GLOBAL VALUE-CHAINS AND CONNECTIVITY IN DEVELOPING ASIA - WITH APPLICATION TO THE CENTRAL AND WEST ASIAN REGION

Richard Pomfret and Patricia Sourdin

NO. 142

November 2014

ADB WORKING PAPER SERIES ON REGIONAL ECONOMIC INTEGRATION

ASIAN DEVELOPMENT BANK

ADB

ADB Working Paper Series on Regional Economic Integration

Global Value-Chains and Connectivity in Developing Asia - with application to the Central and West Asian region

Richard Pomfret* and Patricia Sourdin**

No. 142 | November 2014

*Professor, School of Economics, University of Adelaide, Australia, and Adjunct Professor of International Economics, The Johns Hopkins University, Bologna, Italy. richard.pomfret@ adelaide. edu.au

**Dr. Patricia Sourdin, School of Economics, University of Adelaide, Australia. patricia.sourdin@gmail.com

ASIAN DEVELOPMENT BANK

The ADB Working Paper Series on Regional Economic Integration focuses on topics relating to regional cooperation and integration in the areas of infrastructure and software, trade and investment, money and finance, and regional public goods. The Series is a quick-disseminating, informal publication that seeks to provide information, generate discussion, and elicit comments. Working papers published under this Series may subsequently be published elsewhere.

November 2014
Publication Stock No. WPS146976-2

Contents

Abstract

An increasingly important part of international trade consists of fragmentation of the production process, with differing tasks in the global value chain (GVC) being undertaken in different locations. The paper traces the origins of the GVC phenomenon, attempts to measure the significance of GVCs, and analyzes why some countries participate in GVCs while others do not. GVCs rely on timely delivery of parts and components at every stage, with no unnecessary costs to crossing borders. West and Central Asian countries have been non-participating because their economies are characterized by high costs of doing business, obtrusive border controls, and other obstacles. Governments may be reluctant to undertake necessary reforms, and wary of the potential for increased volatility and inequality that sometimes accompany GVC participation. However, the cost of non-participation is falling behind in economic prosperity. Import-substituting industrialization is no longer a serious option, because no country with an integrated car or computer industry can hope to be competitive with goods produced along efficient GVCs.

Keywords: global value chains - Central Asia - connectivity

JEL Classification: F14, F63, O53

1. Introduction

Global value chains (GVCs) and the fragmentation of production across borders are shaping today's trade and investment patterns. Regional and global value chains are continuously evolving: new value chains are appearing between emerging and developing countries, owing to increasing costs in emerging markets. Improved connectivity can substantially reduce the supply chain costs to trading firms and increase countries' competitive advantage, and is central for developing countries seeking to participate in and benefit from GVCs. This requires initiatives to develop GVC-relevant transport and communications infrastructure and logistics, and other policy interventions to reduce the costs of international trade.

The next section provides background on the evolution and current status of value chains, drawing on the extensive existing literature and focusing on East Asia. It includes discussion of alternative measures of the significance of GVCs. The third section reviews measures of trade costs and the fourth section analyzes links between bilateral trade flows and various determinants of trade costs; an underlying aim of these two sections is to identify policy initiatives that developing Asia can undertake to plug into and capture the gains from GVCs. The fourth section also provides a synthetic measure of the extent of GVCs in Central and West Asia. The fifth section gives examples of experiences from the Central and West Asian region and elsewhere in Asia on how countries have been successful in connecting and embedding their production networks into GVCs. The final section draws conclusions about opportunities for developing Asian economies, particularly the landlocked countries in Central and West Asia, to connect to GVCs.

2. The Evolution of Asian GVCs

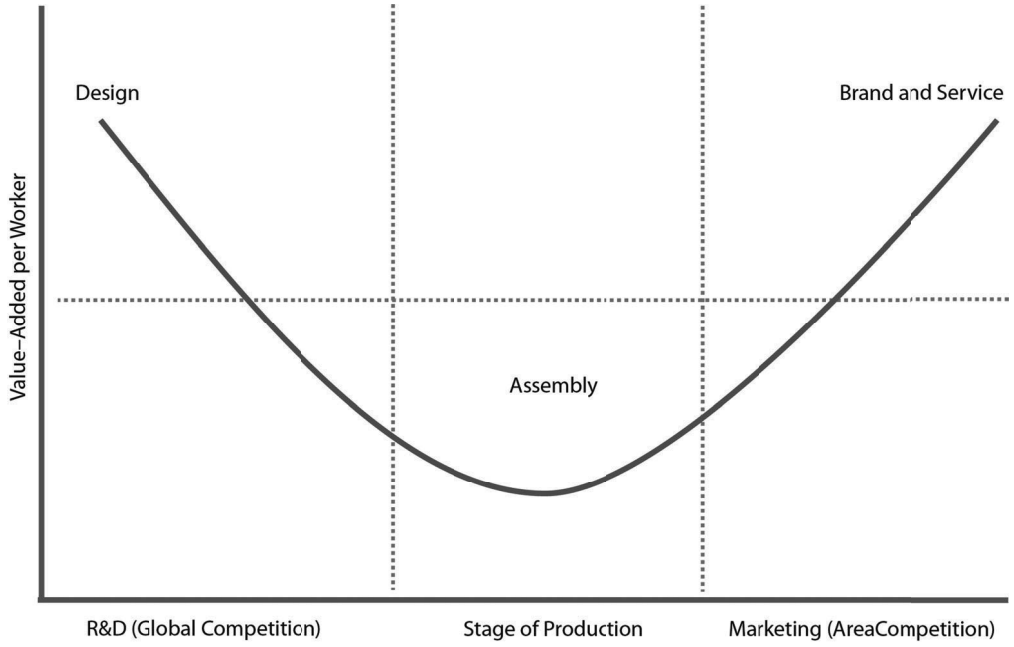
International supply chains are not a new phenomenon. The 18th century Industrial Revolution drew on triangular trade as labor was shipped from Africa to the Americas to work on cotton plantations that supplied inputs to the British factories that produced textiles for the global market. Nevertheless, in 19th century globalization, international trade could largely be represented as trade in final goods, such as Ricardo's example of British cloth for Portuguese wine. As late as the 1950s, the "2x2x2 trade model" (two goods–two factors–two countries) still captured the essence of international trade.

Origins of Modern GVCs

Vertical specialization began to become more visible in the 1960s. Semiconductors were the classic case, with discrete stages of production involving differing factor combinations and with low transport costs due to high value-to-weight ratios. Development and component production were human-capital- and physical-capital-intensive, assembly was labor-intensive (essentially sewing with wire), and testing and marketing were human-capital- and physical-capital-intensive; thus, the first and last stages of production required inputs typical of high-income countries, while the middle stage involved lower value-added per worker and required cheap labor (Figure 1). Some producers in the United States (US) realized that the key to

profitability was relocating assembly to a low-wage location which had good communications, reliable local support services, and enforceable contracts (e.g., Fairchild found Singapore).[1] Similar relocation of labor-intensive parts of the production process occurred in branded clothing and footwear in other parts of the world (e.g., *maquiladoras* in Mexico and Wrangler jeans in Malta).[2] Until the 1980s, however, these phenomena were restricted to a handful of locations and were not a large part of global trade.

Figure 1: The Smiling Curve



Note: The smiling curve concept is usually credited to Stan Shih, the founder of Acer, who used the concept to motivate a shift in the 1990s from assembly and then production of standardized electronic products to a focus on brand-name, PC-related products, which Acer could market globally. In the early 2000s, Acer implemented a new business model, becoming a designer, marketer, and distributor of products, while subcontracting fabrication to other manufacturers. By the end of the decade Acer was the fourth-largest "maker" of computers in the world, and owner of the largest computer retail chain in Taipei,China.

Source: Authors' illustration.

[1] Fairchild was successful, while competitors that invested in labor-saving equipment to keep assembly in the US failed. For pioneers the step was, of course, not without risks. Singapore in the 1960s had frequent strikes and was a newly independent country with an uncertain political future. Athukorala and Kohpaiboon (2013) provide further examples.

[2] We do not analyze the organization of supply chains. Choices between subsidiaries or subcontracting are influenced by the nature of firms' intellectual property and ability to keep control. If foreign direct investment (FDI) is chosen over subcontracting, it may, depending on circumstances, take the form of a joint venture in which a local partner handles relations with the host government and labor force management.

Baldwin (2012) dates the "revolutionary transformation of industry and trade" from 1985.[3] Rapid appreciation of the yen led many Japanese car, electronics, and other producers to offshore labor-intensive processes, initially to Southeast Asia and then to the People's Republic of China (PRC). The completion of the European Union (EU) Single Market and signing of the North American Free Trade Agreement (NAFTA) encouraged similar responses to competitive pressures in Europe and North America. For developing countries, the 1982 debt crisis had highlighted the failure of import-substituting industrialization, and recognition of the new industrializing economies' success encouraged countries to open themselves to the global economy. The outcome, what Baldwin (2011) calls the "second unbundling," was for different stages of the production processes to be separated by international trade.[4]

The exact nature of the unbundling depends on comparative advantage and on trade costs. The greater the differences in opportunity costs across countries, the greater the incentive to fragment production along a supply chain, but the feasibility of fragmentation will depend on trade costs. These determinants will be product and process specific. They will also be related to distance, and variations in trade and monitoring costs are likely to encourage regional rather than global value chains (Ito and Okuba 2012, Johnson and Noguera 2012c).

Quantifying Fragmentation

The above narrative, although not controversial, is remarkably data-lite. Recognition of subcontracting and other types of international supply chains has been largely based on anecdotal evidence—semiconductors in the 1970s, Barbie dolls in the 1990s, iPods in the 2000s—and even these are poorly documented because the evidence is commercially sensitive. More systematic evidence emerged first from the intra-industry literature, especially as computing facilities improved and larger datasets became available. More disaggregated trade data allowed researchers to make finer distinction among traded goods, and try to identify intermediates and finished goods. Most recently, researchers have linked input–output tables to compute trade in value-added rather than in gross values. None of these empirical approaches is ideal, but they each shed light on the phenomenon of supply chains and their importance.

The nature of supply chains was highlighted in an article about Barbie dolls by journalist Rone Tempest (1996). He pointed out that only about $0.35 of the $9.99 price of a Barbie doll sold in the US in a box labeled "Made in China"* accrued to the People's Republic of China. Other

[3] Running a gravity model with annual data from 1967–2008 for bilateral trade among six "Factory Asia" economies (Indonesia; Japan; the Republic of Korea; Malaysia; Taipei,China; and Thailand), Baldwin and Taglioni (2011) find sharp drops in gross domestic product (GDP) elasticities in 1985, and again in 1998. They interpret this result as evidence of increased GVC trade, for which partner country GDP is a less direct determinant of trade flows.

[4] The response of trade economists was slower; although some theorists tried to model fragmentation (Jones, 2000; Arndt and Kierzkowski, 2001), the workhorse model remained 2x2x2. Terminology was a source of confusion as authors addressed subcontracting and outsourcing as separate phenomena, while others analyzed vertical specialization, intra-product specialization, multistage production, internationalization or disintegration; Deardorff (2001) emphasized that fragmentation inevitably involves greater input of services if only to coordinate the fragments. Grossman and Rossi-Hansberg (2008) popularized the term "trading tasks".

* ADB recognizes China as the People's Republic of China.

economies contributed to the $2.00 free-on-board (fob) value (Saudi Arabia; Taipei,China; Japan; the US; and Hong Kong, China), and the rest of the $9.99 accrued in the US, mostly to Mattel. Tempest's article raised popular awareness, but his evidence is largely based on hearsay and is not from the producers. He also underestimated the complexity of the supply chain because different items of Barbie's clothing or accessories came from almost every East Asian economy. Many other newspaper reports highlighted the small share of value-added contributed at the assembly stage of supply chains; Pascoe (2011) and Wall Street Journal (2010), on Barbie and the iPhone, respectively, are examples.

More systematic case studies have focused on electronic goods, because they can be reverse-engineered and many component costs can be inferred from known arms-length transactions. The case studies of the iPod by Linden et al. (2007), of the iPhone by Xing and Detert (2010) and Rassweiler (2012), of the Nokia N95 by Stehrer et al. (2011, pp. 102–119), and of the Samsung S4 Galaxy by the Asia-Pacific Economic Community (APEC) Policy Support Unit (2103, pp. 28–31) are examples. Nevertheless: "Product-level data are extremely hard to obtain directly from electronics industry firms, who jealously protect information about the pricing deals they have negotiated, and often require the silence of their suppliers and contractors through non-disclosure agreements."[5] Thus, Linden et al. (2007) and case studies require heroic assumptions to complete the costing.

Linden et al. (2007) break down the cost of the 2005 30GB video iPod that sold in the US for $299. The most striking result is that, despite the "Made in China"* label, over half of the retail value accrued in the US. The assembled iPod delivered to the US cost Apple $144.40, with the remaining $155 accruing to Apple (or any independent US retailers), part of which would go to US workers and for other costs, leaving an estimated gross profit of $80 per iPod. Although the iPod was "Made in China,"* only a few dollars at most of the value-added accrued in the PRC. The largest input costs were for the hard drive supplied by Toshiba (estimated value $73) and the display module supplied by a Toshiba–Matsushita joint venture (estimated value $20), with other components supplied by companies from Japan; Taipei,China; the US; and the Republic of Korea, all of which were themselves produced from internationally sourced components and sometimes involved royalty payments to patent-holders in the United Kingdom (UK), US, and elsewhere.[6]

Supply chains and production networks characterize many other activities, such as clothing, footwear, travel goods, and sporting goods, but the cost structure is jealously guarded proprietary knowledge.[7] In some areas, such as jeans production, a dominant intermediary (Li and Fung in Hong Kong, China) organizes physical production for brand-owners who

[5] Linden et al. (2007).

[6] Supply chains may be more complex with networks nested within chains. An example is the production of a computer disk drive as described by Hiratsuka (2005). The disk drive was assembled in Thailand, using 11 components produced in Thailand and 43 components from 10 other countries. The disk drive was then shipped to the final computer assembly (say, in the PRC), which was a larger hub linking the disk drive hub to hubs for other components. The label on the assembled computer would say "Made in China."*

[7] Gereffi et al. (2011) provide evidence on GVCs in fruit and vegetables, tourism, and offshore services, as well as apparel.

* ADB recognizes China as the People's Republic of China.

provide design and marketing.[8] Other assembly operations are kept within a supply chain coordinated by the brand-owner, such as Nike shoes assembled by subcontractors in Viet Nam. The two universal features are that the label "Made in –" is close to meaningless and that more of the value-added accrues to service providers than to actual manufacturers (e.g., Apple is primarily a design and marketing company even though it is famous for its range of manufactured products, and it receives the largest share of the value-added in those products).[9]

A more systematic view of supply chains was suggested by the literature on intra-industry trade (IIT). Grubel and Lloyd (1975) highlighted the importance of IIT, a phenomenon inconsistent with predictions of the 2x2x2 trade model in which a good is either exported or imported but not both. Their explanations—in terms of border trade, seasonal trade, and economies of scale combined with product differentiation—all focused on trade in finished goods. Early critics also pointed to aggregation issues (Pomfret 1985), which were hard to resolve with the data and computing facilities of the time, but perhaps reflected finished good and intermediate good trade within the same industry.[10] The growth of intra-industry trade and its characteristics are consistent with an increasingly fine-tuned division of labor, which can be interpreted as evidence of the growth of international value chains. However, attempts to draw more specific causality from the intra-industry trade literature have not been fully convincing.[11] Detailed studies of a single product group (e.g., machinery in Ando 2006) are more illuminating, but they shade into the case study literature reviewed in the previous subsection.

An alternative approach advocated by Alexander Yeats, Francis Ng, and others (Yeats 2001, Ng and Yeats 1999, Kimura 2006, Lee et al. 2011, Fung et al. 2013, Athukorala 2014) is to identify categories in the trade databases that contain the keywords "parts" or "components" or reflect trade in inputs. Ferrarini (2013) and Brooks and Ferrarini (2012) adopt a similar approach to construct global production networks among 75 countries, and for each country a Network Trade Index measures the degree of participation in GVCs. Orefice and Rocha (2011) use the same measure to analyze the two-way relationship between deep integration and production networks. We will follow this approach in Section 4 to calculate quantitative

[8] Victor Fung gave the example of jeans; Korean yarn was woven and dyed in Taipei,China, the fabric was cut in Bangladesh, zippers were sourced from Japan, the sewing was done in Thailand, and the jeans marked "Made in Thailand" were shipped to and marketed in North America or Europe (Magretta 1998). Li and Fung's role was in skill-intensive niches before and after physical production; that is, organizing and managing production and quality testing before shipping to the brand-owner for marketing.

[9] Rassweiler (2012) estimated that, of an iPhone5 retailing for $649 in the US, $207 was manufacturing costs and the remainder accrued to Apple for design, packaging, marketing, and other services. Moretti (2012) points out that if a US customer orders an iPhone online the only US worker making physical contact with the product is the UPS deliveryman.

[10] IIT studies in the 1970s and early 1980s relied on SITC 3-digit groups, of which there were about 250, some very heterogeneous (e.g., computers and pencil sharpeners were included in "office equipment" and kayaks and supertankers in "ships and boats"). In the 1990s and 2000s, IIT studies made use of HS 6-digit data with 5,000 categories (Brülhart 2009), and sometimes HS 8-digit data (Ito and Okubo 2012), which were more homogeneous.

[11] The comparison of western European countries' trade with eastern Europe and with the PRC by Ito and Okubo (2012) highlights the difference between the quality upgrading of Eastern European trade partners and the ongoing concentration of PRC exports to the EU on low-price goods, although this may not be evidence of value chains.

indicators of the extent to which countries participate in GVCs. As with the IIT literature, growth in the parts and components share of trade flows is consistent with the increasing importance of international value chains, but it is hard to be more specific without detailed analysis of the composition of the various product categories.

Measuring trade by value-added, as we measure sectors' contribution to GDP, rather than by gross flows, provides an aggregative view of the importance of global supply chains. A detailed global input–output table would allow us to estimate each country's direct and indirect contribution to final goods and services (Hummels, Ishii, and Yi 2001). In recent years several sets of value-added trade data have been constructed. Satoshi Inomata and colleagues from the Institute of Developing Economies developed an input–output table for Asian economies that they used to separate value-added from gross trade for Asian countries (IDE-JETRO and WTO 2011). The OECD–WTO dataset contains the newest value-added trade data, and the descriptive data already highlights a much greater role for services in international trade than might be deduced from gross exports (OECD 2013a).[12] Johnson and Noguera have the most developed analysis of the difference between value-added and gross sales trade data.[13]

Johnson and Noguera (2012b) link input–output tables for 42 countries, accounting for over 90% of global GDP and 80%–90% of trade in 1990, plus a residual "rest of the world" category. Their preferred indicator is VAX, the ratio of value-added to gross trade flows.[14] The largest changes in VAX between 1970 and 2009 were for open economies undergoing structural transformation: Thailand, Hungary, Viet Nam, Ireland, Mexico, Romania, Turkey, and the PRC experienced the largest changes, in that order. Johnson and Noguera (2012c) analyze differences by region and by decade. In Europe and East Asia, VAX declines in 1975–1985, flattens in 1985–1995, and then has a larger decline in 1995–2005. In North America, the largest decline in VAX occurs in 1985–1995, with little change in the other two decades, suggesting an important policy role: the dramatic liberalization of Mexican trade policy from the 1986 WTO accession to the 1992 signing of NAFTA. The largest change in any region and decade is East Asia in 1995–2005, reinforcing casual impressions that the expansion of regional value chains is most pronounced in East Asia and it has gathered momentum since the mid-1990s.

---

[12] At a minimum, GVCs require coordination services that are not needed in simpler trade patterns, but the service inputs in most modern GVCs are more complex than that. For APEC countries, services accounted for about 17% of trade in 2012, but when trade is measured in value-added terms the share more than doubled to 39%. The most striking case is Hong Kong, China, where moving from gross to value-added data increases the share of services in exports from 22% to 85% (Pasadilla and Findlay 2014).

