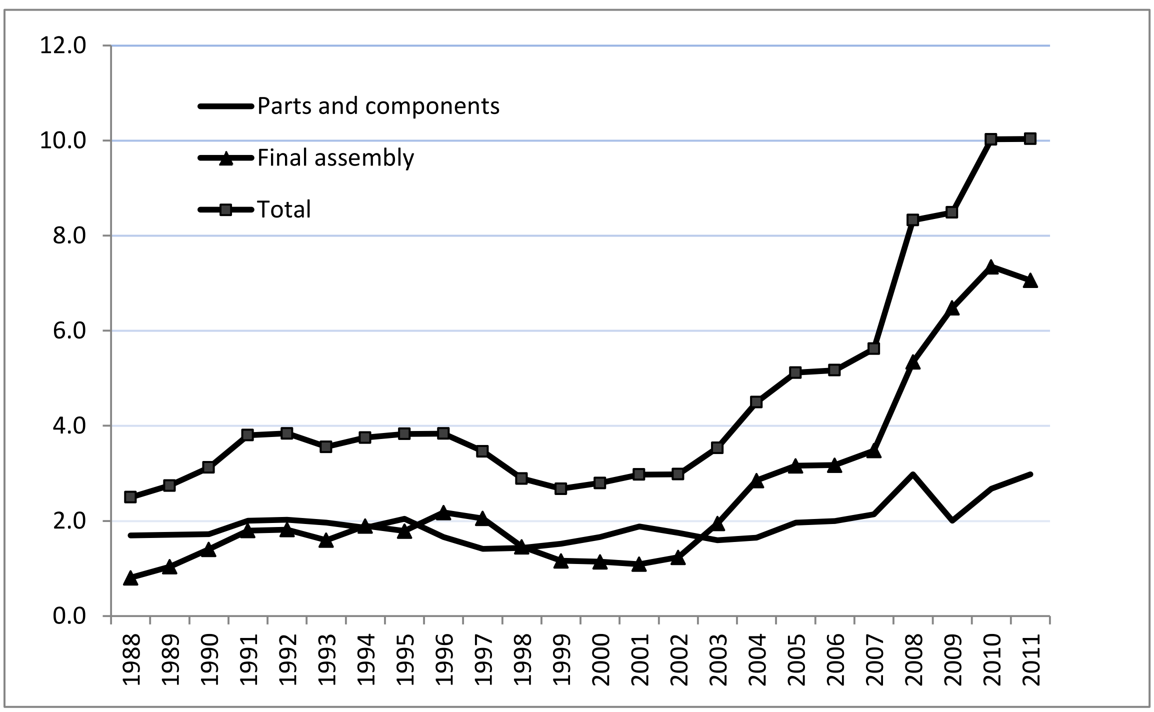
Source: based on data compiled from the UN *Comtrade* database

Figure 3: Exports of transport equipment from India, 1988-2011

(a) Value (US$ million)



(b) Share in total manufacturing export (%)



Source: Based on data compiled from the UN Comtrade database

Table 1: Shares in World Manufacturing Exports: India and Developing East Asian (DEA) Countries, 1979/80, 1989/90 and 2005/06 (%)[1]

		Total exports[2]	Primary products (1 to 4 + 68)	Manufacturing (SITC 5 to 8 – 68)				
				Total	Chemicals and related products (5)	Products classified by material (6 – 68)	Machinery and transport equipment (7)	Miscellaneous manufacturing (8)
India	1990-91			0.6	0.5	1.4	0.1	2.2
	2000-01	0.8	1.1	0.7	0.8	2.0	0.1	2.9
	2010-11	1.6	2.0	1.6	1.6	3.4	0.7	3.2
East Asia countries	1990-91	15.2	12.1	16.3	7.3	15.7	17.3	69.3
	2000-01	20.2	12.2	22.4	11.9	20.0	29.5	47.6
	2010-11	29.1	15.0	33.1	17.5	27.2	45.5	57.0
China	1990-91	2.5	2.7	2.5	1.4	3.6	1.3	13.0
	2000-01	4.6	3.4	5.0	2.2	5.3	4.5	18.6
	2010-11	12.8	3.4	15.3	5.9	13.9	19.5	37.9
Hong Kong	1990-91	3.6	1.3	4.1	2.1	4.6	3.5	15.6
	2000-01	3.6	0.9	4.1	1.7	3.4	4.3	12.2
	2010-11	3.2	0.5	3.7	1.1	2.2	6.4	6.5
Korea, Rp	1990-91	2.5	0.8	2.9	1.0	3.2	2.7	10.0
	2000-01	2.8	0.7	3.2	2.3	3.5	3.9	2.4
	2010-11	3.5	0.7	4.2	3.2	3.3	4.5	0.5
Taiwan	1990-91	2.2	0.7	2.8	0.8	2.8	2.8	18.6
	2000-01	2.6	0.5	3.3	1.9	3.8	4.7	6.0
	2010-11	2.5	0.5	3.2	1.9	3.1	5.0	3.9
Indonesia	1990-91	0.6	1.3	0.5	0.3	1.3	0.0	2.6
	2000-01	0.8	1.8	0.7	0.5	1.4	0.5	2.4
	2010-11	1.1	3.9	0.6	0.6	1.2	0.4	2.0
Malaysia	1990-91	1.0	1.9	0.8	0.2	0.5	1.5	1.9