[13] Johnson and Noguera (2012a) use the input–output table from the GTAP project which is more globally complete than the alternatives, but less appropriate because it was designed for use in CGE modeling rather than with trade flows. Johnson and Noguera (2012b and 2012c) use a mix of Organisation for Economic Co-operation and Development (OECD) and Institute for Developing Economies (IDE) input–output tables. They conclude (2012b, pp. 50–51) that the results do not differ much depending on the input–output tables, but that may reflect the very high level of aggregation at which they work, with only four sectors: agriculture, fish, and forestry; non-manufacturing industry; manufacturing; and services.

[14] VAX = 1 clearly signifies no GVCs, and a declining share of value-added in gross trade is a sign that more imported inputs are being used in the production of a country's traded goods. A lower VAX is consistent with increased GVC participation, although there may be other reasons for importing inputs (e.g., equipment to develop mineral or energy resources).

All of these approaches confirm the observation that trade is becoming increasingly fragmented and global value chains more complex and important. However, none of the approaches is as yet truly satisfactory. The IIT measures are dependent on choice of "industries," and even then are difficult to interpret. The "parts and components" measures rely on the accuracy of descriptions of categories used in trade databases, and the trade-in-value-added estimates are constrained by the aggregation level of currently available input–output tables. The case study evidence is subject to selection bias, because domestic value-added varies substantially across sectors (Koopman et al. 2014, Meng et al. 2013), and the low value-added in selected PRC exports to the US is in contrast to much higher macro estimates (e.g., Meng et al. estimate an overall share of 75% of PRC exports to the US consist of value-added in the PRC).

GVCs and RVCs: Europe, North America, and Asia

Distance matters and regional value chains are more pronounced than global supply chains (Johnson and Noguera 2012c), presumably reflecting lower trade and monitoring costs when suppliers or customers are geographically closer. The process has been conspicuously absent from Sub-Saharan Africa and South America, and from South, Central and West Asia. The approach to supply chains varies across the main three regional groupings (centered on North America, Europe, and East Asia), and in each case arrangements have evolved to support the strengthening of regional value chains, including the EU, NAFTA, and Association of Southeast Asian Nations (ASEAN).

In the 1960s, 1970s, and 1980s, Europe and the US encouraged supply chains by special tariff lines that subtracted the value of either EU or US inputs from the value of imported goods. These policies encouraged fragmentation of the production progress, especially in textiles and clothing, where labor-intensive sewing activities were moved offshore without resistance from powerful textile manufacturers. In its time, outward processing was important for some Caribbean and Central American economies and for some Mediterranean and Eastern European economies, but it was never a major part of global trade. The outward processing using special tariff lines was distinct from the later boom in supply chains in the degree to which it was regulated by final-importer policies to benefit domestic upstream producers. However, this type of "mercantilist" supply chain formation lived on in North America in the carefully negotiated NAFTA rules of origin, which made access to the US market for some Mexican exports effectively conditional on use of US inputs.[15] By contrast, in the explosion of supply chains between Western and Eastern Europe after the end of Communism and with the integration of Eastern Europe into the EU, "mercantilist" supply chain formation practically disappeared as supply chains were organized within a large integrated market which imposes no rules of origin or other constraints on intra-EU trade.[16]

[15] The most notorious of these rules of origin were defined to ensure that Mexican textile producers wishing to have duty-free access to the US market must use US yarn. In essence, this side of NAFTA is a return to mercantilism rather than embracing globalization; the US internationalizes the production process and gives Mexican producers a privileged position as output suppliers, but only on condition that US producers have a privileged position as input suppliers.

[16] European value chains appear to have been limited before the 1990s. Outward processing traffic was probably greatest in clothing, but only accounted for 8% of imports in 1988, rising to 20% in 1996 (Graziani 2001, p. 217).

The East Asian environment is similar to the EU set-up apart from that the supply chains cross borders of countries with diverse national policies toward trade and everything else, so trade facilitation is a big part of the policy challenge. Initial value chains were simple subcontracting arrangements, as described above for semiconductors. As wages rose in Singapore and Hong Kong, China, producers in those cities sought to move labor-intensive activities to neighboring regions, a phenomenon recognized by the early 1990s as sub-regional zones.[17] In the broader ASEAN region, however, establishment of an ASEAN Free Trade Area (AFTA) faltered in the 1990s, as governments responded to domestic pressures for protection by back-loading tariff reductions and insisting on long lists of exclusions.

While some producers were resisting increased competition, others recognized a need for trade facilitation so that they could use supply chains to become more competitive. Thus, several ASEAN members undertook large unilateral tariff reductions, four signed the WTO Information Technology Agreement (ITA), and the five original ASEAN members improved border clearance through introduction of single windows and other measures, which was reflected in convergence of trade costs toward the regional best practice of Singapore (Pomfret and Sourdin 2009).[18] As trade costs fell, regional value chains (RVCs) became more prevalent, creating a virtuous circle of pressure for further liberalization, reflected in completion of AFTA and further deepening to create an ASEAN Economic Community by 2015. East Asian regional integration was given a further boost by the PRC's renewed reforms after 1992 and establishment of RVCs in which final assembly was carried out in the PRC using components that were often from elsewhere in East Asia. The Barbie doll was the most widely publicized example in the late 1990s. Trade facilitation support was provided first by the PRC's WTO accession, completed in 2001, and then by instigation of a PRC–ASEAN trade agreement, completed in the 2004 ASEAN–PRC FTA (Sheng et al. 2012).

The main regions involved were Mediterranean countries, especially Tunisia and Morocco, and Eastern Europe. The Single Market, or EC92 program, reduced the costs of trade between EU members, especially those that signed the 1985 Schengen treaties creating an area with no internal border controls and common visa requirements. Eleven EU members adopted the euro in 1999, and Greece (2001), Slovenia (2007), Malta and Cyprus (2008), Slovakia (2009), Estonia (2011), and Latvia (2014) have since joined the eurozone, while the euro is also used in Montenegro and Kosovo. The 2004–2007 EU enlargement brought in new members with lower wage costs and relatively good human capital. New member countries that embraced the single market and adopted the euro (e.g., Slovakia, Estonia, and Slovenia) were especially welcome participants in European RVCs. In sum, since the 1990s, production unbundling in Europe has been facilitated by deep integration that included countries with large differences in factor prices, and firms have responded by creating RVCs that reflect efficient location of tasks according to comparative advantage. The good policy environment for European RVCs has been a by-product of politically motivated integration and EU enlargement.

[17] Sub-regional zones (SRZs) cross national borders, but are not coterminous with nation states. The Pearl River Delta SRZ included Hong Kong, China and Guangdong province in the PRC, and the Sijori SRZ included Singapore, Johor in Malaysia, and Riau Province in Indonesia. Pomfret (2011) provides details.

[18] The ITA provides for participants to completely eliminate customs duties on all products covered by the Agreement (from 155 HS6-digit categories), and all other duties and charges must be bound at zero (Kuriyama and Ogazon 2013). There are no exceptions to product coverage, although for sensitive items it is possible to have an extended implementation period. The commitments undertaken under the ITA are on a most-favored nation (MFN) basis, and benefits accrue to all other WTO Members. The original signatories included Australia; Hong Kong, China; Indonesia; Japan; the Republic of Korea; Singapore; Taipei,China; and Turkey. By the April 1997 deadline, they had been joined by India; Israel; Macao, China; Malaysia; New Zealand; and Thailand. The 76 participants in 2013 include the PRC, the Philippines, and Viet Nam.

East Asia saw a proliferation of trade agreements after 2000, which is best explained by efforts to remove obstacles to GVCs. While some were reasonably comprehensive and covered large trade flows, others were very limited. Many agreements were bilateral and some seemed redundant (e.g., Japan signed agreements with both Singapore and ASEAN) until the detailed provisions are examined. The agreements are not primarily about establishing standard free trade areas with zero internal tariffs or customs unions (i.e., free trade areas with common external tariffs); the country signing the most agreements in the 21st century has been Singapore (Table 1), which has essentially zero tariffs. Other major agreement-signers include Malaysia and Thailand, which are the two countries along with the PRC and Singapore that are most involved in regional value chains. It is difficult to generalize about such a heterogeneous assortment and simply counting agreements does not capture their importance, but they are not empty and they do reflect policy decisions made, especially, by countries involved in international supply chains that wish to reduce the trade costs that hamper GVCs.

Table 1: Trade Agreements involving ASEAN+6 Countries, 2013

	Proposed	Under Negotiation	Signed but not in Force	Signed and in Force
Brunei Darussalam	6	4	0	8
Cambodia	4	2	0	6
Indonesia	6	7	2	7
Lao PDR	4	2	0	8
Malaysia	7	7	1	12
Myanmar	4	3	0	6
Philippines	7	2	0	7
Singapore	6	11	2	19
Thailand	8	7	0	12
Viet Nam	4	7	0	8
Australia	3	10	0	9
People's Rep. of China	6	7	2	12
India	7	14	0	13
Japan	5	8	0	13
Rep. of Korea	11	10	1	10
New Zealand	3	7	1	9

Note: ASEAN+6 refers to the 10 members of the Association of Southeast Asian Nations plus Australia, the People's Republic of China, India, Japan, the Republic of Korea, and New Zealand.

Source: Asia Regional Integration Center, ADB. Available at http://www.aric.adb.org/ftatrends.php, Table 6 FTA Status by Country (accessed 15 January 2014).

A corollary of the emergence of RVCs with three principal centers is that South America, Africa, Oceania, and Central and West Asia have not been much involved in international value chains.[19] There are several explanations: too far from the coordinating centers, too poor conditions for doing business, too high trade costs, and so forth. The explanations vary in importance depending on the country and sector, but they are not prohibitive. Exceptions exist when firms with a strong competitive edge are located in countries where the obstacles are moderate; Boeing Aerostructures Australia, for example, employs 1,300 workers in Melbourne, producing flight control surfaces for large commercial aircraft such as the 787 Dreamliner. Moreover, the situation is continually evolving as new locations, such as Cambodia in recent years, are brought into GVCs.

3. Measuring Trade Costs

Economists and trade policy makers paid little attention to trade costs before the 1990s. In trade theory, the wedge between world and domestic prices was ascribed to tariffs or equivalent non-tariff barriers to trade, and the General Agreement on Tariffs and Trade (GATT) trade negotiations focused on the same topics. In an influential article, however, McCallum (1995) highlighted that even across the US–Canada border where trade was free of tariffs and non-tariff barriers appeared negligible, there was a large difference in trade flows when they crossed the border as opposed to trade among US states or among Canadian provinces.[20] In the policy arena, after the WTO superseded GATT in 1995 attention shifted toward new areas, including trade facilitation.

Several direct measures of trade costs exist, but they are either conceptually flawed or have indirect coverage. For Central and West Asia, widely cited measures such as the *Doing Business* indicators or cost-insurance-freight (cif)–free on board (fob) measures of trade costs appear to have weak foundations, but the time and cost data on specific routes are among the best in the world. This section reviews the measures and tries to establish cross-country comparisons.

Financial Costs

Anderson and Wincoop (2004) explicitly addressed the question of measuring trade costs. They came up with a highly publicized ad valorem estimate of average trade costs of OECD countries of 170%. Their article highlighted the operational issues and suggested useful ways to get around some of the problems. It also raised definitional issue; by counting all costs from the

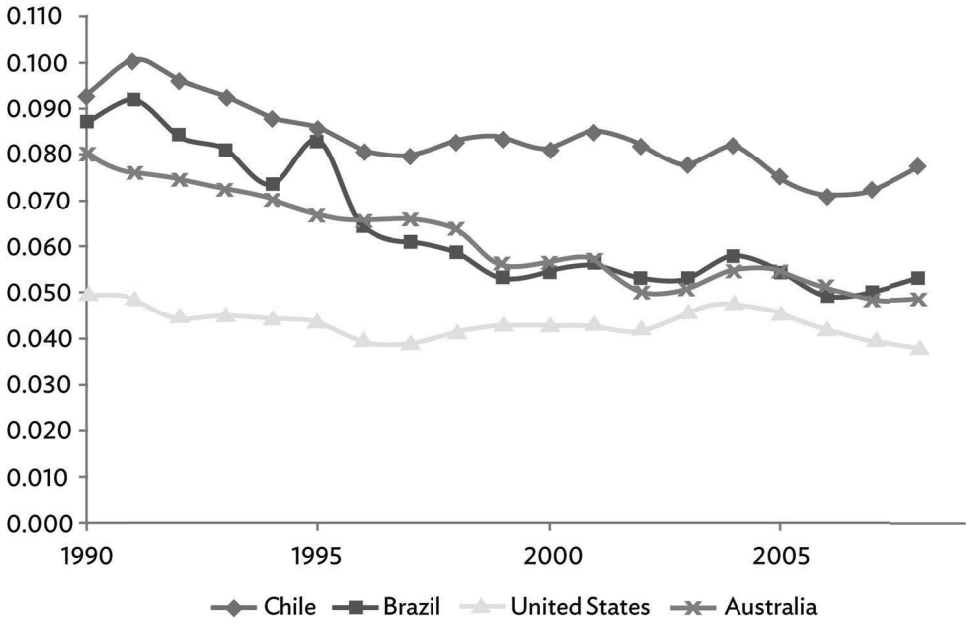
[19] Brunner (2013) reviews GVCs in South Asia, but his two main case studies (bamboo tiles in India and ceramic tableware in Bangladesh) involve domestic value chains up to the point of exporting the finished good.

[20] Other influential papers in the "border effect" context included Trefler (1995), who estimated that actual world trade was far less than the volume predicted by standard trade models that ignored transport or transactions costs, and Obstfeld and Rogoff (2000), who argued that trade costs, or home bias, could explain six major puzzles in international macroeconomics. Limao and Venables (2001) and Clark et al. (2004) provided empirical evidence that trade costs varied from country to country. CGE models indicated that reducing trade costs had a bigger impact on trade and GDP than reducing tariffs, although these results are based on ad hoc assumptions of the extent of trade facilitation. (For a survey of results, see WEF 2013, pp. 13–16 and the online annex by Ferrantino, Geiger, and Tsigas.)

factory gate to the point of final sale, they exceeded the normal concept of trade costs as the difference between the cost of domestic and international trade. An alternative measure, proposed by Harrigan (1993) and publicized by Hummels (2007), is the gap between the free on board (fob) value of goods at the port of exportation and the cost-insurance-freight (cif) value at the port of importation. Hummels refers to this measure as transport costs, and it understates trade costs by ignoring behind-the-border costs associated with international trade.[21]

The cif-fob gap measure is much closer to the concept of trade costs than the Anderson and van Wincoop estimate, but faces the operational difficulty of obtaining fob and cif data on a common basis. Hummels' results are restricted to values for the US and New Zealand, for which he reports ad valorem trade costs in the US falling from 8% in 1974 to 4% in 2004, and in New Zealand from 11% in 1963 to 7% in 1997. In a broader study including Australia, Brazil, Chile, and the US, Sourdin and Pomfret (2012) report that in 2008 trade costs varied from 3.8% in the US to 4.9% in Australia to 5.4% in Brazil to 7.8% in Chile. In all four countries trade costs had declined steadily since 1990 (Figure 2). These results all suggest that trade costs are now larger than tariff barriers, at least for high-income countries, and Sourdin and Pomfret's detailed results show plausible variations across commodities and across trading partners.

Figure 2: Average Trade Costs (cif-fob gap), Australian, Brazilian, Chilean, and United States Imports, 1990–2008



Source: Sourdin and Pomfret (2012).

[21] Blyde (2012) and Volpe Martincus and Blyde (2013) show for Chile and Colombia that higher domestic transport costs (primarily due to poor roads) have a large negative impact on international trade. Underdeveloped banking or insurance sectors may increase trade costs, for example, by making letters of credit more expensive or difficult to arrange.

Traders and investors are concerned about time costs as well as financial costs. Based on a survey of 7,302 companies in eight developing countries (including the PRC and India), Dollar et al. (2004) concluded that customs clearance times are key determinants of foreign investment and of export status.[22] Hummels (2001) estimated that the cost of a day's delay in transport adds on average 0.8% to the value of a manufactured good, and in a more disaggregated study Hummels and Schaur (2012) place the estimated time cost in a range of 0.6%–2.1%, with parts and components trade the most time-sensitive.[23] Djankov et al. (2006) estimated that each extra day of expected delay prior to shipment reduces trade flows by just over 1.0%, although some delays appear to be more destructive of trade than others. For example, Freund and Rocha (2011) highlight the cost of transit delays in Africa and estimate that a single day reduction in inland travel times would increase exports by 7%. All of these results point to the importance of time costs for participation (or non-participation in the African setting) in global supply chains, and the need to keep larger inventories if trade is slow or unreliable. Because just-in-time delivery and minimal inventories are crucial to the profitability of GVCs, it is likely that variance in delivery times is at least as important as the average time taken, but we have little information on this.[24]

There is a debate about the fixed and variable components of trade costs.[25] Several theoretical papers in the late 1980s highlighted the possibility of hysteresis in exports at the firm level due to the sunk costs of entering a market, but analysis of disaggregated trade flows revealed substantial volatility.[26] An early concern about GVCs was that since there are many low-wage countries the bottom rung of the ladder might be unstable as "footloose" activities could be moved to another location. The duration of trade relationships varies across commodity types, with longer relations among traders in differentiated goods than in homogeneous goods, where arms-length relations focused on price competition are the norm (Besedeš and Prusa 2006b).

[22] Engman (2005) reports that a critical condition for Philips Electronics investing in Hungary in the early 1990s was the reduction of customs clearance time; working with Hungarian authorities, the company's specialized service unit dealing with movement of goods across borders succeeded in cutting the time from an average of 4–5 days to 1–2 days by the early 2000s. Of the specialized unit's professional staff of 150, some 40 dealt solely with the PRC, facilitating trade at the local and provincial level as well as at the national border. Using proprietary data from a major US department store chain, Evans and Harrigan (2005) found that the retailer's demand for timely deliveries influenced its choice of source countries.

[23] This finding, clearly related to GVCs, is in conflict with popular ideas that the most time-sensitive items are perishable food or fashion goods. Nordas et al. (2006) also find that time delays reduce the probability that firms will enter export markets for time-sensitive products.

[24] An exception is the thesis by Büge (2012), who highlights uncertainty as a trade cost.

[25] The heterogeneous firms literature highlights the level and nature of role of trade costs as influences on firms' differential responses. Domestic market costs are lower that foreign market access costs, as evidenced by the negligible number of firms that export without serving the domestic market. However, the extent to which trade costs are fixed or variable influences the type of firm that enters export markets and influences the extent to which trade will be at the intensive (more of the same items) or extensive (a greater variety of items) margin. The relative importance of transport, information, marketing, and other trade costs and the role of intermediaries in reducing trade costs may also influence the composition of exporting firms (Melitz and Redding 2012, Section 5).

[26] Baldwin (1988), Baldwin and Krugman (1989), Dixit (1989), and the slightly later literature on networks pioneered by Rauch (1999) argued for hysteresis. Besedeš and Prusa (2006a) found that only two-thirds of trade flows at the 7-digit level of the US Tariff Schedule survived the first year and the median survival rate was 2 years. Similarly short-lived trade relationships have been found for Germany (Nitsch 2009), the EU15 (Hess and Persson 2010), Latin America (Besedeš and Blyde 2010), and a larger sample of developing countries (Brenton et al. 2010).

In East Asia, Obashi (2010) has found evidence of greater relational longevity in machinery trade, which she relates to the existence of global supply chains, concluding that "the network-forming firms would put priority not only on lowering production costs but on the stability of trade relationships," although the extent of stability may be related to the centrality of the specific bilateral link in the entire chain. In sum, trade relations seem to be more permanent in areas where GVCs are common, suggesting that participants incur fixed costs associated with finding reliable and trustworthy partners, and once a reliable supply-chain partner has been found the relationship is not readily terminated.[27]

The trade-cost estimates covering the largest number of countries are survey-based. These do not provide direct numerical estimates of trade costs, but they rank countries by ease of doing trade or provide estimates of the time or cost of specific cross-border transactions. The most popular of these estimates are the annual World Bank's *Doing Business* indicators, which report for 189 countries in 2014 the cost, time and documentation associated with importing and exporting a standard container. Despite the efforts at standardization, however, it is not clear that the definitions are equally applicable to all countries. More importantly, the estimates are based on surveys of informed people, often consultancy firms, rather than of traders, and hence may report what ought to happen to a legal shipment rather than what actually happens to an average shipment.