	2000-01	1.5	1.3	1.6	0.7	0.8	3.2	1.1
	2010-11	1.3	1.8	1.3	0.8	0.9	2.2	1.1
Philippines	1990-91	0.2	0.3	0.1	0.1	0.1	0.2	1.2
	2000-01	0.6	0.4	0.7	0.1	0.2	1.5	1.3
	2010-11	0.4	0.3	0.3	0.1	0.2	0.7	0.4
Singapore	1990-91	1.7	1.1	1.8	1.3	0.8	3.6	2.2
	2000-01	2.2	0.6	2.4	1.7	0.6	4.7	0.9
	2010-11	2.3	0.5	2.5	2.6	0.7	4.5	0.3
Thailand	1990-91	0.9	2.1	0.7	0.2	0.7	0.8	4.2
	2000-01	1.2	2.0	1.1	0.7	1.0	1.5	1.9
	2010-11	1.5	2.2	1.4	1.2	1.3	1.7	1.2
Vietnam	1990-91	---	---	---	---	---	---	---
	2000-01	0.2	0.7	0.1	0.0	0.1	0.1	0.9
	2010-11	0.6	1.1	0.5	0.1	0.5	0.4	3.1
Developing countries	1990-91	19.0	21.2	19.2	9.8	21.5	18.6	81.7
	2000-01	26.7	23.7	28.4	15.6	28.4	34.4	63.6
	2010-11	36.9	30.7	39.7	22.1	37.2	50.4	68.0
World, $ billion	1990-91	2,708.6	407.5	2,241.9	274.7	472.4	749.1	76.4
	2000-01	5,469.8	615.2	4,602.5	567.0	820.2	1,764.7	195.2
	2010-11	13,400.4	1,914.8	10,756.6	1,724.1	2,051.3	3,808.1	373.9

Notes

1 Standard International Trade Classification (SITC) codes are given in brackets. 2 Excluding oil and gas.

--- Data not available

Source: Compiled from UN Comtrade database.

Table 2: Composition of exports: India and Developing East Asian (DEA)Countries, 1979/80, 1989/90 and 2005/06 (%)