The most accurate estimates of trade costs are microeconomic studies of actual shipments. Leading examples are the World Customs Organization's customs time-release studies and the distance, time, and cost studies pioneered by the United Nations Economic and Social Commission for Asia and the Pacific. When carefully done, such studies provide invaluable information, although because of their detail and hence irregularity they are open to the criticism that they might be capturing atypical cases.

Trade Costs in Central and West Asia

We do not have good ad valorem trade cost measures for the Central and West Asian countries. In the World Bank's Doing Business 2014 rankings (Table 2), Georgia ranked 8th, Armenia 37th, Kazakhstan 50th, the Kyrgyz Republic 68th, Azerbaijan 70th, Tajikistan 143rd, and Uzbekistan 146th on the overall ease of doing business (Turkmenistan was not ranked).[28] However, they rank worse on the ease of crossing international borders criterion, and in the Central Asian cases very poorly: Georgia 43rd, Armenia 117th, Azerbaijan 168th, the Kyrgyz Republic 182nd, Kazakhstan 186th, Tajikistan 188th, and Uzbekistan 189th out of 189 countries. In sum, Table 2 presents a mixed overall picture, but includes some of the worst countries in the world for ease of conducting international trade.

[27] Obashi (2010) provides evidence from East Asia, and Córcoles et al. (2012) for Spain.

[28] An added caveat is that the Central Asian numbers are based on small numbers of respondents, probably based in the capital cities.

Table 2: World Bank *Doing Business* Indicators, Central and West Asia

	Overall Ranking	Trading Across Borders
Armenia	37	117
Azerbaijan	70	168
Georgia	8	43
Kazakhstan	50	182
Kyrgyz Republic	68	186
Tajikistan	143	188
Turkmenistan	n.r.	n.r.
Uzbekistan	146	189

n.r. = not reported.
Note: Rankings based on 189 countries.
Source: *Doing Business 2014* at http://www.doingbusiness.org/rankings (accessed 12 February 2014).

The most convincing indicators of high trade costs are the data collected in the CAREC *Corridor Performance Measurement and Monitoring* program. These are based on a large number of trips, over 3000 in 2012, along the six corridors monitored by CAREC, and provide a detailed picture of the difficulties of conducting overland trade in Central Asia.[29] Some of the physical infrastructure is good, e.g., the Tashkent–Beyneu corridor (part of the E40 route to Berlin) has been upgraded so that speeds of 100kph are possible on parts of and 60kph on most of the road, which is a big improvement over the Kungrad–Beyneu section which was a rough dirt road 6 years ago. In 2012, however, crossing the border took on average 30 hours at the Kazakhstani border post and 14 hours at the Uzbekistani post (CAREC 2012, p. 24). This is typical of a general pattern of some improvements in roads but little improvement in trade facilitation; indeed, for many border-crossing points delays have become longer, apart from those between the Russian Federation and Kazakhstan, which have shortened since the establishment of the customs union. The longest delays are on the corridor with the highest volume of freight, the railway from the PRC through Kazakhstan to the Russian Federation and Germany. At the border crossing between the PRC and Kazakhstan, the average time at the PRC border was 353 hours and at the Kazakhstani border 54 hours.[30] The exception to the long delays is the Chongqing–Duisburg train, which has special wagons to facilitate the gauge change and which is subject to simplified border formalities. This last observation and the

[29] The methodology is based on the time-cost-distance method developed by UN-ESCAP, but instead of ad hoc individual studies CAREC's corridor performance measurement consists of regular monitoring in conjunction with the freight forwarder associations. The 2012 sample consisted of 3,194 trips, of which 80% were by road, 17% by rail, and 3% inter-modal.

[30] Some of this is associated with the change of gauge, but delays are mostly associated with customs and quarantine. It is difficult to allocate the time to one post rather than the other because delays at one crossing point lead to back-up of trains at the other. For example, delays entering Kazakhstan lead to back-ups on the PRC border, and there is a suspicion that the 2012 data are influenced by the Customs Union's hardline toward goods entering from the PRC (CAREC 2012, p. 21).

changes at the Kazakhstan–Russian Federation border suggest that governments could facilitate trade, but the political will to do so for intra-Central-Asian trade is lacking.[31]

High-quality, empirically based indicators do not exist for the West Asian countries, but field reports suggest that customs procedures are time-consuming at all of their borders. In reviewing the status of trade facilitation in West Asia, Jan Forest concluded:

"The biggest challenges to trade in the South Caucasus are the lack of open borders, overlapping and conflicting trade agreements, inadequate infrastructure, cumbersome customs procedures and corruption. The areas of greatest need with respect to trade facilitation are the legal frameworks among the countries, standardization of documents, improving transport, and increasing cross-border cooperation among the Customs Services."[32]

Even though Georgia since 2000 and Armenia since 2003 are WTO members and all three countries are World Customs Organization (WCO) members, they are far from respecting the principles of the Revised Kyoto Convention. Only Georgia has implemented a Single Window, while integrated border management and implementation of other best practice is in all three countries far from complete. Cross-border cooperation is poor everywhere, and in the extreme case of Armenia and Azerbaijan, recorded bilateral trade is zero.

4. Connectivity and GVCs

In this section we analyze connectivity and value chains, with a particular focus on the Central and West Asian region. The first subsection examines evidence, largely based on the gravity equation, on the determinants of trade costs. Although this literature has helped us to better understand underlying determinants, the results are sensitive to model specification and choice of data sources. Application to Central and West Asia is further compromised by the poor trade data for some of the countries and by the weight of primary product exports sold on the world market often with unknown final destinations.

The second subsection provides estimates of the prevalence of GVCs, using the parts and components measure discussed in Section 2. Data limitations prevent us from measuring trade in value-added for Central and West Asian countries. The OECD TiVA database, for example, covers 57 countries (OECD members, Brazil, Russian Federation, India, People's Republic of China, and South Africa (BRICS), and some other emerging economies), but none are in Central or West Asia.

[31] Although there is anecdotal evidence that the level and frequency of corruption has declined, the 2012 CPMM annual report found a 32% chance that "unofficial payments" would be demanded at border crossing points.

[32] USAID. 2012. Report on the Single Window and Data Harmonization in the South Caucasus presented at the Second Regional Conference on Trade Facilitation. June.

Determinants of Trade Costs

The link between GVCs and reduced time and money costs of international trade is clear, but the drivers of the link are not. An extensive literature, based primarily on gravity models, estimates the extent to which good logistics, shipping and air connectivity, and domestic institutions, among other factors, influence bilateral trade flows. Although this literature sheds light on the nexus of trade costs and GVCs, attempts at quantification, or even establishing statistical significance, are undermined by data deficiencies.

Early studies found that, while cross-country differences in trade costs were to some extent physically determined, distance and commodity composition matter and landlocked countries have higher transport costs ceteris paribus, much of the variance was due to differences in port infrastructure (Limao and Venables 2001; Clark et al. 2004).[33] In the micro-founded gravity model of Anderson and van Wincoop (2003), country fixed effects are used to take account of country-specific trade resistance, although the source of the resistance is indeterminate. Competitive transport services affect trade costs. Micco and Serebrisky (2006) found that the existence of an Open Skies Agreement reduced air transport costs to the US by 9% and increased the share of imports arriving by air by 7%, while Geloso–Grosso (2008) and Piermartini and Rousova (2008) also found a robust positive relationship between liberalization and the volume of air traffic for a larger sample of countries. Monopoly power in shipping is also associated with higher trade costs and lower volume of trade, although this is less conclusive— and less relevant to the landlocked Central and West Asian countries.

Trade costs are also influenced by institutional and policy factors. Limao and Venables (2001) identified onshore infrastructure as an important variable, using an infrastructure index based on kilometers of road, paved road and railway per square kilometer, and telephone main lines per capita. Devlin and Yee (2005) document the wide variation in logistics costs among Middle Eastern and North African countries and how they can influence shipping costs. For example, inefficient trucking services lead to longer stand times on the dockside and costly inventory accumulation as well as reduced export volumes so that there are infrequent shipping services.[34] There is a large literature on the "Digital Divide" between developed and developing countries, and on the positive effect of internet adoption on economic growth.[35] There is also a literature on financial development, institutional quality, and corruption as determinants of trade costs (Sourdin and Pomfret 2012, p. 71–122).

---

[33] Their principal measure of port efficiency was survey data drawn from the Global Competitiveness Report published by the World Economic Forum. Bloningen and Wilson (2008) show that survey data overstate the importance of port efficiency because respondents include other country fixed effects. A problem with the Global Competitiveness Report data or Bloningen and Wilson's econometric estimates of port costs is that the former only cover about 50 countries and the latter cover 100 ports in 42 countries.

[34] The World Bank Logistics Perceptions Index provides proxy measures for cross-country variations in logistics quality (http://info.worldbank.org/etools/tradesurvey/mode1a.asp).

[35] Freund and Weinhold (2004) found that internet use had no impact on world trade in 1995 but after 1997 it had an increasing impact. A series of World Bank gravity studies has examined the relative impact on trade flows of improved port efficiency, regulatory environment, e-business, and customs environment (e.g., Wilson et al. 2003) whose ranking was in this order.

The results of the gravity modeling are generally plausible. However, because they are based on differing specifications of the model and choice of control variables (e.g., for common language, legal system, colonial heritage) and they are using explanatory variables that are difficult to quantify, the quantitative results must be treated cautiously. For Central and West Asia, it is difficult to draw lessons from this literature. The countries have poor hard and soft infrastructure, limited internet access, and extensive corruption. When we run gravity models that include the Central and West Asian countries, some of these phenomena may be picked up, but many are caught in the country fixed effects.

Measuring the Incidence of GVCs

As an indicator of GVC significance in Central and West Asia, we calculate measures of the share of parts and components in trade and the degree to which countries' trade flows are in the sectors most commonly associated with GVCs. We follow the approach of Athukorala who has a clear and transparent methodology for measuring trade in parts and components.[36]

Athukorala measures parts and components trade by 525 HS6-digit categories. Table A5 in the Appendix lists the categories and highlights the degree of detail involved, although in every category there may be items that are not part of GVCs and some parts of GVC trade will not be picked up in these categories. Athukorala defines network trade by six SITC 2-digit product categories in which most such trade occurs: office machinery (SITC 75), telecommunications and recording equipment (SITC 76), electrical machinery (SITC 77), road vehicles (SITC 78), professional and scientific equipment (SITC 87), and photographic apparatus (SITC 88). Again, there will be items within these categories that are not GVC trade and there are GVCs in other economic sectors. Moreover, as described above, some sectors are more important in some regional value chains than in others, so this measure will be high for countries such as Slovakia or Thailand that are involved in automobile value chains, but much smaller for countries involved primarily in clothing or agribusiness GVCs. In sum, the value of parts and components trade or participation in the network trade sectors are, like all of the measures reported in Section 2 above, imperfect measures of GVC trade, but they can offer some indication as to which countries are more involved and which are less involved in GVCs.

The Appendix lists the value of GVC trade by these two measures for emerging European and Asian economies in 2002, 2007, and 2012. The clear message is that the West and Central Asian countries participate far less in GVCs than the leading participants or even than more recent entrants into GVC trade. Table 3 provides 2012 figures for the West and Central Asian countries and for Slovakia and Malaysia as relatively small countries established within Asian and European GVCs, respectively, and for Viet Nam as a recent entrant into GVCs. Whether measured by exports of parts and components or by exports in goods from the six major GVC categories, the West and Central Asian countries are trivial GVC participants. The import data

[36] The working papers (Athukorala 2010 and 2013) provide more details of method and calculations than the published versions (Athukorala 2011 and 2014). Athukorala used SITC (revision 3), which may have understated (compared to later revisions) trade in parts and components, and will not be fully consistent with our estimates using the HS categories. However, variations due to data updates, SITC revisions, and SITC/HS concordance should not be large enough to affect the qualitative conclusions.

tell a similar story, with the largest entry (Kazakhstan's network trade) in part picking up imports of electrical equipment and cars by consumers. COMTRADE does not report appropriate data for Tajikistan, Turkmenistan, or Uzbekistan, but the last two countries' relatively closed trade policies make GVC participation unlikely.

Table 3: Trade in Parts and Components, and Value of Network Trade, 2012 ($ million)

	Imports		Exports	
	P&C Trade	**Network Trade**	**P&C Trade**	**Network Trade**
Armenia	210	512	38	46
Azerbaijan	1,337	2,080	43	36
Georgia	590	1,772	31	675
Kazakhstan	5,245	9,059	409	616
Kyrgyz Republic	317	1,017	77	154
Malaysia	45,666	69,489	44,230	84,219
Slovakia	19,493	27,368	16,246	37,148
Viet Nam	13,816	28,123	10,678	29,099

P&C = parts and components.
Note: Data for Tajikistan, Turkmenistan, and Uzbekistan not reported in the source.
Source: Authors' calculations based on COMTRADE data (Tables A1 and A2).

The Central and West Asian countries are much smaller exporters of manufactured goods than the major trading nations of emerging Asia or emerging Europe, but even allowing for the difference in scale the Central and West Asian countries' participation in GVCs as captured by the parts and components and network trade indicators is small. For the emerging Asian and European economies most involved in GVCs, trade in the six network trade sectors accounts for over two-fifths of their manufactured exports (and over half in the case of Malaysia, the Philippines, and Slovakia). By contrast, goods in these six sectors characteristic of GVCs amount to generally less than one-tenth of the manufactured exports of the Central and West Asian countries (Table A3).[37] The picture with respect to parts and components as a share of manufactured exports (Table A4) is even clearer. Parts and components amounted to 2%–6% of Central and West Asian countries' manufactured goods exports in 2012, while for countries involved in GVCs the share was 23%–39% (Table 4).[38]

[37] The exception is the high share for Georgia in 2012, which is driven by exports of used cars. In 2011–2012, Georgia served as a transshipment point for used cars from the EU to Kazakhstan.

[38] The share is lower for the PRC because its role in many GVCs is as assembler of final goods, rather than exporter of parts and components.

Table 4: Trade in Parts and Components as a Share of Trade in Manufactures, 2012 (%)

	Central and West Asia			Emerging Asia			Emerging Europe	
	Imports	Exports		Imports	Exports		Imports	Exports
Armenia	0.08	0.05	People's Rep. of China	0.20	0.17	Czech Rep	0.32	0.34
Azerbaijan	0.17	0.06	Hong Kong, China	0.24	0.25	Hungary	0.31	0.34
Georgia	0.12	0.02	Malaysia	0.30	0.29	Poland	0.21	0.25
Kazakhstan	0.15	0.02	Philippines	0.38	0.39	Romania	0.25	0.28
Kyrgyz Republic	0.09	0.06	Rep. of Korea	0.19	0.20	Slovakia	0.32	0.23
			Singapore	0.28	0.24	Slovenia	0.19	0.23
			Thailand	0.26	0.26			

Note: Data for Tajikistan, Turkmenistan, and Uzbekistan not reported in the source.
Source: Authors' calculations based on COMTRADE data (Table A4).

In Section 2 we argued that there is no ideal measure of the extent of participation in GVCs. However, for all their shortcomings, the parts and components and network trade measures provide convincing quantitative evidence of the Central and West Asian countries' absence from GVCs. In the next section we will provide case studies of GVCs, including some that involve Central and West Asian countries. These examples must be set in the context of limited overall participation by Central and West Asian countries in GVCs.

5. Case Studies

In East Asia the electrical and electronics industry is the most important current example of GVCs, but as mentioned above it is difficult to carry out detailed studies due to commercial sensitivity. The leading products are smartphones, flat panel LCD televisions, and laptops, and leading Asian locations are the PRC; Hong Kong, China; Indonesia; Japan; Malaysia; the Philippines; Taipei,China; Thailand; and Viet Nam. Markets for these products can be fast-changing. For example, smartphones only became popular in 2007 and early leaders such as Nokia, Blackberry, and Motorola have fallen back, while Apple has maintained a leading position and Samsung has increased market share, and Sony has fallen and risen again.[39] It is less clear whether locations change so quickly, but Malaysia is believed to have lost ground since the 1990s due to relatively rigid labor markets limiting firms' ability to scale-up, while firms in Taipei,China have greatly expanded their activities in the PRC since the turn of the

[39] Market shares for key components can change even more quickly. Smart phone vendors initially wrote their own software for the broadbands that control communications between the phone and the carriers' base stations. Then Qualcomm (US) became the dominant supplier of broadbands and stretched its package into a "reference design" of associated software. MediaTek (Taipei,China) began to compete with Qualcomm, increasing its reference design deliveries from 10 million in 2011 to 110 million in 2013. As MediaTek's market share was growing, in 2013 it faced competition from Shanghai-based Spreadtrum and RDA Micro (APEC Policy Support Unit 2013, p. 34).

century. The PRC's central role has continuously increased, helped by WTO accession in 2001, but believed to be threatened in the 2010s by competition from lower-cost locations such as Viet Nam.[40] Sharp, which dominated the LCD TV market for many years, did not manage the transition to flat panel TVs well, focusing on small and medium-sized panels that were not very popular, and Sharp also misjudged the benefits of building large production facilities in Japan. When Sony, the original leader in flat panel TVs, began losing ground to Samsung and LG after 2007, it sold off many of its facilities and then purchased inputs from the new owners, suggesting that once a product ceases to be cutting-edge the internalization strategy allowing the vendor to maintain a high share of rents becomes less attractive than a GVC of independent specialized contractors. The laptop sector was innovative in developing various GVC models during its growth decades of the 1990s and 2000s, but has stagnated since 2010 when the iPad and other tablets became popular. In sum, each of the three leading sectors has had differing experiences from which it Is not easy to generalize, especially for Central and West Asian countries that would appear to have little to offer as participants in electrical and electronics GVCs.

The electrical and electronics industry is the most striking part of "Factory Asia," but Asian suppliers participate in GVCs for many other products. The textiles, clothing, and footwear sectors were among the first to develop such chains, and Li and Fung is the largest specialized intermediary in supply chain coordination. Barbie highlighted the toy industry's GVCs, and is typical of many light-manufacturing goods. Globally, the car industry has been an important example of cross-border value chains; this is especially true in the EU today, but every major carmaker draws on inputs from competitive global locations. Within Asia, large-scale Japanese offshoring is associated with the relocation of car assembly to Thailand, which was followed by some suppliers relocating while other inputs were imported into Thailand; producers' demand for the relaxation of import duties was a major force behind the 2007 Japan–Thailand Free Trade Agreement. The list goes on.

The car industry is important for Central Asia, because it has been a major focus of Uzbekistan's industrialization and more recently part of Kazakhstan's diversification strategy. The largest manufacturing foreign investment in Central Asia has been the UzDaewoo joint venture, which after Daewoo's bankruptcy became a joint venture with General Motors. UzDaewoo has successfully produced a range of models for the domestic market and also exported within Central Asia and to the Russia Federation.[41]In Kazakhstan, Peugeot started assembly operations in 2013, and construction began on a joint venture factory involving Avtovaz (Russian producer of Ladas and part of the Renault-Nissan global alliance) that will commence production in 2016. In both of these projects, exports to Customs Union partners the Russia Federation and Belarus are expected to be substantial. GM Uzbekistan also benefits

[40] APEC Policy Support Unit (2013) surveyed the electrical and electronics industry. Samsung has been especially aggressive in relocating assembly from the PRC to Viet Nam, but Sony and component manufacturers in the Republic of Korea and Taipei,China have also relocated tasks to Viet Nam in pursuit of lower labor costs.