			Manufacturing (5 to 8 - 68)					Total US$ billion
		Primary products (1 to 4 less 68)	Total	Chemicals and related products (5)	Products classified by material (6 – 68)	Machinery and transport equipment	Miscellaneous manufacturing (8)	
India	1990-91	24.9	73.3	8.1	36.6	7.6	20.9	17.5
	2000-01	17.1	80.4	11.0	39.7	8.3	21.4	41.4
	2010-11	17.6	78.0	12.8	32.3	17.2	15.6	214.1
East Asia	1990-91	12.0	88.9	4.9	18.0	34.9	28.8	411.2
	2000-01	6.8	93.0	6.1	14.9	50.8	21.3	1,106.1
	2010-11	7.4	91.2	7.7	14.3	50.9	17.8	3,905.1
China	1990-91	16.4	83.6	5.5	25.1	16.8	36.2	67.5
	2000-01	8.2	91.6	5.0	17.1	35.2	34.3	252.5
	2010-11	3.8	96.1	5.9	16.6	49.2	24.4	1,712.5
Hong Kong,	1990-91	5.3	94.3	5.8	22.2	28.5	37.8	98.6
	2000-01	2.9	96.5	5.0	14.4	39.2	37.9	196.4
	2010-11	2.3	93.3	4.5	10.6	57.5	20.7	427.3
Korea, Rp	1990-91	4.8	95.0	4.2	22.6	41.2	26.9	67.3
	2000-01	2.8	96.3	8.6	18.7	61.3	7.8	152.7
	2010-11	2.7	96.7	11.7	14.7	60.3	10.1	468.0
Taiwan	1990-91	4.6	95.4	3.7	22.0	48	30.9	71.7
	2000-01	2.0	98.0	7.5	21.5	65.3	11.5	139.1
	2010-11	3.1	96.9	9.9	18.6	59.5	7.7	291.5
Indonesia	1990-91	33.1	66.0	4.5	36.9	3.2	21.5	16.4
	2000-01	24.0	75.1	6.6	25.8	21.7	21	45.7
	2010-11	51.0	47.8	6.8	16.3	14.2	10.5	145.7
Malaysia	1990-91	28.9	70.5	2.0	9.5	46.4	12.6	26.5
	2000-01	9.2	89.8	4.5	7.8	68.2	9.3	84.1

	2010-11	19.6	79.6	7.8	11.0	49.6	11.3	177.1
Philippines	1990-91	25.5	74.5	3.6	8.9	29.1	33	4.3
	2000-01	6.5	93.2	1.0	3.8	76.1	12.3	34.7
	2010-11	12.6	76.1	3.5	8.1	57.4	7	48.7
Singapore	1990-91	9.8	88.4	7.8	8.6	61.1	10.9	46.0
	2000-01	3.2	92.7	8.1	4.1	71.3	9	120.1
	2010-11	3.3	86.7	14.6	4.7	58.9	8.5	311.8
Thailand	1990-91	33.3	65.5	2.4	13.0	23.3	26.8	25.5
	2000-01	19.3	77.5	6.0	12.0	44.2	15.3	64.9
	2010-11	21.2	75.7	9.9	13.1	41.9	10.8	200.8
Vietnam	1990-91	---	---	---	---	---	---	---
	2000-01	38.3	58.0	1.6	7.7	11.4	37.4	11.2
	2010-11	28.0	71.3	3.1	12.5	19.8	35.9	76.7
Developing countries	1990-91	16.8	83.8	5.2	19.7	31.2	25.8	514.8
	2000-01	10.0	89.5	6.0	15.9	47.6	20	1,462.4
	2010-11	11.9	86.3	7.7	15.4	46.6	16.1	4,945.1
						0	0	
World	1990-91	15.0	82.8	10.1	17.4	42.7	12.5	2,708.6
	2000-01	11.2	84.1	10.4	15.0	45.1	13.8	5,469.8
	2010-11	14.3	80.3	12.9	15.3	39.5	12.6	13,400.4

Notes

1 Standard International Trade Classification (SITC) codes are give in brackets.

--- Data not available

Source: Compiled from UN Comtrade database.

Table 3: The share of Network Products in Manufacturing Exports from India and Developing East Asian Countries (%)

	Parts and component			Final assembly			Network products			Contribution to export increment between 1990-91 and 2010-11
	1990-91	**2000-01**	2010-11	**1990-91**	**2000-01**	2010-11	**1990-91**	**2000-01**	2010-11	
India	7.0	8.3	11.0	4.9	4.1	12.3	11.9	12.4	23.4	23.4
East Asia	23.9	42.0	39.3	20.0	18.1	23.2	43.9	60.0	62.5	68.9
China	11.4	25.0	30.7	12.7	17.2	25.1	24.1	42.3	55.8	63.5
Hong Kong	18.6	31.8	52.4	18.9	17.0	15.6	37.5	48.8	68.0	59.7
Korea, Rp	22.2	39.0	34.9	23.3	26.8	36.5	45.6	65.8	71.4	81.3
Taiwan	23.5	49.0	53.5	26.9	23.7	23.0	50.4	72.6	76.5	88.1
Indonesia	3.0	22.1	18.2	3.0	8.7	13.1	6.0	30.8	31.3	42.3
Malaysia	47.3	62.5	50.6	21.6	16.7	16.5	68.9	79.2	67.1	82.6
Philippines	37.3	77.8	66.8	8.5	5.8	11.3	45.7	83.6	78.1	87.7
Singapore	49.3	71.9	63.1	24.5	10.9	10.7	73.8	82.8	73.8	88.0
Thailand	26.6	42.3	35.9	12.3	17.5	23.1	38.9	59.8	59.0	70.2
Viet Nam	---	16.8	20.1		4.6	10.3		21.4	30.5	21.4
Memo items:										
Developing countries	22.3	38.6	36.4	19.1	19.6	23.6	41.4	58.3	60.1	66.6
World	27.4	33.1	29.7	29.7	26.2	25.2	57.1	59.3	54.9	61.4