[41] The joint venture agreement was signed in 1992 and Daewoo began production in 1996. The Korean company ran into difficulties in 2001, and the restructured joint venture has been known as GM Uzbekistan since 2008. According to a 5 September 2013 article on *Eurasianet*, the factory produces about 200,000 vehicles per year, accounts for 94% of Uzbekistan's new car market, and exports to the Russia Federation and Kazakhstan. (Available at http://www.eurasianet.org/node/67469)

from a free trade agreement with the Russia Federation. Besides tariffs and other charges on new car imports, both Uzbekistan and Kazakhstan place heavy restrictions on the import of used cars. In sum, the car industry is hoping to thrive in a protected domestic market with favorable entry into other protected markets (notably the Russia Federation), rather than benefiting from locations in countries that have a comparative advantage in car assembly. Without being part of GVCs, the Central Asian car factories are unlikely to ever be competitive beyond these protected markets.[42]

The attraction of import-substituting industrialization and processing local resources, although discredited globally in the era of GVCs, is strong in Central Asia. Turkmenistan has built capital-intensive textile and clothing factories to turn cotton into jeans, probably with negative-value added; that is, at world prices the value of the jeans is less than the value of the cotton that goes into their production (Pomfret 2001). Uzbekistan explicitly pursues an import-substituting development strategy, and (as well as the car factory) this includes reserving part of the cotton crop for domestic textile mills.[43] Kazakhstan's use of oil revenues to promote diversification has included large subsidies for agribusiness projects, which are intended to add value to farm products (OECD 2013b).

The Kyrgyz Republic adopted the most open economic system in Central Asia, and in 1998 became the first Soviet successor state to join the WTO. One consequence was that it became the *entrepôt* through which consumers goods entered the region, and during the 2000s the country's bazaars became major trading hubs.[44] In 2008 the Dordoi bazaar in Bishkek employed 55,000 people and had 40,300 sales outlets and annual sales of $2,842 million, of which $2,131 million was estimated to have been foreign sales (to ultimate customers in Uzbekistan, Kazakhstan, and the Russia Federation); facilities included overnight accommodation and well-organized local and long-distance transport facilities. The smaller Karasuu bazaar in Osh (annual sales in 2008 of $684 million, of which $400 million–$500 million went to Uzbekistan) involved mainly ethnic Uzbek traders with family connections on both sides of the border.[45]

---

[42] General Motors intends to integrate its Uzbekistan operations into the company's global operations (e.g., by exporting small engines from Uzbekistan). Trade costs will determine whether that is practical or not.

[43] In a long historical context the desire to process cotton beyond ginning is ironic, because since the 18th century industrial revolution cotton growing has been geographically separated from spinning and weaving, which are in turn largely separated from apparel and other finished goods production.

[44] During the 1990s, the shuttle trade—comprising small-scale traders travelling to Turkey, the PRC, the Gulf states, and elsewhere to buy consumer goods for resale in bazaars upon returning home—was an important element of Central Asia's international economic relations, helping many households to weather the transitional recession. Much of this trade was unmonitored and unregulated, and indeed it was lack of regulation that allowed the traders to be competitive given their small scale of operations. As governments tightened their borders or monitored bazaars more closely, transactions costs increased and the shuttle trade became less attractive by the end of the decade. One consequence was their replacement by the more organized bazaars, whose stock came primarily from the PRC: in 2001–13 the Kyrgyz Republic and the PRC were the only countries in the neighborhood that were WTO members, and Kyrgyz trade barriers were low. Many of the customers were from neighboring countries, and took responsibility for traversing the more tightly regulated borders.

[45] Data in this paragraph are from surveys taken in mid-2008 (World Bank 2009). On the operation of the bazaars, see also Kaminski and Raballand (2009), and Kaminski and Mitra (2010).

The logistics developed around the bazaars have facilitated the development of production for export, notably the rapid growth since the early 2000s of an export-oriented clothing industry located primarily in Bishkek and to a lesser extent in Osh. At independence, textiles accounted for over 80% of light industry production in the Kyrgyz Republic and clothing for 15%. Following the disintegration of the unified Soviet economic space and the breakdown of supply chains, output of textiles and clothing collapsed in the 1990s. Reemergence in the 2000s was based on clothing exports to the Russia Federation and Kazakhstan of better quality items than were coming from the western and eastern PRC producers. Textile production has not recovered, and accounted for less than 10% of light industry production in 2010; the largest cotton textile producer went bankrupt in 2012. The clothing producers are mostly small and informal; official estimates are of exports of $170 million in 2008 falling to $155 million during the global recession in 2009, and of employment just over 100,000, but the actual numbers for exports and employment are believed to be three to four times higher. Material inputs are mostly imported, with a significant portion purchased at the Dordoi bazaar (Birkman et al. 2012).

The open Kyrgyz economy has also had success in agricultural GVCs, importing know-how and inputs, and benefitting from foreign intermediaries with knowledge of export markets. A well-documented example is the study by Tilekeyev (2013) of small-scale farmers in Talas oblast. The story began with the introduction of new bean varieties from Turkey in 2003, after which the farmers in this relatively poor rural area became competitive producers supplying export markets in Turkey, Bulgaria, and the Russia Federation.

Global value chains involving Caucasus countries are rare. The best documented is the diamond value chain that involves Armenia, but the skills and marketing channels have specific historical roots and it is atypical of modern GVCs (Grigorian 2012). Otherwise, production for export involves domestic value chains (USAID 2010), not specialization in a GVC segment.[46]

6. Conclusion

Supply chains have potentially positive implications for economic development. A would-be developer in the 21st century no longer needs to develop its own complete production process, as the Republic of Korea did for cars or Taipei,China for plastics, but needs only to identify a task in which it has a comparative advantage (Baldwin 2011). Once the niche has been occupied, learning-by-doing may create opportunities to move up the skills ladder and occupy new niches (Lucas 1993). The secret to getting on the first rung of the ladder is to have business-friendly conditions, including low trade costs. Countries wishing to join value chains will introduce trade facilitation measures. Like-minded countries may cooperate where desirable (e.g., in setting common procedures for clearing customs or standardizing domestic regulations). Countries more concerned about sovereignty and policy autonomy may avoid such steps, at the cost of remaining outside international value chains.

[46] Athukorala and Waglé (2013) analyze the disappointing degree of export diversification in Georgia.

To be an attractive value chain participant, a country must have unimpeded flows of inputs and outputs, be able to provide good access to trade services and information technology, and offer hassle-free people movement (at least for key managers and technical staff). In all of these areas, low-cost and minimal delays are essential for the just-in time processes without large inventories that make a value chain location attractive. GVCs include commercial services (information and communications, business and professional, and insurance and financial services), trade in which has grown from $300 billion in 1990 to $2,300 billion in 2011, over one-fifth of which was service exports from East, South, and Southeast Asia.[47]

The challenge for the global trading system is that heterogeneous responses make WTO progress, which is by consensus, difficult. Plurilateral agreements like the 1997 Information Technology Agreement (ITA) are feasible, but a general agreement as in the Doha Development Round seems beyond reach. Even the trade facilitation aspects of Doha negotiations are difficult to agree upon (e.g., the December 2013 agreement in Bali contained little depth). This may, however, not be a major problem, because bilateral or regional agreements focused on trade facilitation are unlikely to be discriminatory, so they do not challenge the MFN principle in the way that classical customs unions or free trade areas do (Hamanaka et al. 2010; Hamanaka 2014). Indeed, trade facilitation may be better dealt with unilaterally or bilaterally or plurilaterally, pressed for by producers who know where bottlenecks occur and how they can be dismantled. In this scenario, trade liberalization will progress much as GATT did before the mid-1960s by the principal-supplier process, while the WTO sets trade law, settles disputes, and gets out of the process of detailed trade policy negotiations.[48]

The challenges and opportunities for developing Asian economies are to connect to GVCs and, particularly for the landlocked countries in Central and West Asia, to do this in relation to major trading partners in the Russia Federation, the PRC, and Europe.[49] Many of the

[47] Data are from the UN Services Trade Database, using the category "commercial services" with transport and travel services excluded. Baldwin and Lopez-Gonzalez (2013) point to the importance of intermediate services, which account for 28% of world supply-chain trade flows and offer opportunities for economies such as India, which do not appear to have a comparative advantage in manufacturing. Lodefalk (2014) provides evidence of the importance of services inputs for Swedish manufactured exports.

[48] Menon (2013) makes the point that classical trade barriers (the main subject of GATT rounds of multilateral trade negotiations) are insignificant for GVCs because tariffs have already been removed on GVC-relevant trade flows. This shift is reflected in the increasing importance of the WCO, which in the past was largely seen as a technical organization, but in the 21st century plays an important role in establishing norms for single windows, integrated border management, and other at-the-border issues that are important for GVCs. A further complication arises when sub-national units have authority with respect to regulations, standards, or other measures that increase trade costs; De Burca, Keohane, and Sabel (2013) argue that modern international governance consists not just of international regimes (e.g., the WTO or WCO), but also of related networks (of state and non-state actors) and experimentalist governance.

[49] Another challenge for the formerly centrally planned economies of the Soviet Union is that, rather than being agrarian economies that can develop by transferring rural labor into manufacturing until the Lewis turning point is reached, they start with a workforce of varied skills. In Eastern Europe, both Slovenia and Slovakia experienced a decline in skill premia, of which Cho and Diáz (2013) ascribe about one-half to participation in GVCs that hollow out the labor force, as many skilled and semi-skilled workers are not globally competitive in their tasks. This finding can be related to a theoretical literature on the increasing margins earned by brokers in global trade (e.g., Antràs and Costinot 2011, Bardhan et al. 2013); such intermediaries may be scarcer in economies with

developing Asian economies are landlocked, including all of the Central Asian and Caucasus countries. At independence in December 1991, these countries inherited transport networks that were almost exclusively directed to the north and a major challenge has been to develop networks better suited to participation in the global economy, especially as the EU in the 1990s and then the PRC in the 2000s joined the Russia Federation as major investors in and trading partners of the region. At the same time, the notoriously poor level of regional cooperation in both Central and West Asia has hampered transit.

How can Central and Western Asia countries participate in GVCs to a greater extent? The evidence on RVCs implies that Central and West Asian countries are penalized by distance, being just too far from the main economic centers. RVCs flourish when person-to-person contacts are easier, or more specifically, when suppliers or customers can be reached by a short journey to address hold-ups, disputes, or technical problems swiftly. For example, person-to-person contact may be less of an issue for Tbilisi dealing with EU-centered RVCs than for Tashkent, but all eight countries are outside the comfort zone of a 1–2 hour flight from RVC centers.

More fundamentally, participation requires a situation where a firm or individual is able to fill a GVC niche competitively, and the local environment does not make participation difficult. This requires hard and soft infrastructure that keeps money and time costs of international economic intercourse at low levels. Trade-offs are pervasive. For example, Australia is not close to economic centers but Australian firms are in some GVCs (e.g,. the Boeing Dreamliner) because of niche firms and a favorable economic environment since the late 20th century. The diamond GVC in which Armenia participates is characterized by extremely low bulk-to-value ratios so that ad valorem trade costs are low even with the poor regional infrastructure of the Caucasus.

The changing global trade environment presents major implications for Central and West Asian countries' goal of economic diversification. As Baldwin (2011) observes, GVCs have killed import-substituting industrialization as a development strategy. In Southeast Asia this has been strikingly demonstrated by the contrasting fortunes of the Malaysian and Thai car industries. Malaysia followed the Korean route of establishing an integrated car industry and produced a good national car, the Proton Saga, in the 1970s, but Proton never seriously challenged world markets. The Thai car industry flourished after the leading Japanese manufacturers relocated assembly operations to Thailand in the late 1980s; the factories were part of GVCs, and Thailand soon became the most competitive car producer in Asia. In 2005, Malaysia withdrew cars from its ASEAN Free Trade Area (AFTA) exclusion list, a highly symbolic retreat from import substitution in favor of GVC participation, which requires as unconditional as possible commitment to the reduction of trade barriers and trade costs.

This is a lesson not yet learned in Central Asia, where both Uzbekistan and Kazakhstan are promoting industrial development on the Korean model without realizing that this is a 20th century model and that today a single-country car industry cannot compete with GVC cars.

shorter traditions of market-based relations, so that joining GVCs may worsen income distribution and increase concerns about profiteering foreign intermediaries, both of which can be politically challenging.

The observation applies to many other import-substitution projects besides cars. By contrast, the Kyrgyz clothing industry, a rare GVC success story in Central Asia, relies on access to best price and quality zips, buttons, thread, and other materials bought in bazaars open to the world. Even an agricultural GVC, such as the Talas bean growers, depends on openness for technology transfer, imported inputs, and timely delivery of the beans to foreign markets.

Finally, it is important to note that the GVC situation is fluid. Improved transport, better air connections, and high-speed rail links could reduce travel times between the region and GVC centers. In the more distant future, a third unbundling is likely as improved technology allows many of the benefits of face-to-face contact to be realized without physical proximity. Such developments will reduce the barriers of isolation faced by Central and West Asian countries, and help them to participate in GVCs. First, however, they must address the obstacles to trade, investment, skilled labor mobility, and communications that are under their own control.

References

Asian Development Bank (ADB). 2013. Beyond Factory Asia: Fueling Growth in a Changing World. Manila: ADB.

J. Anderson and D. Marcouiller. 2002. Insecurity and the Pattern of Trade: An Empirical Investigation. *Review of Economics and Statistics.* 84. pp. 342–352.

J. Anderson and E. van Wincoop. 2003. Gravity with Gravitas: A Solution to the Border Puzzle. *American Economic Review.* 93 (1). pp. 170–192.

J. Anderson and E. van Wincoop. 2004. Trade Costs. *Journal of Economic Literature.* 42 (3). pp. 691–751.

M. Ando. 2006. Fragmentation and Vertical Intra-Industry Trade in East Asia. *North American Journal of Economics and Finance.* No. 17. pp. 257–281.

P. Antràs and A. Costinot. 2011. Intermediated Trade. *Quarterly Journal of Economics.* 126 (3). pp. 1319–1374.

Asia-Pacific Economic Cooperation (APEC) Policy Support Unit. 2013. *Global Supply Chain Operation in the APEC Region*. Singapore: APEC Secretariat.

S. Arndt and H. Kierzkowski (eds.) 2001. *Fragmentation: New Production Pattern in the World Economy*. Oxford: Oxford University Press.

P-C. Athukorala. 2010. Production Networks and Trade Patterns in East Asia: Regionalization or Globalization? ADB *Working Paper Series on Regional Economic Integration.* No. 56. Manila: ADB. Published without data appendix in *Asian Economic Papers*. 2011. 10 (1). pp. 65–95. Available at *http://www.adb.org/sites/default/files/pub/2010/WP56-Trade-Patterns-East-Asia.pdf*

P-C. Athukorala. 2013. Global Production Sharing and Trade Patterns in East Asia. *Working Papers in Trade and Development.* No. 2013-10. Canberra: Australian National University.

P-C. Athukorala. 2014. Global Production Sharing and Trade in East Asia in Inderjit Kaur and Nirvikar Singh (eds.) *The Oxford Handbook of the Economics of the Pacific Rim*. Oxford University Press. pp. 333–361.

P-C. Athukorala and A Kohpaiboon. 2013. Global Production Sharing, Trade Patterns, and Industrialization in Southeast Asia. *Working Papers in Trade and Development.* No. 2013-18. Australian National University. Forthcoming in Ian Coxhead (ed.) *Handbook of Southeast Asian Economies*. London: Routledge.

P-C. Athukorala and S. Waglé. 2013. Export Performance in Transition: The Case of Georgia. *Working Papers in Trade and Development.* No. 2013-02. Canberra: Australian National University.

R. Baldwin. 1988. Hysteresis in Import Prices: The Beachhead Effect. *American Economic Review.* 78 (4). pp. 773–785.

R. Baldwin. 2011. Trade and Industrialisation after Globalisation's 2nd Unbundling: How Building and Joining a Supply Chain are Different and Why it Matters. *NBER Working Paper.* No. 17,716. Cambridge, MA: National Bureau of Economic Research (NBER).

R. Baldwin. 2012. WTO 2.0: Global Governance of Supply-Chain Trade. *CEPR Policy Insight No.64*. London: Centre for Economic Policy Research.

R. Baldwin and P. Krugman. 1989. Persistent Trade Effects of Large Exchange Rate Changes. *Quarterly Journal of Economics.* 104 (4). pp. 635–654.

R. Baldwin and Javier Lopez-Gonzalez. 2013. Supply-Chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. *NBER Working Paper.* No. 18,957. Cambridge, MA: NBER.

R. Baldwin and D. Taglioni. 2011. Gravity Chains: Estimating Bilateral Trade Flows When Parts and Components Trade is Important. *NBER Working Paper.* No. 16,672. Cambridge, MA: NBER.

P. Bardhan, D. Mookherjee, and M. Tsumagari. 2013. Middlemen Margins and Globalization. *American Economic Journal: Microeconomics.* 5 (4). pp. 81–119.

T. Besedeš and J. Blyde. 2010. What Drives Export Survival? An Analysis of Export Duration in Latin America. unpublished. Available at http://siteresources.worldbank.org/INTRANETTRADE/Resources/Internal-Training/287823-1256848879189/Besedes_Mar16_2010.pdf

T. Besedeš and T. Prusa. 2006a. Ins, Outs, and the Duration of Trade. *Canadian Journal of Economics.* 39 (1). pp. 266–295.

T. Besedeš and T. Prusa. 2006b. Product Differentiation and Duration of US Import Trade. *Journal of International Economics.* 70 (2). pp. 339-358.

L. Birkman, M. Kaloshnika, M. Khan, U. Shavurov, and S. Smallhouse. 2012. *Textile and Apparel Cluster in Kyrgyzstan*. Cambridge, MA: Harvard University Kennedy School and Harvard Business School. Available at http://www.isc.hbs.edu/pdf/Student_Projects/2012%20MOC%20Papers/Kyrgyzstan_Textile%20and%20Apparel%20Cluster_Final_May%204%202012.pdf

B. Blonigen and W. Wilson. 2008. Port Efficiency and Trade Flows. *Review of International Economics*. 16 (1). pp. 21–36.

J. Blyde. 2012. Paving the Road to Export: Assessing the Trade Impacts of Road Quality. *IDB Publications 82534*. Washington, DC: Inter-American Development Bank.

P. Brenton, C. Saborowski, and E. von Uexkull. 2010. What Explains the Low Survival Rate of Developing Country Export Flows? *World Bank Economic Review*. 24 (3). pp. 474–499.

D. Brooks and B. Ferrarini. 2012. Vertical Gravity. *ADB Economics Working Paper.* No. 303. Manila: ADB.

M. Brūlhart. 2009. An Account of Global Intra-Industry Trade, 1962-2006. *The World Economy*. 32 (3). pp. 401–459.

H-P. Brunner. 2013. Can Global Value Chains Effectively Serve Regional Economic Development in Asia? *ADB Working Paper Series on Regional Economic Integration. No. 110*. Manila: ADB.

M. Büge. 2012. *Three Essays on Institutions and International Economic Relations*. PhD thesis. Institut d'Etudes Politiques (SciencesPo). Paris.

CAREC. 2012. *Corridor Performance Measurement and Monitoring Annual Report 2012.* Available at http://cfcfa.net/cpmm/cpmm-annual-and-quarterly-reports/2012-annual-report/

S-W. Cho and J. Diáz. 2013. Trade Integration and the Skill Premium: Evidence from a Transition Economy. *Journal of Comparative Economics.* 41(2). pp. 601-620.

X. Clark, D. Dollar, and A. Micco. 2004. Port Efficiency, Maritime Transport Costs, and Bilateral Trade. *Journal of Development Economics*. 75 (2). pp. 417–450.

N. Coe, P. Dicken, and M. Hess. 2008. Global Production Networks: Realizing the Potential. *Journal of Economic Geography. 8 (3)*. pp. 271–295.

D. Córcoles, C. Díaz-Mora, and R. Gandoy. 2012. Export Survival in Global Value Chains. *DEFI Working Papers on International Economics and Finance.* 12-03. Documentos de Economía y Finanzas Internacionales, Asociación Española de Economía y Finanzas Internacionales.

A. Deardorff. 2001. International Provision of Trade Services, Trade, and Fragmentation. *Review of International Economics.* 9 (2). pp. 233–248.

G. De Burca, R. Keohane, and C. Sabel. 2013. New Modes of Pluralist Global Governance. *New York University Journal of International Law and Politics. 45 (1)*. pp. 723–786.

J. Devlin and P. Yee. 2005. Trade Logistics in Developing Countries: The Case of the Middle East and North Africa. *The World Economy*. 28 (3). pp. 435–456.

A. Dixit. 1989. Hysteresis, Import Penetration, and Exchange Rate Pass-Through. *Quarterly Journal of Economics.* 104 (2). pp. 205–228.

S. Djankov, C. Freund, and C. Pham. 2006. Trading on Time. *Policy Research Working Paper.* No. 3909. Washington, DC: World Bank.

D. Dollar, M. Hallward-Driemeier, and T. Mengistae. 2004. Investment Climate and International Integration. *Policy Research Working Paper.* No. 3323. Washington, DC: World Bank.

M. Engman. 2005. The Economic Impact of Trade Facilitation. *OECD Trade Policy Working Paper.* No. 21. Paris: Organisation for Economic Co-operation and Development (OECD).

C. Evans and J. Harrigan. 2005. Distance, Time, and Specialization: Lean Retailing in General Equilibrium. *American Economic Review*. 95 (1). pp. 292–313.

B. Ferrarini. 2013. Vertical Trade Maps. *Asian Economic Journal.* 27 (2). pp. 105–123.

C. Freund and N. Rocha. 2011. What Constrains Africa's Exports? *World Bank Economic Review.* 25 (3). pp. 1–26.

C. Freund and D. Weinhold. 2004. On the Effect of the Internet on International Trade. *Journal of International Economics*. 62 (1). pp. 171–189.

K.C. Fung, H-C. Hwang, F. Ng, and J. Seade. 2013. Production Networks in China and India: A Comparative Analysis. *Economic Change and Restructuring.* 46. pp. 45–69.

M. Geloso-Grosso. 2008. Liberalizing Air Cargo Services in APEC. *Groupe d'Economie Mondiale (GEM) Working Paper.* Paris: GEM. Available at http://gem.sciencespo.fr/content/publications/pdf/Geloso_Air%cargo_122008.pdf

G. Gereffi, K. Fernandez-Stark, and P. Psilos. 2011. *Skills for Upgrading Workforce Development and Global Value Chains in Developing Countries*. Durham, NC: Duke University Center on Globalization, Governance, and Competiveness.

G. Graziani. 2001. International Subcontracting in the Textile and Clothing Industry in S. Arndt and H. Kierzkowski (eds.) *Fragmentation: New Production Pattern in the World Economy.* Oxford: Oxford University Press. pp. 209–230.

D. Greenaway, R. Hine and C. Milner. 1995. Vertical and Horizontal Intra-Industry Trade: A Cross-Industry Analysis for the United Kingdom. *The Economic Journal.* No. 105. pp. 1505–1518.

K. Grigorian. 2012. Diamond Production and Processing: What Armenia Can Learn from an Intra-Regional Exchange on the Diamond Trade. *Europe and Central Asia Knowledge Brief*. Vol. 47. Washington, DC: World Bank.

G. Grossman and E. Rossi-Hansberg. 2008. Trading Tasks: A Simple Theory of Offshoring. *American Economic Review.* 98 (5). pp. 1978–1997.

H. Grubel and P. Lloyd. 1975. *Intra-Industry Trade*. London: Macmillan.

S. Hamanaka. 2014. Asian Free Trade Agreements and WTO Compatibility: Goods, Services, Trade Facilitation, and Economic Cooperation. Singapore: World Scientific.

S. Hamanaka, A. Tafgar, and D. Lazaro. 2010. Trade Facilitation Measures under FTAs: Are they Discriminatory against Nonmembers? *Global Trade and Customs Journal.* 5 (10). pp. 399–410.

J. Harrigan. 1993. OECD Imports and Trade Barriers in 1983. *Journal of International Economics.* No. 35 (1-2). pp. 91–111.

J. Henderson, P. Dicken, M. Hess, N. Coe, and H. Yeung. 2002. Global Production Networks and the Analysis of Economic Development. *Review of International Political Economy. 9 (3)*. pp. 436–464.

W. Hess and M. Persson. 2010. Exploring the Duration of EU Imports. *IFN Working Paper. No. 849*. Stockholm: Research Institute of Industrial Economics. Available at http://swopec.hhs.se/iuiwop/abs/iuiwop0849.htm.

D. Hiratsuka. 2005. Vertical Intra-Regional Production Networks in East Asia: A Case Study of Hard Disk Drive Industry. *IDE Working Paper*. Chiba: Institute of Developing Economies (IDE).

D. Hummels. 2001. Time as a Trade Barrier. *GTAP Working Paper No. 18*. West Lafayette, IN: Global Trade Analysis Project (GTAP). Available at http://www.mgmt.purdue.edu/faculty/hummelsd/research/time3b.pdf

D. Hummels. 2007. Transportation Costs and International Trade in the Second Era of Globalization. *Journal of Economic Perspectives.* No. 21. pp. 131–154.

D. Hummels, J. Ishii, and K-M. Yi. 2001. The Nature and Growth of Vertical Specialization in World Trade. *Journal of International Economics*. 54 (1). pp. 75–96.

D. Hummels and V. Lugovskyy. 2006. Are Matched Partner Trade Statistics a Usable Measure of Transport Costs? *Review of International Economics*. No. 14. pp. 69–86.

D. Hummels, V. Lugovskyy, and A. Skiba. 2009. The Trade Reducing Effects of Market Power in International Shipping. *Journal of Development Economics*. 89 (1). No. 84–97.

D. Hummels and G. Schaur. 2012. Time as a Trade Barrier. *American Economic Review. 103 (7)*. pp. 2935–2959.

IDE-JETRO and World Trade Organization (WTO). 2011. *Trade Patterns and Global Value Chains in East Asia: From Trade in Goods to Trade in Tasks*. Geneva: WTO. Available at http://www.ide.go.jp/English/Press/pdf/20110606_news.pdf

T. Ito and T. Okubo. 2012. New Aspects of Intra-Industry Trade in EU Countries. *IDE Discussion Paper.* No. 361. Tokyo: IDE. Available at http://www.ide.go.jp/English/ Publish/ Download/Dp/pdf/361.pdf

T. Iwanow and C. Kirkpatrick. 2009. Trade Facilitation and Manufactured Exports: Is Africa Different? *World Development.* 37 (6). pp. 1039–1050.

D. Jacks, C. Meissner, and D. Novy. 2008. Trade Costs 1870–2000. *American Economic Review, Papers & Proceedings.* 98 (2). No. 529–534.

D. Jacks, C. Meissner, and D. Novy. 2010. Trade Costs in the First Wave of Globalization. *Explorations in Economic History*. 47 (2). pp. 127–141.

D. Jacks, C. Meissner, and D. Novy. 2011. Trade Booms, Trade Busts, and Trade Costs. *Journal of International Economics.* 83 (2). pp. 185–201.

R. Johnson and G. Noguera. 2012a. Accounting for Intermediates: Production Sharing and Trade in Value Added. *Journal of International Economics.* No. 86. pp. 224–236.

R. Johnson and G. Noguera. 2012b. Fragmentation and Trade in Value Added over Four Decades. *NBER Working Paper.* No. 18. Cambridge, MA: NBER.

R. Johnson and G. Noguera. 2012c. Proximity and Production Fragmentation. *American Economic Review, Papers and Proceedings.* 102 (3). pp. 407–411.

R. Jones. 2000. *Globalization and the Theory of Input Trade*. Cambridge, MA: MIT Press.

B. Kaminski and S. Mitra. 2010. Skeins of Silk: Borderless Bazaars and Border Trade in Central Asia. Washington, DC: World Bank.

B. Kaminski and G. Raballand. 2009). Entrepôt for Chinese Consumer Goods in Central Asia: Re-Exports through Kyrgyzstan—A Statistical Puzzle. *Eurasian Geography and Economics*. No. 50. pp. 581–590.

F. Kimura. 2006. International Production and Distribution Networks in East Asia: Eighteen Facts, Mechanics, and Policy Implications. *Asian Economic Policy Review*. 1 (2). pp. 326–344.

R. Koopman, Z. Wang, and S-J. Wei. 2014. Tracing Value-Added and Double Counting in Gross Exports. *American Economic Review.* 104 (2). pp. 459–494.

C. Kuriyama and A. Ogazon. 2013. Expanding the Information Technology Agreement. *APEC Policy Support Unit Policy Brief. No.6*. Singapore: Asia-Pacific Economic Cooperation (APEC).

H-H. Lee, D. Park, and J. Wang. 2011. The Role of the People's Republic of China in International Fragmentation and Production Networks: An Empirical Investigation. ADB *Working Paper Series on Regional Economic Integration.* No. 87. Manila: ADB. Available at http://www.adb.org/sites/default/files/WP87-Lee-Park-Wang The Role of the People's Republic of China.pdf

A. Levchenko. 2007. Institutional Quality and International Trade. *Review of Economic Studies.* 74 (3). pp. 791–819.

N. Limao and A. Venables. 2001. Infrastructure, Geographical Disadvantage, and Transport Costs. *World Bank Economic Review.* 15 (3). pp. 451–479.

G. Linden, K. Kraemer, and J. Dedrick. 2007. Who Captures Value in a Global Innovation System? The Case of Apple's iPod. *Personal Computing Industry Center Working Paper*. Irvine, CA: University of California at Irvine.

M. Lodefalk. 2014. The Role of Services for Manufacturing Firm Exports, *Review of World Economics (Weltwirtschaftliches Archiv).* 150 (1). pp. 59–82.

R. Lucas. 1993. Making a Miracle. *Econometrica.* 61 (2). pp. 251–272.

J. Magretta. 1998. Fast, Global, and Entrepreneurial: Supply Chain Management, Hong Kong Style—An Interview with Victor Fung. *Harvard Business Review*. September/October. pp. 103–114.

J. McCallum. 1995. National Borders Matter: Canada–US Regional Trade Patterns. *American Economic Review*. 85 (3). pp. 615–623.

M. Melitz and S. Redding. 2012. Heterogeneous Firms and Trade. *NBER Working Paper.* No. 18,652. Cambridge, MA: NBER. Forthcoming in *Handbook of International Economics—4th edition.*

B. Meng, Z. Wang, and R. Koopman. 2013. How are Global Value Chains Fragmented and Extended in China's Domestic Production Networks? *IDE Discussion Paper.* No. 424. Tokyo: IDE.

J. Menon. 2013. Supporting the Growth and Spread of International Production Networks in Asia: How Can Trade Policy Help? *Working Papers on Regional Economic Integration.* No. 112. Manila: ADB.

A. Micco and T. Serebrisky. 2006. Competition Regimes and Air Transport Costs: The Effects of Open Skies Agreements. *Journal of International Economics.* 70 (1). pp. 25–51.

C. Milner and D. McGowan. 2013. Trade Costs and Trade Composition. *Economic Inquiry.* 51 (3). pp. 1886–1902.

E. Moretti. 2012. *The New Geography of Jobs*. Boston: Houghton Mifflin Harcourt.

F. Ng and A. Yeats. 1999. Production Sharing in East Asia: Who Does What for Whom, and Why? *Policy Research Working Paper.* No. 2197. Washington, DC: World Bank.

V. Nitsch. 2009. Die Another Day: Duration in German Import Trade. *Review of World Economics (Weltwirtschaftliches Archiv). 145 (1)*. pp. 133–154.

H. Nordas, E. Pinali, and M. Gelato-Grosso. 2006. Logistics and Time as a Trade Barrier. *OECD Trade Policy Working Papers.* No. 35. Paris: OECD.

N. Nunn. 2007. Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade. *Quarterly Journal of Economics.* 122 (2). pp. 569–600.

K. O'Rourke and J. Williamson (eds.). 1999. *Globalization and History*. Cambridge, MA: MIT Press.

A. Obashi. 2010. Stability and International Production Networks: Is East Asia Special? *Japan and the World Economy. 22 (1)*. pp. 21–30.

M. Obstfeld and K. Rogoff. 2000. The Six Major Puzzles in International Macroeconomics: Is There a Common Cause? in B. Bernanke and K. Rogoff (eds.) *NBER Macroeconomics Annual 2000*. Cambridge, MA: MIT Press.

OECD. 2013a. *Interconnected Economies Benefiting from Global Value Chains.* Paris: OECD.

OECD. 2013b. *Review of Agricultural Policies, Kazakhstan 2013.* Paris: OECD.

G. Orefice and N. Rocha. 2011. Deep Integration and Production Networks: An Empirical Analysis. *Staff Working Paper.* ERSD-2011-11. Geneva: WTO.

G. Pasadilla and C. Findlay. 2014. APEC, Services, and Supply Chains: Taking Stock of Services-Related Activities in APEC. *APEC Policy Support Unit Policy Brief.* No. 9. Singapore: APEC Secretariat.

M. Pascoe. 2011. Barbienomics: The Reality of Manufacturing. *Sydney Morning Herald*. 31 August.

R. Piermartini and L. Rousová. 2013. The Sky is Not Flat: How Discriminatory is the Access to International Air Services? *American Economic Journal: Economic Policy*. 5 (3). pp. 287–319.

R. Pomfret. 1985. Categorical Aggregation and International Trade. *Economic Journal. 95*. pp. 483–485.

R. Pomfret. 1986. Mediterranean Policy of the European Community: A Study of Discrimination in Trade. New York: Macmillan and London: Macmillan and New York: St. Martin's Press.

R. Pomfret. 2001. Turkmenistan: From Communism to Nationalism by Gradual Economic Reform. *MOCT-MOST Economic Policy in Transitional Economies*. 11 (2). pp. 165–176.

R. Pomfret. 2006. *The Central Asian Economies since Independence*. Princeton, NJ: Princeton University Press.

R. Pomfret. 2011. *Regionalism in East Asia: Why Has it Flourished since 2000 and How Far Will it Go?* Singapore: World Scientific Publishing Company.

R. Pomfret and P. Sourdin. 2009. Have Asian Trade Agreements Reduced Trade Costs? *Journal of Asian Economics. 20 (3)*. pp. 255–268.

R. Pomfret and P. Sourdin. 2011. Why do Trade Costs Vary? *Review of World Economics (Weltwirtschaftliches Archiv). 146 (4)*. pp. 709–730.

A. Rassweiler. 2012. Many iPhone 5 Components Change, but Most Suppliers Remain the Same, Teardown Reveals. 25 September. Available at http://www.isuppli.com/Teardowns/News/Pages/Many-iPhone-5-Components-Change-But-Most-Suppliers-Remain-the-Same-Teardown-Reveals.aspx

J. Rauch. 1999. Networks versus Markets in International Trade. *Journal of International Economics. 48 (1)*. pp. 7–35.

S. Refas and T. Cantens. 2011. Why Does Cargo Spend Weeks in African Ports? The Case of Douala, Cameroon. *Policy Research Working Paper.* No. 5565. Washington, DC: World Bank.

Y. Sheng, H.C. Tang, and X. Xu (2012): The Impact Of ACFTA on People's Republic of China–ASEAN Trade: Estimates Based on an Extended Gravity Model for Component Trade. *ADB Working Paper Series on Regional Economic Integration.* No. 99. Manila: ADB.

P. Sourdin and R. Pomfret. 2012. Trade Facilitation: Defining, Measuring, Explaining, and Reducing the Cost of International Trade. Cheltenham, UK: Edward Elgar.

R. Stehrer, J. Ali-Yrkkö, D. Hanzl-Weiss, N. Foster, P. Rouvinen, T. Seppälä, R. Stöllinger, and P. Ylä-Anttila. 2011. Trade in Intermediate Products and EU Manufacturing Supply Chains. *Wiener Institut für Internationale Wirtschaftsvergleiche (WIIW) Research Reports.* No. 369. Vienna: WIIW.

R. Tempest. 1996. Barbie and the World Economy. *Los Angeles Times*. 22 September.

K. Tilekeyev. 2013. Productivity Implications of Participation in Export Activities: The Case of Farmers in Talas Oblast of Kyrgyzstan. *University of Central Asia Institute of Public Policy and Administration.* Working Paper No. 17.

D. Trefler. 1995. The Case of the Missing Trade and Other Mysteries. *American Economic Review*. 85 (5). pp. 1029–1046.

USAID. 2010. Rapid Assessment of Value Chain Opportunities in Armenia. Available at http://www.rciproject.com/rcicaucasusarmenia_files/Armenia_USAID_Rapid%20Assessment%200f%20Value%20Chain%20Opportunities_10.pdf (accessed 18 February 2014).

USAID. 2012. Regional Competitiveness Initiative: Caucasus Trade Facilitation Analysis. Available at http://www.rciproject.com/rcicaucasus_files/RCI_Trade_Facilitation_Analysis_Final.pdf

C. Volpe and J. Blyde. 2013. Shaky Roads and Trembling Exports: Assessing the Trade Effects of Domestic Infrastructure Using a Natural Experiment. *Journal of International Economics.* 90 (1). No. 148–161.

Wall Street Journal. 2010. Not Really "Made in China": The iPhone's Complex Supply Chain Highlights Problems with Trade Statistics. *Wall Street Journal*. 15 December.

J. Wilson, C. Mann, and T. Otsuki. 2003. Trade Facilitation and Economic Development: A New Approach to Quantifying the Impact. *World Bank Economic Review*. No. 17. pp. 367–389.

World Bank. 2009. *Bazaars and Trade Integration in CAREC Countries*. Report prepared by S. Mitra, B. Kaminski, and M. Kholmatov. Available at http://www.carecinstitute.org/uploads/events/2009/10th-TPCC/10thTPCC-Bazaars-Trade-Integration-Paper.pdf

WEF. 2013. *Enabling Trade: Valuing Growth Opportunities*. Geneva: World Economic Forum.

WTO. 2011. *World Trade Report 2011: The WTO and Preferential Trade Agreements: From Co-Existence to Coherence.* Geneva: WTO.

X. Yuqing and N. Detert. 2010. How iPhones Widen the US Trade Deficit with the PRC. *GRIPS Policy Research Center Discussion Paper. No. 10-21.* Tokyo: National Graduate Institute for Policy Studies.

A. Yeats. 2001. Just How Big is Global Production Sharing? in S. Arndt and H. Kierzkowski (eds.) *Fragmentation: New Production Pattern in the World Economy*. Oxford: Oxford University Press. pp. 108–143.