Notes

--- Data not available

Source: Compiled from UN Comtrade database.

Table 4: Composition of Networks Exports from India and Developing East Asian Countries, 2010-11 (%)

	Office machines and automatic data processing machines (75)	Telecom. and sound recording equipment (76)	Electrical machinery excluding semiconductors (77)	Semi-Conductors[2]	Road vehicles (78)	Other transport equipment (79)	Professional and scientific equipment (87)	Photographic apparatus and optical goods, watches and clocks (88)	Other [2]	Total US$ billion
India	1.9	10.9	14.1	1.9	26.3	22.0	3.0	1.0	18.8	34.6
East Asia	19.1	18.8	14.4	17.3	7.8	6.2	5.5	2.1	8.8	1,841.2
Chian	24.9	22.9	16.2	7.8	6.1	5.4	5.3	1.5	9.9	851.1
Hong Kong	17.7	25.8	17.4	25.1	0.6	0.2	3.4	5.0	4.9	264.2
Korea, Rp	4.5	12.9	9.9	14.9	20.1	17.5	10.8	1.5	7.8	297.9
Indonesia	11.3	22.7	24.3	4.7	15.2	6.6	1.2	1.0	13.0	20.5
Malaysia	23.0	14.6	11.9	36.2	1.8	1.5	5.3	1.2	4.5	90.4
Philippines	25.7	3.0	14.3	42.7	7.1	2.3	0.9	2.2	1.8	28.7
Singapore	15.1	6.2	8.7	44.6	2.3	4.7	4.3	1.6	12.5	190.6
Thailand	21.4	10.5	15.1	11.4	22.4	2.8	2.1	3.2	11.2	81.6
Vietnam	15.6	33.4	19.6	4.0	5.3	4.2	2.1	4.0	11.8	16.0
Memo items										
Developing countries	17.2	18.3	14.5	15.0	11.8	6.1	5.4	1.9	9.8	2,150.4
World	10.9	12.1	13.8	9.2	21.8	6.6	6.5	2.2	16.9	5,236.6

Notes

1 Standard International Trade Classification (SITC) codes are given in brackets.

2 These two categories contain parts and components only.

Source: Compiled from UN Comtrade database.

Table 5: Shares of Parts and Components in Total Networks Exports, 2010-11 (%) [1]

	Office machines and automatic data processing machines (75)	Telecommunication and sound recording equipment (76)	Electrical machinery excluding semiconductors (77)	Road vehicles (78)	Other transport equipment (79)	Professional and scientific equipment (87)	Photographic apparatus and optical goods, watches and clocks (88)	Total
India	87.3	45.2	79.3	31.8	24.3	28.3	14.4	53.2
East Asia	75.9	60.1	64.7	40.1	9.0	12.1	25.3	66.1
Chian	64.4	55.4	55.8	45.4	3.8	10.3	22.6	59.3
Hong Kong	97.6	62.9	77.3	25.9	61.7	22.1	23.2	79.1
Korea, Rp	96.8	85.2	74.0	33.1	2.5	3.1	11.4	53.0
Indonesia	95.9	33.0	69.2	50.2	8.5	19.3	24.4	61.5
Malaysia	71.5	56.1	75.7	75.6	51.3	32.8	53.8	78.8
Philippines	86.4	79.9	66.2	93.6	20.8	22.7	8.9	86.1
Singapore	97.5	79.2	79.1	77.6	52.8	27.6	27.5	89.4
Thailand	99.6	39.0	57.9	27.8	54.3	40.7	48.1	66.8
Vietnam	99.6	35.8	89.0	78.6	3.1	19.5	84.5	68.9
Developing countries	76.3	57.5	65.4	34.2	10.4	12.6	24.6	63.8
World	82.1	60.7	68.5	30.1	18.1	14.5	17.6	61.0

Notes

1 Standard International Trade Classification (SITC) codes are given in brackets.

Source: Compiled from UN Comtrade database.

Table 6: India: Exports from Special Economic Zones, 2007-10[1] (%)

Product	2007/08	2008/09	2009/10
Biotech	0.3	0.9	0.2
Computer/electronic Software	6.0	16.3	20.7
Computer hardware[2]	16.7	13.1	7.9
Electronics	0.8	0.4	0.4
Engineering	2.5	3.1	1.9
Gems and jewellery	34.5	33.5	19.9
Chemical and pharmaceuticals	2.2	6.4	33.5
Handicraft	0.1	0.0	0.0
Plastic and rubber	1.0	0.4	0.3
Leather, footwear, and sport goods	0.9	0.3	0.2
Food and agricultural products	0.9	0.3	0.2
Nonconventional energy	0.2	0.2	0.6
Textiles and garments	2.0	3.0	1.5
Trading and services	31.4	18.9	11.3
Miscellaneous	1.4	3.4	1.3
Total (%)	100	100	100
US$ billion	14.8	22.2	49.1
Memo item			
Percentage of India's total exports	9.1	12.0	27.4

Notes:

1. Data are based on Indian financial year.
2. Assembly of computers and printers.

Source: Compiled from WTO (2013), Table 111.19

Table 7: Determinants of Bilateral Trade Flows (1996-2009) – Hausman Taylor Estimations

		Network products			
Variable	Manufacturing	Total	Parts and components	Final assembly	Non network products
	(1)	(2)	(3)	(4)	(5)
Log GDP exporter	0.99*** (24.32)	1.14*** (22.18)	0.92*** (16.95)	1.35*** (26.80)	1.02*** (20.58)
Log GDP importer	1.09*** (32.65)	1.04*** (23.85)	1.13*** (25.44)	0.99*** (23.54)	1.07*** (29.19)
Log distance	-1.30*** (-19.96)	-1.23*** (-13.07)	-1.55*** (-15.96)	-1.36*** (-15.46)	-1.46*** (-20.65)
Log real exchange rate	0.26*** (4.73)	0.32*** (4.19)	0.32*** (4.19)	0.30*** (3.47)	0.18*** (3.41)
Log Institutional quality index	0.40*** (5.26)	0.42*** (4.45)	0.36*** (3.29)	0.38*** (3.41)	0.20** (2.73)
Log logistic index	1.11*** (3.97)	2.76*** (7.43)	2.51*** (5.95)	3.92*** (9.68)	1.47*** (5.15)
RTA Dummy	0.12* (1.85)	0.27* (2.09)	0.18 (1.22)	0.25* (2.25)	-0.06 (-1.03)
Colony	0.30 (0.86)	0.38 (1.13)	0.28 (o.87)	0.53 (1.34)	0.62* (1.68)
Contiguity	-0.20 (-0.72)	-0.12 (0.32)	-0.41 (-0.97)	0.04 (0.13)	-0.14 (-0.59)
Common language	0.67*** (5.50)	0.64*** (4.04)	0.90*** (5.29)	0.39 (2.60)	0.53*** (4.35)
AFC Dummy	-0.23*** (-5.55)	-0.53*** (-9.13)	-0.40*** (-6.33)	-0.52*** (-7.43)	-0.01 (-0.30)
GFC dummy	-0.20*** (7.49)	-0.30*** (6.78)	-0.25*** (6.43)	-0.28*** (5.02)	-0.20*** (7.44)
India dummy	-1.46*** (-13.85)	-2.82*** (-15.62)	-2.50*** (-13.13)	-2.56*** (-13.65)	-0.55*** (-3.71)
Other country dummy	-1.44*** (-9.78)	-2.49*** (-19.97)	-2.87*** (-19.52)	-1.84*** (-14.76)	-0.70*** (-6.82)
Constant	-24.99*** (-17.53)	-30.65*** (-16.45)	-25.96*** (-13.33)	-36.65*** (-19.30)	-25.10*** (-15.77)
Chi2	7324.9	4930.5	3862.3	3590.3	5847.1
Observations	11881	10431	10460	9952	10248
Number of paired	922	911	914	889	911

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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