APPENDIX

Table A1: Total Network Trade by Economy and Region ($ million)

	Exports				Imports		
Reporter	**2002**	**2007**	**2012**	**Reporter**	**2002**	**2007**	**2012**
Emerging Europe	64,626	221,440	276,238	Emerging Europe	81,802	304,087	341,216
Albania	4	26	30	Albania	233	607	631
Belarus	1,360	3,130	4,547	Belarus	989	2,988	4,589
Bosnia Herzegovina		188	297	Bosnia Herzegovina		1,470	1,271
Bulgaria	386	1,621	2,880	Bulgaria	1,543	5,833	5,135
Croatia	571	1,517	1,365	Croatia	2,579	5,512	2,899
Czech Rep.	16,966	49,155	65,900	Czech Rep.	13,814	37,556	45,336
Estonia	1023	2453	4058	Estonia	1668	4203	4719
Hungary	15195	42366	41268	Hungary	14620	35500	29327
Latvia	116	1,000	1,803	Latvia	882	3,693	2,658
Lithuania	903	3,083	3,585	Lithuania	1,687	6,290	4,483
Montenegro		8	10	Montenegro		613	317
Poland	8,599	38,557	47,363	Poland	12,979	40,282	42,298
Moldova	20	83	275	Moldova	119	602	792
Romania	1,765	8,622	17,380	Romania	3,680	18,662	15,452
Russian Federation	2,871	6,635	8,737	Russian Federation	8,224	64,880	95,912
Serbia		621	1,815	Serbia		3,720	2,949
Serbia and Montenegro	119			Serbia and Montenegro	1,101		
Slovakia	4,429	26,076	37,148	Slovakia	4,449	21,589	27,368
Slovenia	2,922	7,667	6,788	Slovenia	2,607	7,125	5,501
FYR of Macedonia	65	110	194	FYR of Macedonia	317	782	761
Turkey	6,506	25,144	26,871	Turkey	8,318	30,296	35,885
Ukraine	806	3,381	3,923	Ukraine	1,993	11,887	12,934
Central and West Asia	150	380	1,527	Central and West Asia	1,794	11,254	14,440
Armenia	29	52	46	Armenia	106	479	512
Azerbaijan	13	25	36	Azerbaijan	225	1,354	2,080
Georgia	5	88	675	Georgia	118	1,098	1,772
Kazakhstan	61	136	616	Kazakhstan	1,275	8,015	9,059
Kyrgyz Republic	41	78	154	Kyrgyz Republic	70	310	1,017
Emerging Asia	482,498	1,243,655	1,773,803	Emerging Asia	408,942	959,857	1,399,976
Bangladesh	26	202		Bangladesh	770	1,809	
Brunei Darussalam	16		100	Brunei Darussalam	334		739

Table A1: ***Continued***

	Exports				Imports		
Reporter	**2002**	**2007**	**2012**	**Reporter**	**2002**	**2007**	**2012**
Bhutan		1		Bhutan		88	
Cambodia	13	51	332	Cambodia	153	476	853
People's Rep. of China	115,453	519,398	836,106	People's Rep. of China	106,333	382,124	611,342
Hong Kong, China	90,828	192,420	281,457	Hong Kong, China	93,994	196,180	295,862
India	2,741	8,738	23,574	India	6,782	26,156	46,104
Indonesia	8,785	11,492	18,564	Indonesia	3,666	8,685	32,615
Malaysia	55,503	82,881	84,219	Malaysia	42,640	66,446	69,489
Mongolia	1	7		Mongolia		382	
Myanmar				Myanmar			
Pakistan	194	404	487	Pakistan	1,198	4,456	4563
Philippines	26,852	35,232	29,596	Philippines	24,333	29,217	22,823
Rep. of Korea	79,176	183,733	235,112	Rep. of Korea	44,946	81,715	100,345
Singapore	75,536	146,223	157,324	Singapore	58,022	113,161	122,281
Sri Lanka	135	370	351	Sri Lanka	746	1,364	2,626
Thailand	26,042	57,617	77,446	Thailand	21,927	38,150	62,166
Viet Nam	1,154	4,810	29,099	Viet Nam	3,089	9,430	28,123

Notes: Total trade in SITC 75, 76, 77, 78, 87, and 88.

Source: COMTRADE data; blank cells = data unavailable.

Table A2: Total Trade in Parts and Components by Economy and Region ($ million)

	Exports				Imports		
Reporter	**2002**	**2007**	**2012**	**Reporter**	**2002**	**2007**	**2012**
Emerging Europe	58,034	156,427	194,651	Emerging Europe	66,661	184,419	229,087
Albania	9	46	52	Albania	151	310	268
Belarus	550	1,493	1,806	Belarus	969	2,818	4,041
Bosnia Herzegovina		664	802	Bosnia Herzegovina		999	683
Bulgaria	453	1,680	2,642	Bulgaria	912	2,672	3,399
Croatia	652	1,874	1,872	Croatia	1,307	2,344	1,653
Czech Rep.	13,691	38,590	48,029	Czech Rep.	11,844	31,057	36,586
Estonia	990	1,427	1,911	Estonia	1,075	1,674	2,040
Hungary	16,373	29,812	30,320	Hungary	13,611	27,436	23,424
Latvia	148	565	789	Latvia	526	1,320	1,128
Lithuania	488	1,493	2,056	Lithuania	873	2,190	1,978
Montenegro		11	21	Montenegro		218	120
Poland	8,874	30,609	37,222	Poland	10,129	27,777	31,546
Moldova	13	54	301	Moldova	79	315	456
Romania	2,040	8,946	13,704	Romania	2,868	10,413	13,513
Russian Federation	3,157	6,247	8,207	Russian Federation	4,995	20,290	52,313
Serbia		762	1,346	Serbia		1,549	1,984
Serbia and Montenegro	186			Serbia and Montenegro	669		
Slovakia	3,016	10,689	16,246	Slovakia	4,453	18,221	19,493
Slovenia	2,230	5,403	5,485	Slovenia	2,212	4,575	4,030
FYR Macedonia	63	109	179	FYR Macedonia	139	299	360
Turkey	3,214	11,553	15,910	Turkey	8,406	20,187	23,314
Ukraine	1,887	4,400	5,753	Ukraine	1,444	7,756	6,759
Central Asia	196	491	598	Central Asia	1,537	6,002	7,699
Armenia	28	44	38	Armenia	69	147	210
Azerbaijan	30	38	43	Azerbaijan	264	972	1,337
Georgia	18	32	31	Georgia	88	499	590
Kazakhstan	91	309	409	Kazakhstan	1,065	4,168	5,245
Kyrgyz Republic	29	68	77	Kyrgyz Republic	51	217	317
Emerging Asia	316,998	559,333	788,501	Emerging Asia	293,417	517,411	694,987
Bangladesh	32	222		Bangladesh	585	1,577	
Bhutan		1		Bhutan		45	
Brunei Darussalam	52		109	Brunei Darussalam	250		427
Cambodia	3	4	38	Cambodia	118	175	359

Table A2: *Continued*

	Exports				Imports		
Reporter	**2002**	**2007**	**2012**	**Reporter**	**2002**	**2007**	**2012**
People's Republic of China	79,107	205,440	338,796	People's Republic of China	75,898	176,495	251,542
Hong Kong, China	55,780	95,167	123,282	Hong Kong, China	59,110	91,884	124,753
India	3,217	10,161	18,551	India	7,489	27,066	37,157
Indonesia	6,949	9,896	11,151	Indonesia	5,147	9,893	27,199
Malaysia	31,569	47,453	44,230	Malaysia	31,251	46,703	45,666
Mongolia	0	5		Mongolia		197	
Myanmar				Myanmar			
Pakistan		238	159	Pakistan		3,456	2,402
Philippines	24,204	16,885	17,367	Philippines	24,136	23,210	16,253
Rep. of Korea	46,692	64,790	97,971	Rep. of Korea	26,496	42,749	55,895
Singapore	50,155	63,669	78,594	Singapore	39,445	52,726	68,896
Sri Lanka	229	470	391	Sri Lanka	473	951	1,333
Thailand	17,910	40,027	47,206	Thailand	20,608	31,342	49,263
Viet Nam	1,054	4,826	10,618	Viet Nam	2,404	8,923	13,816

Notes: Total trade in HS6-digit categories listed in Table A5.

Source: COMTRADE data; blank cells = appropriate data unavailable in the source.

Table A3: Share of Network Products in Manufacturing Trade

	Exports			Imports		
Reporter	**2002**	**2007**	**2012**	**2002**	**2007**	**2012**
Emerging Europe	0.25	0.29	0.30	0.29	0.33	0.31
Albania	0.01	0.03	0.03	0.23	0.22	0.21
Belarus	0.24	0.23	0.19	0.18	0.18	0.19
Bosnia Herzegovina		0.05	0.07		0.22	0.21
Bulgaria	0.08	0.12	0.17	0.22	0.28	0.26
Croatia	0.15	0.16	0.15	0.31	0.28	0.22
Czech Rep.	0.42	0.44	0.46	0.35	0.37	0.39
Estonia	0.29	0.27	0.30	0.35	0.33	0.33
Hungary	0.49	0.49	0.47	0.44	0.44	0.39
Latvia	0.06	0.16	0.20	0.28	0.31	0.25
Lithuania	0.23	0.26	0.21	0.30	0.35	0.27
Montenegro		0.01	0.03		0.31	0.24
Poland	0.25	0.32	0.32	0.29	0.30	0.29
Moldova	0.09	0.11	0.22	0.18	0.25	0.21
Romania	0.14	0.24	0.35	0.26	0.33	0.28
Russian Federation	0.06	0.05	0.07	0.24	0.38	0.36
Serbia		0.09	0.22		0.27	0.21
Serbia and Montenegro	0.07			0.25		
Slovakia	0.34	0.50	0.53	0.34	0.44	0.45
Slovenia	0.30	0.31	0.28	0.28	0.29	0.26
FYR Macedonia	0.08	0.04	0.07	0.22	0.23	0.19
Turkey	0.21	0.28	0.21	0.21	0.23	0.22
Ukraine	0.06	0.09	0.09	0.23	0.30	0.26
Central and West Asia	0.03	0.02	0.06	0.23	0.30	0.27
Armenia	0.07	0.07	0.06	0.18	0.24	0.20
Azerbaijan	0.07	0.04	0.05	0.20	0.30	0.26
Georgia	0.03	0.12	0.39	0.26	0.32	0.35
Kazakhstan	0.02	0.01	0.03	0.24	0.31	0.26
Kyrgyz Republic	0.12	0.12	0.13	0.21	0.25	0.30
Emerging Asia	0.47	0.47	0.44	0.45	0.46	0.43
Bangladesh	0.01	0.02		0.11	0.16	
Bhutan		0.00			0.30	
Brunei Darussalam	0.04		0.18	0.26		0.28
Cambodia	0.01	0.01	0.04	0.12	0.16	0.16
People's Republic of China	0.39	0.45	0.43	0.41	0.50	0.48

Table A3: *Continued*

	Exports			Imports		
Reporter	**2002**	**2007**	**2012**	**2002**	**2007**	**2012**
Hong Kong, China	0.46	0.56	0.58	0.48	0.57	0.58
Macao, China	0.03	0.08	0.21	0.16	0.26	0.40
India	0.07	0.09	0.12	0.19	0.20	0.17
Indonesia	0.25	0.18	0.21	0.18	0.20	0.25
Malaysia	0.70	0.61	0.55	0.61	0.54	0.46
Mongolia	0.00	0.01			0.30	
Pakistan		0.03	0.03		0.21	0.20
Philippines	0.82	0.78	0.66	0.71	0.68	0.53
Rep. of Korea	0.52	0.54	0.49	0.42	0.35	0.35
Singapore	0.67	0.58	0.49	0.60	0.56	0.51
Sri Lanka	0.04	0.06	0.05	0.18	0.19	0.23
Thailand	0.47	0.45	0.43	0.41	0.34	0.33
Viet Nam	0.13	0.17	0.36	0.19	0.19	0.31

Notes: Manufacturing trade is the sum of HS2-digit products, HS28 and above. Network trade is trade in SITC 75, 76, 77, 78, 87, and 88.

Source: COMTRADE data; blank cell = appropriate data unavailable in the source.

Table A4: Share of Parts and Components in Manufacturing Trade

	Exports			Imports		
Reporter	**2002**	**2007**	**2012**	**2002**	**2007**	**2012**
Emerging Europe	0.22	0.20	0.21	0.24	0.20	0.21
Albania	0.03	0.06	0.05	0.15	0.11	0.09
Belarus	0.10	0.11	0.07	0.18	0.17	0.16
Bosnia Herzegovina		0.19	0.19		0.15	0.11
Bulgaria	0.10	0.12	0.15	0.13	0.13	0.17
Croatia	0.17	0.20	0.21	0.16	0.12	0.12
Czech Rep.	0.34	0.34	0.34	0.30	0.31	0.32
Estonia	0.28	0.16	0.14	0.23	0.13	0.14
Hungary	0.53	0.35	0.34	0.41	0.34	0.31
Latvia	0.07	0.09	0.09	0.17	0.11	0.10
Lithuania	0.13	0.13	0.12	0.15	0.12	0.12
Montenegro		0.02	0.07		0.11	0.09
Poland	0.25	0.26	0.25	0.22	0.21	0.21
Moldova	0.06	0.07	0.24	0.12	0.13	0.12
Romania	0.17	0.25	0.28	0.20	0.18	0.25
Russian Federation	0.07	0.05	0.06	0.14	0.12	0.20
Serbia		0.11	0.17		0.11	0.14
Serbia and Montenegro	0.11			0.15		
Slovakia	0.23	0.20	0.23	0.34	0.37	0.32
Slovenia	0.23	0.22	0.23	0.24	0.19	0.19
FYR Macedonia	0.07	0.04	0.06	0.10	0.09	0.09
Turkey	0.10	0.13	0.13	0.21	0.16	0.14
Ukraine	0.14	0.11	0.13	0.16	0.20	0.14
Central and West Asia	0.04	0.03	0.02	0.20	0.16	0.14
Armenia	0.07	0.06	0.05	0.12	0.07	0.08
Azerbaijan	0.17	0.06	0.06	0.24	0.22	0.17
Georgia	0.09	0.04	0.02	0.19	0.15	0.12
Kazakhstan	0.03	0.02	0.02	0.20	0.16	0.15
Kyrgyz Republic	0.08	0.11	0.06	0.15	0.17	0.09
Emerging Asia	0.31	0.21	0.20	0.32	0.25	0.21
Bangladesh	0.01	0.02		0.08	0.14	

Table A4: *Continued*

	Exports			Imports		
Reporter	**2002**	**2007**	**2012**	**2002**	**2007**	**2012**
Bhutan		0.00			0.15	
Brunei Darussalam	0.12		0.20	0.20		0.16
Cambodia	0.00	0.00	0.01	0.09	0.06	0.07
People's Republic of China	0.27	0.18	0.17	0.29	0.23	0.20
Hong Kong, China	0.28	0.28	0.25	0.30	0.26	0.24
Macao, China	0.03	0.09	0.05	0.17	0.13	0.06
India	0.08	0.10	0.10	0.21	0.20	0.13
Indonesia	0.20	0.16	0.13	0.25	0.23	0.21
Malaysia	0.40	0.35	0.29	0.44	0.38	0.30
Mongolia	0.00	0.01			0.15	
Pakistan		0.02	0.01		0.16	0.11
Philippines	0.74	0.37	0.39	0.70	0.54	0.38
Rep. of Korea	0.31	0.19	0.20	0.25	0.18	0.19
Singapore	0.45	0.25	0.24	0.41	0.26	0.28
Sri Lanka	0.06	0.08	0.06	0.11	0.13	0.12
Thailand	0.32	0.31	0.26	0.38	0.28	0.26
Viet Nam	0.12	0.17	0.13	0.15	0.18	0.15

Note: Manufacturing trade is the sum of HS2-digit products, HS28 and above.

Source: COMTRADE data; blank cell = appropriate data unavailable in the source.

Table A5: List of Parts and Components Categories

	HS Code	SITC-Rev.3	Description
1	392113	58291	Plates, sheets etc. nesoi, cellular polyurethanes
2	392119	58291	Plates, sheets etc. nesoi, cellular plastic nesoi
3	381800	59850	Chem elem doped, used in electron, discs wafers etc
4	420400	61210	Articles of leather used in machinery/mechanical appliances
5	400920	62142	Pipe, reinforced/combine w/metal only, w/o fitting
6	400930	62143	Pipe, reinforced/combine w/ textiles, w/o fitting
7	400940	62144	Pipe, reinforced/combine w/ material, w/o fitting
8	400950	62145	Tubes, pipe etc, vulcanized soft rubber, with fitting
9	401021	62921	Endless transmission belt, trapz, circumference >60cm <180c
10	401022	62921	Endless transmission belt, circumference > 180cm < 240c
11	401011	62929	Conveyor belts or belting reinforced with metal
12	401012	62929	Conveyor belts reinforced with textile materials
13	401013	62929	Conveyor belts reinforced only with plastics
14	401019	62929	Conveyor belts/belting of vulcanized rubber, nesoi
15	401023	62929	Endless synchron belt, Circumference >60cm <150cm
16	401024	62929	Endless synchron belt, Circumference >150cm <198cm
17	401029	62929	Transmission belt/belting, of vulcanized rub, nesoi
18	401699	62999	Articles of soft vulcanized rubber nesoi
19	401693	62999	Gasket, washers & other seals, of vulcanized rub
20	580710	65621	Textile labels, badges etc, not embroidered, woven
21	560311	65720	Nonwovens of circumference weighing < 25 g/m2
22	560312	65720	Nonwovens, of mmf weighing > 25 g/m2 but < 70 g/m2
23	560790	65751	Twine, cord whether/not plait impreg w/rub/plastic nesoi
24	560122	65771	Wadding; other articles of wadding of manmade fib
25	591110	65773	Text fabric for card clothing & other tech uses
26	591120	65773	Bolting cloth, whether or not made-up
27	591131	65773	Textile fabrics etc, papermaking, under 650 g/m2
28	591132	65773	Textile fabrics etc, papermaking, 650 g/m2 or more
29	590900	65791	Textile hose piping and similar textile tubing
30	591000	65792	Transmission/conveyor belt, textile mat, whthr/nt reinfcd, ctd
31	681310	66382	Brake linings a pads, asbestos, other minerals, celuls
32	700711	66471	Toughened safety glass of size a shape for vehicles etc
33	700721	66472	Laminated safety glass for vehicles, aircraft etc.
34	700910	66481	Rear-view mirrors for vehicles
35	701710	66591	Lab, hygienic, pharmaceutical glassware, fused quartz/silica
36	702000	66599	Articles of glass, nesoi (used in electronics)

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
37	820220	69551	Band saw blades, and base metal parts thereof
38	820231	69552	Circular saw blades base metal with working part of steel
39	820239	69553	Circular saw blades, base metal, working part oth than stl, parts
40	820240	69554	Chain saw blades (lengths o ct to sz) and parts, base metal
41	820291	69555	Straight saw blades for working metal, base metal
42	820299	69559	Saw blades nesoi and parts, of base metal nesoi
43	820810	69561	Knives & cutting blades f metal working and parts
44	820820	69561	Knives & cutting blades f wood working and parts
45	820830	69561	Knives & cutting blades f kitchen appln or food ind mach a parts
46	820840	69561	Knives & cutting blades f agric or forestry mach, a parts
47	820890	69561	Other knives and cutting blades f mach or mech eqp, pts b mt
48	820900	69562	Plates, sticks tips etc f tools unmounted cermets
49	820713	69563	Rock drilling earth boring tools wrkng pt cermets, & parts
50	820719	69563	Interchangeable tools for hand or machines; & parts
51	820720	69564	Dies drw o extr mtl a parts thereof
52	820730	69564	Tools for pressing, stamping or punching, base metal parts
53	820740	69564	Tools for tapping or threading, parts, of base metal
54	820750	69564	Tools for drilling other than rock drill, base metal parts
55	820760	69564	Tools for boring or broaching, and parts, base metal
56	820770	69564	Tools for milling, and parts, base metal
57	820780	69564	Tools for turning of base metal
58	820790	69564	Interchangeable tools nesoi, and parts, base metal
59	821194	69680	Blades for knives, nesoi
60	821195	69680	Handles base metal for knives with cutting blades nt 8208
61	830230	69915	Other base metal mountings fittings etc for motor vehicles
62	830810	69933	Hooks, eyes and eyelets, of base metal
63	830890	69933	Clasps, buckles etc and parts of base metal, nesoi
64	732010	69941	Leaf springs and leaves therefor, of iron or steel
65	732020	69941	Helical springs of iron or steel
66	840290	71191	Super-heated water boilers & steam generating boiler parts
67	840490	71192	Parts for aux plt for blrs, cond for stm, vpr pr unt
68	840690	71280	Parts for steam and other vapor turbines
69	840710	71311	Aircraft engines (spark-ignition/rotary int cmbus)
70	840910	71319	Parts for aircraft engines (spark-ignition, rotary or comp)
71	840731	71321	Spark-ignition piston engine f veh ex railwy not over 50 cc
72	840732	71321	Spark- ignition reciprocating piston engine etc not over 250cc
73	840733	71321	Spark- ignition recip piston engine etc >250 not over 1000cc
74	840734	71322	Spark- ignition reciprocating piston engine etc > 1000 cc

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
75	840820	71323	Compression-ignition internal combustion piston engine etc
76	840729	71332	Inboard engines for marine propulsion
77	840810	71333	Marine compress-ignition combustion piston engine etc
78	840790	71381	Spark-ignition rcprctng/rotary internal combstn eng, nesoi
79	840991	71391	Spark-ignition internal combustion piston eng pts nesoi
80	840999	71392	Spark-ignition reciprocating internal com piston engine parts
81	841111	71441	Turbojets of a thrust not exceeding 25 kn
82	841112	71441	Turbojets of a thrust exceeding 25 kn
83	841210	71449	Reaction engines other than turbojets
84	841121	71481	Turbo propellers of a power not exceeding 1,100 kw
85	841122	71481	Turbo propellers of a power exceeding 1,100 kw
86	841181	71489	Gas turbines of a power not exceeding 5,000 kw
87	841182	71489	Gas turbines of a power exceeding 5,000 kw
88	841191	71491	Turbojet and turbo propeller parts
89	841199	71499	Gas turbine parts nesoi
90	850110	71610	Electric motors of an output not exceeding 37.5 w
91	850131	71620	Dc motors & generators w output not over 750 w
92	850132	71620	Dc motors & generators w output > 750w; not over 75 Kw
93	850133	71620	Dc motors & generators w output > 75kw; not over 375kw
94	850134	71620	Dc motors & generators of output exceeding 375 kw
95	850120	71631	Universal ac/dc motors of an output > 37.5 w
96	850140	71631	Ac motors nesoi, single-phase
97	850151	71631	Ac motors, multi-phase, output not exceeding 750 w
98	850152	71631	Ac motors, multi-phase; output > 750w not over 75 Kw
99	850153	71631	Ac motors, multi-phase, of an output > 75 kw
100	850220	71651	Generating set w spark-ignition internal combustion engines
101	850300	71690	Parts of electric motors, generators & sets
102	841090	71819	Parts, inc regulators, for hydraulic turbine & water wheels
103	840140	71878	Parts of nuclear reactors
104	841290	71899	Engine and motor parts, nesoi
105	843290	72119	Agric hort/forest machinery & lawn/ground roller parts
106	843390	72129	Parts for harvester, grass mowers, sorting egg etc
107	843490	72139	Parts of milking machines and dairy machinery
108	843590	72198	Parts, pres, crush & sim mac, use in mfg of fruit juices
109	843691	72199	Parts of poultry-keep mac or poultry incub & brood
110	843699	72199	Parts for agric, horticultural, forest, bee-keeping mach nesoi
111	843141	72391	Buckets, shovels, grabs & grips for derricks etc
112	843142	72392	Bulldozer or angledozer blades

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
113	843143	72393	Parts for boring or sinking machinery, nesoi
114	843149	72399	Parts and attachments nesoi for derricks etc.
115	845230	72439	Sewing machine needles
116	845240	72439	Furniture, bases & covers for sewing machines & parts
117	845290	72439	Parts for sewing machines, nesoi
118	844820	72449	Parts & accessories for mach for extruding mm text mtl etc
119	844831	72449	Card clothing
120	844832	72449	Parts of mach for preparing textile fibers ex card cloth
121	844833	72449	Spindles, spin flyers, spin rings & ring travellers
122	844839	72449	Parts & access for spinning, winding machines etc nesoi
123	844811	72461	Dob & jac; card reduc, copy, punch, assm mac as aux mc
124	844819	72461	Auxiliary mac for text machines (head 8444 - 8447)
125	844841	72467	Shuttles for looms
126	844842	72467	Reeds for looms, healds and heald-frames
127	844849	72467	Parts & accessories of weaving mach or their aux mach, nesoi
128	844851	72468	Sinkers needles & other articles used in forming stitches
129	844859	72468	Parts & access nesoi for machinery for knitting, braid etc
130	845390	72488	Parts of machine for preparation or make art of hides, leather
131	845090	72491	Parts of household or industry-type washing mac inc wsh/dry
132	845190	72492	Parts for wash/clean, pasting floor covers etc
133	843991	72591	Parts of machinery to make pulp of fiber cellulosic material
134	843999	72591	Parts for machinery making or finishing paper or paperboard
135	844190	72599	Parts of mac for make up paper pulp, paper/paperboard, cut
136	844250	72635	Print type, blocks, cylinders etc for print purpose
137	844090	72689	Parts for bookbinding machinery, inc book-sew machines
138	844240	72691	Parts of machinery & equip to make print blocks, etc
139	844390	72699	Parts for print machinery & mach ancillary to printing
140	843790	72719	Parts of machines to clean, sort, mill grain, veg, ex farm
141	843890	72729	Parts of machines of ch 84, nesoi, ind prep food, drink
142	846691	72819	Parts for machines of heading 8464
143	846692	72819	Parts for machines of heading 8465
144	847490	72839	Parts of machinery for sorting etc earth stone ores etc
145	847590	72851	Parts of mach for assembling electric lamp etc mfg glassware
146	847790	72852	Parts mach for work rubber/plastic/mfg rubber/plastic products
147	847890	72853	Parts of mach, nesoi, for prep or making up tobacco
148	847990	72855	Parts of mach/mechanical appl with individual function nesoi
149	846610	73511	Tool holders & self-opening dieheads for machines
150	846620	73513	Work holders for machine tools

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
151	846630	73515	Dividing heads & other spec attachments for machine tools
152	846693	73591	Parts and accessories for use with machine tools nesoi
153	846694	73595	Parts for machines of heading 8462 or 8463
154	845490	73719	Parts for converters ladles etc used in metal foundry
155	845530	73729	Rolls for metal-rolling mills
156	845590	73729	Parts for metal rolling mills exc rolls for rolling mills
157	851590	73739	Parts elect laser ultrasonic, etc, hot spray metal mach
158	846890	73749	Machinery & appr parts for soldering brazing welding, nesoi
159	841690	74128	Parts of furnace burners
160	851490	74135	Parts for ind, lab furnaces, ovens or heating equip
161	841790	74139	Parts of ind or lab furn & oven, incinerators, nonelectric
162	841891	74149	Furniture for refrigeration or freezing equipment
163	841899	74149	Refrigerator freezer and heat pump parts nesoi
164	841520	74155	Automotive air conditioners
165	841590	74159	Parts, nesoi, of air conditioning machines
166	840590	74172	Parts, prod gas, wtr gas, acetylene gas, wtr pro gas gen
167	841990	74190	Parts for machinery plant or lab equipment etc
168	841330	74220	Fuel, lub/cooling med pumps for internal comb piston engines
169	841391	74291	Parts of pumps for liquids
170	841392	74295	Parts of liquid elevators
171	842123	74363	Oil or fuel filters for internal combustion engine
172	842131	74364	Intake air filters for internal combustion engines
173	841490	74380	Air/gas pump, compressor and fan etc parts, nesoi
174	842191	74391	Parts of centrifuges, including centrifugal dryers
175	842199	74395	Filter/purify machine & apparatus parts
176	870990	74419	Parts for works trucks w/o lift equip
177	842542	74443	Jacks and hoists, hydraulic, exc built-in jack systems
178	843110	74491	Parts for pulley tackle, hoist ex skip, winches, etc
179	843120	74492	Parts of fork lift trucks & works trucks with lift or hndl
180	843131	74493	Parts of elevators, exc cont action, sk hoist, escal
181	843139	74494	Parts for lifting, handling, loading/unloading mach nesoi
182	846791	74519	Parts of chain saws
183	846792	74519	Parts of pneumatic tools for working in the hand
184	846799	74519	Parts for hand tools self-con nonelectric motor nesoi
185	842290	74529	Parts for machines for dishwashing, packing, etc
186	842390	74539	Weighing machine weights & parts of weighing machine
187	842490	74568	Parts for mechanical appliance project liquid etc
188	842091	74593	Cylinders for rolling mach, exc of metals or glass

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
189	842099	74593	Parts, nesoi, for rolling mach, exc of metals or glass
190	847690	74597	Parts of automatic vending machines
191	848210	74610	Ball bearings
192	848220	74620	Tapered roll bearings, incl cone & roller assemblies
193	848230	74630	Spherical roller bearings
194	848240	74640	Needle roller bearings
195	848250	74650	Cylindrical roller bearing nesoi
196	848280	74680	Other ball or roll bearing, inc combined ball/roll bearings
197	848291	74691	Balls, needles and rollers for bearings
198	848299	74699	Parts of bearings, nesoi
199	848110	74710	Pressure-reducing valves
200	848120	74720	Valves f oleohydraulic or pneumatic transmissions
201	848130	74730	Check valves
202	848140	74740	Safety or relief valves
203	848180	74780	Taps cocks etc f pipe vat inc thermo control nesoi
204	848190	74790	Parts of taps etc f pipe vat inc press & thermo control
205	848310	74810	Transmission shafts (inc cam-&crank-shafts), etc.
206	848320	74821	Housed bearings, incorp ball or roller bearings
207	848330	74822	Bearing housings; plain shaft bearings
208	731519	74839	Parts of articulated link chain of iron or steel
209	848340	74840	Gears; ball or roller screws; gear boxes, etc
210	848350	74850	Flywheels and pulleys, including pulley blocks
211	848360	74860	Clutches & shaft couplings (incl universal joints)
212	848390	74890	Toothed wheels, chain sprockets & other trans elem; parts
213	848410	74920	Gaskets, metal layers, or other material, mechanical seals
214	848490	74920	Sets or assortments of gaskets and similar joints
215	848510	74991	Ships' or boats' propellers and blades therefor
216	848420	74999	Mechanical seals
217	848590	74999	Machine parts with no electric features nesoi
218	847149	75230	Digital adp mac & units, entered as systems, nesoi
219	847150	75230	Digital processing units, n.e.s.o.i.
220	847160	75260	Adp input or output units, storage or not, nesoi
221	847170	75270	Automatic data processing storage units, n.e.s.o.i
222	847180	75290	Automatic data processing units, n.e.s.o.i.
223	847190	75290	Adp machines & units thereof; mag/opt rder, trnscrb, proc dat
224	900990	75910	Parts and accessories of photocopying apparatus
225	847350	75990	Parts suitable for use with mac of 2/more head 8469-8472
226	847310	75991	Typewriter & word processing machines, parts & accessories

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
227	847340	75993	Parts and accessories of office machines, nesoi
228	847321	75995	Parts of electronic calculating machines
229	847329	75995	Parts for machines, nesoi, incorporating calculating device
230	847330	75997	Parts & accessories for adp machines & units
231	852721	76211	Radiobroadcast receivers for motor vehicles w rcos
232	852729	76212	Radiobroadcast receivers for motor vehicles nesoi
233	852731	76281	Radiobroadcast receivers, nesoi, with sound recorder
234	852732	76282	Radiobroadcast receivers, nesoi, with clock wo p & r
235	852739	76289	Radiobroadcast receivers nesoi
236	852520	76432	Transmission apparatus incorporating reception apparatus
237	852790	76481	Reception apparatus for radio-telephone/telegraph etc nesoi
238	851790	76491	Parts electrical apparatus for line telephony or telegraphy etc.
239	851890	76492	Parts micro-head-ear-phone, elect sound ampl sets etc
240	852910	76493	Antennas and antenna reflectors and parts
241	852990	76493	Parts, ext antenna, for transmission, radar, radio, TV, etc nesoi
242	852210	76499	Pickup cartridges for sound recorders
243	852290	76499	Parts & access f sound/video reproducing, record appr
244	850421	77111	Liq Dielect transformer power handling cap not over 650kva
245	850422	77111	Liq Dielect transformer power hnd cap >650 not over 10t Kva
246	850423	77111	Liq Dielect transformer power handling capacity > 10t Kva
247	850432	77119	Transformers, nesoi,> 1 kva but =< 16 kva
248	850433	77119	Transformers nesoi, power handling cap >16 not over 500 kva
249	850434	77119	Transformers, nesoi, > 500 kva
250	850450	77125	Electrical inductors nesoi
251	850490	77129	Parts for elect transformers static converters indct
252	853400	77220	Printed circuits
253	853310	77231	Fixed carbon resistors, composition or film type
254	853321	77232	Fixed resistors, nesoi, power handling capacity not over 20 w
255	853329	77232	Fixed resistors nesoi > 20 w power handling capacity
256	853331	77233	Wirewound variable resistors, < 20 w
257	853339	77233	Wirewound variable resistors inc rheostats etc nesoi
258	853340	77235	Variable resistors inc rheostat & potentiometers nesoi
259	853390	77238	Parts for resistors, rheostats, potentiometers
260	853510	77241	Fuses for electrical apparatus, voltage > 1000 v
261	853521	77242	Automatic circuit breakers > 1000 v but < 72.5 kv
262	853529	77243	Auto circuit breaker voltage 72.5 kv or more
263	853530	77244	Isolating switch & make-&-break switch volt > 1000v
264	853540	77245	Lightning arresters, voltage limiters, surge suppressors

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
265	853590	77249	Elect appr f prtct to electrical circuit >1000 v nesoi
266	853610	77251	Fuses for voltage not exceeding 1000 v
267	853620	77252	Auto circuit breakers voltage not exceeding 1000 v
268	853630	77253	Other apparatus for protecting elc crts =< 1000 v
269	853641	77254	Relays for a voltage not exceeding 60 v
270	853649	77254	Relays For Voltage Over 60v More But Nt Over 1000v
271	853650	77255	Electric switches for voltage not over 1000 v, nesoi
272	853661	77257	Lamp-holders for voltage not over 1000v
273	853669	77258	Elect plugs & sockets f voltage not over 1000 v
274	853690	77259	Elect appr f prtct to elect circt not over 1000 v nesoi
275	853710	77261	Controls etc w elect appr for elect control not over 1000 v
276	853720	77262	Controls etc w elect appr for elect control over 1000 v
277	853810	77281	Boards, panels, consoles etc of 8537 less apts
278	853890	77282	Part of elect appr for electrical circuit; f elct control nesoi
279	854411	77311	Insulated winding wire of copper
280	854419	77311	Insulated winding wire, nesoi
281	854420	77312	Insulated coaxial cable & other coaxial elect condct
282	854430	77313	Insulated wiring sets for vehicles ships aircraft
283	854441	77314	Insulated electric conductors =< 80 v with cntrs
284	854449	77314	Insulated electric conductors =< 80 v nesoi
285	854451	77315	Electrical Conductors > 80 But =< 1000v W Connectors
286	854459	77315	Elec Cond Ov 80v Nov 1000v Not Fitted W Connector
287	854460	77317	Electric conductors for voltage exceeding 1000 v
288	854470	77318	Insulated optical fiber cables with indvuly sh fbr
289	854610	77322	Electrical insulators of glass
290	854620	77323	Electrical insulators of ceramics
291	854690	77324	Electrical insulators, nesoi
292	854710	77326	Insulating fittings of ceramics for electrical mch
293	854720	77328	Insulating fittings for machines made of plastic
294	854790	77329	Insulating fittings ex ceram/plas; elec cond tb/jnt,bmtl etc
295	902230	77423	X-ray tubes
296	902290	77429	X-ray/hi tnsn genr cntr pnl & dsk exm/trtmnt tb pt
297	851090	77549	Parts of electric shavers and hair clippers
298	850990	77579	Parts electromech domestic appl slf-cont elect motors
299	851690	77589	Parts of heaters, hairdressing appr, flt iron, stove etc
300	854011	77611	Cathode-ray TV picture tubes, color inc monitor
301	854012	77612	Cathode-ray TV picture tubes, black and white etc
302	854020	77621	TV camera tubes; image converter & intnsfr; phtocthd tb

Table A5: *Continued*

	HS Code	SITC-Rev.3	Description
303	854040	77623	Data/graphic display tubes, color, w/ pitch < 0.4 m
304	854050	77623	Data/graphic display tubes, monochrome
305	854060	77623	Cathode-ray tubes, nesoi
306	854071	77625	Magnetron microwave tubes
307	854072	77625	Klystron microwave tubes
308	854079	77625	Microwave tubes, nesoi
309	854081	77627	Receiver or amplifier tubes
310	854089	77627	Thermionic and other cathode tubes nesoi
311	854091	77629	Parts of cathode-bay tubes
312	854099	77629	Parts of cathode tubes, nesoi
313	854110	77631	Diodes ex photosensitive or light-emitting diodes
314	854121	77632	Transistors ex photosensitive, dissipation rate < 1 w
315	854129	77633	Transistors, other than photosensitive, nesoi
316	854130	77635	Thyristors, diac & triac, ex photosensitive device
317	854140	77637	Photosensitive semiconductor device inc photovoltaic cell etc
318	854150	77639	Semiconductor device ex photosensitive/photovoltaic cl
319	854212	77641	Cards incorp. Elec. Integrated circuit (smart cards)
320	854213	77641	Metal oxide semiconductors (mos), mono digital inte
321	854214	77641	Monolithic digital integrated circuits, bipolar technology
322	854219	77641	Monolithic integrated circuits, digital, nesoi
323	854230	77643	Electronic monolithic integrated circuit,n.e.s.o.
324	854240	77645	Electronic hybrid integrated circuits
325	854250	77649	Electronic microassemblies
326	854160	77681	Mounted piezoelectric crystals
327	854190	77688	Parts for diodes, transistors & similar semiconductors
328	854290	77689	Electronic integrated circuits and mcrssmbls parts
329	850710	77812	Lead-acid batteries of a kind used for stg engines
330	850720	77812	Lead-acid storage batteries nesoi
331	850730	77812	Nickel-cadmium storage batteries
332	850740	77812	Nickel-iron storage batteries
333	850780	77812	Storage batteries nesoi
334	850690	77817	Primary battery and cell parts
335	850790	77819	Parts elect storage batteries inc separators thereof
336	853929	77821	Filament lamps ex ultraviolet/infrared lamps nesoi
337	853921	77821	Tungsten halogen electric filament lamps
338	853922	77821	Filament lamp power nov 200 w & voltage over 100 v
339	853931	77822	Discharge lamps, (ex ultraviolet), fluorescent
340	853932	77822	Mercury or sodium vapor lamps; metal halide lamps

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
341	853939	77822	Discharge lamps ex ultraviolet, fluorescent ht cathode lamp
342	853910	77823	Sealed beam electric lamp units
343	853941	77824	Arc lamps
344	853949	77824	Ultraviolet or infrared lamps
345	853990	77829	Parts for elect filament, discharge or arc lamps
346	851110	77831	Internal combustion engine spark plugs
347	851120	77831	Internal combustion engine magnetos, magneto-dynam
348	851130	77831	Distributors; ignition coils
349	851140	77831	Internal combustion engine starter motors
350	851150	77831	Internal combustion engine generators, nesoi
351	851180	77831	Elect ignition/start eq f spark/comp engine; generators nesoi
352	851190	77833	Parts elect ignition/start equip; generators & cut-outs
353	851210	77834	Lighting or visual signaling equipment for bicycle
354	851220	77834	Elect lighting/visual signaling eq ex for bicycles
355	851230	77834	Electrical sound signaling equipment for motor vehicle
356	851240	77834	Windshield wiper defroster & demister for cycle/motor vehicle
357	851290	77835	Part elect lighting/signlng eq windshield wiper, defroster etc
358	850890	77848	Electromechanical hand tool parts
359	853210	77861	Fixed capacitors, 50-60 hz, power, capacity =>.5 kvar
360	853221	77862	Tantalum electrolytic fixed capacitors
361	853222	77863	Aluminum electrolytic fixed capacitors
362	853223	77864	Ceramic dielectric, single layer fixed capacitors
363	853224	77865	Ceramic dielectric, multilayer fixed capacitors
364	853225	77866	Dielectric fixed capacitors of paper or plastics
365	853229	77867	Fixed capacitors, nesoi
366	853230	77868	Variable or adjustable (pre-set) capacitors
367	853290	77869	Parts for electrical capacitors
368	854311	77871	Particle accelerators, ion implanters for semiconductors
369	854319	77871	Particle accelerators, nesoi
370	854390	77879	Parts electrical mach & appr w individual functions, nesoi
371	850511	77881	Permanent magnets made of metal
372	850519	77881	Permanent magnets made of materials o/t metal
373	850520	77881	Electromagnetic couplings, clutches and brakes
374	850530	77881	Electromagnetic lifting heads
375	850590	77881	Electromagnets, clamps, similar holding devices & parts
376	853010	77882	Electrical signaling or traffic control equipment, rail
377	853080	77882	Electrical signaling or traffic control equipment, nesoi
378	853090	77883	Parts for elc signaling, traffic, safety equipment

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
379	853190	77885	Parts of electric sound or visual signaling parts
380	854511	77886	Carbon electrodes of a kind used for furnaces
381	854519	77886	Carbon electrodes nesoi
382	854520	77886	Electrical carbon or graphite brushes
383	854590	77886	Electrical carbon or graphite articles, nesoi
384	854890	77889	Electrical parts of machinery nesoi in chapter 85
385	870600	78410	Chas w eng for trac, motor vehicle f pass/gd & special purpose
386	870710	78421	Bodies of motor car/vehicles for transporting persons
387	870790	78425	Bodies of road tractors and motor veh (pub tran,etc)
388	870810	78431	Bumpers and parts, for motor vehicles
389	870821	78432	Safety seat belts for motor vehicles
390	870829	78432	Parts & access of bodies of motor vehicles, nesoi
391	870831	78433	Mounted brake linings for motor vehicles
392	870839	78433	Brakes and servo-brakes & parts for motor vehicles
393	870840	78434	Gear boxes for motor vehicles
394	870850	78435	Drive axles with differential for motor vehicles
395	870860	78436	Non-driving axles & parts thereof for motor vehicles
396	870870	78439	Road wheels & parts & accessories for motor vehicles
397	870880	78439	Suspension shock absorbers for motor vehicles
398	870891	78439	Radiators for motor vehicles
399	870892	78439	Mufflers and exhaust pipes for motor vehicles
400	870893	78439	Clutches and parts thereof for motor vehicles
401	870894	78439	Steering wheels, columns & boxes f motor vehicles
402	870899	78439	Parts and accessories of motor vehicles, nesoi
403	871411	78535	Saddles and seats of motorcycles
404	871419	78535	Parts of motorcycles, nesoi
405	871420	78536	Parts & accessories of carriages for disables persons
406	871491	78537	Frames and forks, and parts for bicycles etc.
407	871492	78537	Wheel rims and spokes for bicycles etc.
408	871493	78537	Hubs, other than coaster braking hubs, hub brakes, spk, wheels
409	871494	78537	Brakes, incl coaster braking hubs, hub brakes, parts, nes
410	871495	78537	Saddles for bicycles etc.
411	871496	78537	Pedals and crank-gear, parts of bicycles etc.
412	871499	78537	Parts and accessories nesoi of bicycles etc.
413	871690	78689	Parts trailers, semi-trailer & other vehicle not mech propelled
414	860711	79199	Truck assemblies for self-propelled railway vehicles
415	860712	79199	Truck assemblies, railway, nesoi
416	860719	79199	Truck axles and wheels & parts, etc for rail vehicles

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
417	860721	79199	Airbrakes and parts thereof
418	860729	79199	Brakes, except airbrakes, and parts thereof
419	860730	79199	Hooks & other coupling devices buffers & parts thereof
420	860791	79199	Parts, nesoi, of locomotives
421	860799	79199	Parts of railway/tramway exc locomotives/rolling stock nesoi
422	880310	79291	Propeller rotor & parts of gliders & a/c, n-pwrd/pwrd
423	880320	79293	Undercarriage & parts gliders & a/c, non-powered/powered
424	880330	79295	Parts of airplanes or helicopters, nesoi
425	880390	79297	Parts of non-powered & powered aircraft etc nesoi
426	732211	81211	Radiators for central heating and parts, cast iron
427	732219	81211	Radiators for central heating and parts, ios exc cstirn
428	732290	81215	Air heaters a hot air dist nt elec htd w fan, parts ios
429	840390	81219	Parts for central heating boilers
430	851390	81380	Parts for portable electric lamps nesoi
431	940591	81391	Parts for lamps etc. Of glass
432	940592	81392	Parts for lamps etc. Of plastic
433	940599	81399	Parts for lamps and lighting fittings, nesoi
434	940110	82111	Seats of a kind used for aircraft
435	940120	82112	Seats of a kind used for motor vehicles
436	940190	82119	Parts of seats (ex medical, barber, dental etc)
437	940390	82180	Parts of furniture, nesoi
438	621220	84552	Girdles & panty girdles, knit or crocheted or not
439	621230	84552	Corsets, knitted or crocheted or not
440	621290	84552	Braces, suspenders, garters, art parts kt o ct
441	650300	84841	Felt hats & other felt headgear from heading 6501
442	650400	84842	Hats & other headgear, plaited/assembled strips any material
443	650700	84848	Headbands, linings, covers, frms, visors, etc chinstraps
444	900590	87119	Parts etc of binoculars, optical telescopes etc
445	901290	87139	Parts for microscopes, exc optical; diffraction
446	901190	87149	Parts & accessories for compound optical microscopes
447	901390	87199	Parts of liq crystal device, laser & other optical, nesoi
448	902890	87319	Pt acces gas lqd elec supply mtr inc clbrating mtr
449	902920	87325	Speedometers and tachometers; stroboscopes
450	902990	87329	Parts for revolution counters, odometer, etc
451	901490	87412	Parts, for direct find compasses, navigational inst
452	901590	87414	Parts and accessories for surveying etc nesoi
453	901790	87424	Parts, for drawing etc & inst for measuring length ins
454	903190	87426	Parts, of machinery nesoi in this chapter, & profile projector

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
455	902690	87439	Parts, inst & apprts measure/check variables liq/gas
456	902490	87454	Parts, machine & appln, test hardness/strength, etc
457	902590	87456	Parts, hydrometers, thermometers, pyrometers, etc
458	903210	87461	Thermostats
459	903220	87463	Manostats
460	903290	87469	Parts, autom regulating/controlling inst & apparatus
461	903090	87479	Parts of inst for measuring elect quat alpha beta inzng rdt
462	903300	87490	Parts, nesoi for machines, appln, inst/appts of chap 90
463	900662	88112	Photo flashbulbs, flashcubes and the like
464	900661	88113	Photo discharge lamp (electronic) flashlight apprts
465	900669	88113	Photographic flashlight apparatus nesoi
466	900691	88114	Parts and accessories for still photo cameras
467	900699	88115	Parts, photographic flashlight exc nesoi
468	900791	88123	Parts and accessories for cinema cameras
469	900792	88124	Parts and accessories for cinema projectors
470	900890	88134	Parts, of image projector, enlarger & reducer excl cinema
471	901090	88136	Parts & access of apparatus & equip for photo/cinema lab
472	900390	88422	Parts for frames and mountings, spectacles, etc
473	900211	88431	Objective lenses parts access for cameras projectors etc
474	900219	88432	Objective lenses and parts, nesoi
475	900220	88433	Filters & parts & accessories for instr & apparatus
476	900290	88439	Prism, mirrors, mounted & parts & accessories, neso
477	910400	88571	Instrument panel clock & clock similar, for vehicle, aircraft, etc
478	911110	88591	Watch cases, precious metal or metal clad with precious metal
479	911120	88591	Watch cases of base metals, gold or silver plated
480	911180	88591	Watch cases, nesoi
481	911190	88591	Parts for watch cases of any material
482	911210	88597	Clock cases of metal
483	911280	88597	Clock cases of other than metal
484	911290	88597	Parts for clock cases, nesoi
485	911011	88598	Complete movements of watches, unassem/partly assembled
486	911012	88598	Incomplete movements of watches, assembled
487	911019	88598	Rough movements of watches
488	911090	88598	Compl clock movement, unassemble/partly assem, rough etc
489	911410	88599	Clock or watch springs, including hair springs
490	911420	88599	Clock or watch jewels
491	911430	88599	Clock or watch dials
492	911440	88599	Clock or watch plates and bridges

Table A5: ***Continued***

	HS Code	SITC-Rev.3	Description
493	911490	88599	Parts for clocks or watches, nesoi
494	930610	89121	Cartridges for riveting or similar tools & parts
495	930529	89195	Parts of sport shotgun and rifles, nesoi
496	482110	89281	Paper and paperboard labels of all kinds, printed
497	392630	89395	Fittings for furniture, coachwork etc, of plastics
498	950291	89423	Doll garments and accessories, footwear & headwear
499	950299	89423	Doll parts and accessories nesoi
500	852440	89860	Magnet tapes for reproducing other than sound/image
501	852452	89865	Mag tape, sound or Image, recorded, over 4mm N/O 6.5mm
502	852453	89867	Magnetic tape and or image, recorded, over 6.5mm wide
503	852460	89879	Recorded, cards incorporating a magnetic stripe
504	852491	89879	Other recorded media, nesoi, for reproducing other than s/i
505	852499	89879	Recorded media for reproducing sound or image, nesoi
506	852431	89879	Laser discs for reproducing other than sound/image
507	852439	89879	Discs for laser reading systems, nesoi
508	920910	89890	Metronomes, tuning forks and pitch pipes
509	920920	89890	Mechanisms for music boxes
510	920930	89890	Music instrument strings
511	920991	89890	Parts and accessories for pianos
512	920992	89890	Parts and accessories for string music instruments nesoi
513	920993	89890	Parts and accessories for keyboard pipe organs etc.
514	920994	89890	Parts and accessories for musical inst of heading 9207
515	920999	89890	Parts and accessories for musical instruments nesoi
516	961390	89935	Parts of lighters, except flints and wicks
517	660310	89949	Handles and knobs for umbrellas, whips etc.
518	660320	89949	Umbrella frames, mounted, shaft/stick
519	660390	89949	Parts, trimmings & access of umbrellas etc.
520	960610	89983	Press-fasteners, snap-fasteners & press-studs& parts
521	960621	89983	Buttons of plastics, covered with textile material
522	960622	89983	Buttons of base metal, covered with textile material
523	960719	89985	Slide fasteners, nesoi
524	960720	89986	Parts of slide fasteners
525	670100	89992	Skins & other parts of birds w feathers processed

nesoi = not elsewhere specified or indicated.

Source: Athokorala (2010), pp. 9–32.

ADB Working Paper Series on Regional Economic Integration*

1. "The ASEAN Economic Community and the European Experience"
   by Michael G. Plummer

2. "Economic Integration in East Asia: Trends, Prospects, and a Possible Roadmap"
   by Pradumna B. Rana

3. "Central Asia after Fifteen Years of Transition: Growth, Regional Cooperation, and Policy Choices"
   by Malcolm Dowling and Ganeshan Wignaraja

4. "Global Imbalances and the Asian Economies: Implications for Regional Cooperation"
   by Barry Eichengreen

5. "Toward Win-Win Regionalism in Asia: Issues and Challenges in Forming Efficient Trade Agreements"
   by Michael G. Plummer

6. "Liberalizing Cross-Border Capital Flows: How Effective Are Institutional Arrangements against Crisis in Southeast Asia" by Alfred Steinherr, Alessandro Cisotta, Erik Klär, and Kenan Šehović

7. "Managing the Noodle Bowl: The Fragility of East Asian Regionalism"
   by Richard E. Baldwin

8. "Measuring Regional Market Integration in Developing Asia: A Dynamic Factor Error Correction Model (DF-ECM) Approach"
   by Duo Qin, Marie Anne Cagas, Geoffrey Ducanes, Nedelyn Magtibay-Ramos, and Pilipinas F. Quising

9. "The Post-Crisis Sequencing of Economic Integration in Asia: Trade as a Complement to a Monetary Future"
   by Michael G. Plummer and Ganeshan Wignaraja

10. "Trade Intensity and Business Cycle Synchronization: The Case of East Asia"
    by Pradumna B. Rana

11. "Inequality and Growth Revisited"
    by Robert J. Barro

12. "Securitization in East Asia"
    by Paul Lejot, Douglas Arner, and Lotte Schou-Zibell

13. "Patterns and Determinants of Cross-border Financial Asset Holdings in East Asia"
    by Jong-Wha Lee

14. "Regionalism as an Engine of Multilateralism: A Case for a Single East Asian FTA"
    by Masahiro Kawai and Ganeshan Wignaraja

15. "The Impact of Capital Inflows on Emerging East Asian Economies: Is Too Much Money Chasing Too Little Good?"
by Soyoung Kim and Doo Yong Yang

16. "Emerging East Asian Banking Systems Ten Years after the 1997–1998 Crisis"
by Charles Adams

17. "Real and Financial Integration in East Asia"
by Soyoung Kim and Jong-Wha Lee

18. "Global Financial Turmoil: Impact and Challenges for Asia's Financial Systems"
by Jong-Wha Lee and Cyn-Young Park

19. "Cambodia's Persistent Dollarization: Causes and Policy Options"
by Jayant Menon

20. "Welfare Implications of International Financial Integration"
by Jong-Wha Lee and Kwanho Shin

21. "Is the ASEAN-Korea Free Trade Area (AKFTA) an Optimal Free Trade Area?"
by Donghyun Park, Innwon Park, and Gemma Esther B. Estrada

22. "India's Bond Market—Developments and Challenges Ahead"
by Stephen Wells and Lotte Schou- Zibell

23. "Commodity Prices and Monetary Policy in Emerging East Asia"
by Hsiao Chink Tang

24. "Does Trade Integration Contribute to Peace?"
by Jong-Wha Lee and Ju Hyun Pyun

25. "Aging in Asia: Trends, Impacts, and Responses"
by Jayant Menon and Anna Melendez-Nakamura

26. "Re-considering Asian Financial Regionalism in the 1990s"
by Shintaro Hamanaka

27. "Managing Success in Viet Nam: Macroeconomic Consequences of Large Capital Inflows with Limited Policy Tools"
by Jayant Menon

28. "The Building Block versus Stumbling Block Debate of Regionalism: From the Perspective of Service Trade Liberalization in Asia"
by Shintaro Hamanaka

29. "East Asian and European Economic Integration: A Comparative Analysis"
by Giovanni Capannelli and Carlo Filippini

30. "Promoting Trade and Investment in India's Northeastern Region"
by M. Govinda Rao

31. "Emerging Asia: Decoupling or Recoupling"
by Soyoung Kim, Jong-Wha Lee, and Cyn-Young Park

32. "India's Role in South Asia Trade and Investment Integration"
by Rajiv Kumar and Manjeeta Singh

33. "Developing Indicators for Regional Economic Integration and Cooperation"
by Giovanni Capannelli, Jong-Wha Lee, and Peter Petri

34. "Beyond the Crisis: Financial Regulatory Reform in Emerging Asia"
by Chee Sung Lee and Cyn-Young Park

35. "Regional Economic Impacts of Cross-Border Infrastructure: A General Equilibrium Application to Thailand and Lao People's Democratic Republic"
by Peter Warr, Jayant Menon, and Arief Anshory Yusuf

36. "Exchange Rate Regimes in the Asia-Pacific Region and the Global Financial Crisis"
by Warwick J. McKibbin and Waranya Pim Chanthapun

37. "Roads for Asian Integration: Measuring ADB's Contribution to the Asian Highway Network"
by Srinivasa Madhur, Ganeshan Wignaraja, and Peter Darjes

38. "The Financial Crisis and Money Markets in Emerging Asia"
by Robert Rigg and Lotte Schou-Zibell

39. "Complements or Substitutes? Preferential and Multilateral Trade Liberalization at the Sectoral Level"
by Mitsuyo Ando, Antoni Estevadeordal, and Christian Volpe Martincus

40. "Regulatory Reforms for Improving the Business Environment in Selected Asian Economies—How Monitoring and Comparative Benchmarking can Provide Incentive for Reform"
by Lotte Schou-Zibell and Srinivasa Madhur

41. "Global Production Sharing, Trade Patterns, and Determinants of Trade Flows in East Asia"
by Prema-chandra Athukorala and Jayant Menon

42. "Regionalism Cycle in Asia (-Pacific): A Game Theory Approach to the Rise and Fall of Asian Regional Institutions"
by Shintaro Hamanaka

43. "A Macroprudential Framework for Monitoring and Examining Financial Soundness"
by Lotte Schou-Zibell, Jose Ramon Albert, and Lei Lei Song

44. "A Macroprudential Framework for the Early Detection of Banking Problems in Emerging Economies"
by Claudio Loser, Miguel Kiguel, and David Mermelstein

45. "The 2008 Financial Crisis and Potential Output in Asia: Impact and Policy Implications"
by Cyn-Young Park, Ruperto Majuca, and Josef Yap

46. "Do Hub-and-Spoke Free Trade Agreements Increase Trade? A Panel Data Analysis"
by Jung Hur, Joseph Alba, and Donghyun Park

47. "Does a Leapfrogging Growth Strategy Raise Growth Rate? Some International Evidence"
by Zhi Wang, Shang-Jin Wei, and Anna Wong

48. "Crises in Asia: Recovery and Policy Responses"
by Kiseok Hong and Hsiao Chink Tang

49. "A New Multi-Dimensional Framework for Analyzing Regional Integration: Regional Integration Evaluation (RIE) Methodology"
by Donghyun Park and Mario Arturo Ruiz Estrada

50. "Regional Surveillance for East Asia: How Can It Be Designed to Complement Global Surveillance?"
by Shinji Takagi

51. "Poverty Impacts of Government Expenditure from Natural Resource Revenues"
by Peter Warr, Jayant Menon, and Arief Anshory Yusuf

52. "Methods for Ex Ante Economic Evaluation of Free Trade Agreements"
by David Cheong

53. "The Role of Membership Rules in Regional Organizations"
by Judith Kelley

54. "The Political Economy of Regional Cooperation in South Asia"
by V.V. Desai

55. "Trade Facilitation Measures under Free Trade Agreements: Are They Discriminatory against Non-Members?"
by Shintaro Hamanaka, Aiken Tafgar, and Dorothea Lazaro

56. "Production Networks and Trade Patterns in East Asia: Regionalization or Globalization?"
by Prema-chandra Athukorala

57. "Global Financial Regulatory Reforms: Implications for Developing Asia"
by Douglas W. Arner and Cyn-Young Park

58. "Asia's Contribution to Global Rebalancing"
by Charles Adams, Hoe Yun Jeong, and Cyn-Young Park

59. "Methods for Ex Post Economic Evaluation of Free Trade Agreements"
by David Cheong

60. "Responding to the Global Financial and Economic Crisis: Meeting the Challenges in Asia"
by Douglas W. Arner and Lotte Schou-Zibell

61. "Shaping New Regionalism in the Pacific Islands: Back to the Future?"
by Satish Chand

62. "Organizing the Wider East Asia Region"
by Christopher M. Dent

63. "Labour and Grassroots Civic Interests In Regional Institutions"
by Helen E.S. Nesadurai

64. "Institutional Design of Regional Integration: Balancing Delegation and Representation"
by Simon Hix

65. "Regional Judicial Institutions and Economic Cooperation: Lessons for Asia?"
by Erik Voeten

66. "The Awakening Chinese Economy: Macro and Terms of Trade Impacts on 10 Major Asia-Pacific Countries"
by Yin Hua Mai, Philip Adams, Peter Dixon, and Jayant Menon

67. "Institutional Parameters of a Region-Wide Economic Agreement in Asia: Examination of Trans-Pacific Partnership and ASEAN+α Free Trade Agreement Approaches"
by Shintaro Hamanaka

68. "Evolving Asian Power Balances and Alternate Conceptions for Building Regional Institutions"
by Yong Wang

69. "ASEAN Economic Integration: Features, Fulfillments, Failures, and the Future"
by Hal Hill and Jayant Menon

70. "Changing Impact of Fiscal Policy on Selected ASEAN Countries"
by Hsiao Chink Tang, Philip Liu, and Eddie C. Cheung

71. "The Organizational Architecture of the Asia-Pacific: Insights from the New Institutionalism"
by Stephan Haggard

72. "The Impact of Monetary Policy on Financial Markets in Small Open Economies: More or Less Effective During the Global Financial Crisis?"
by Steven Pennings, Arief Ramayandi, and Hsiao Chink Tang

73. "What do Asian Countries Want the Seat at the High Table for? G20 as a New Global Economic Governance Forum and the Role of Asia"
by Yoon Je Cho

74. "Asia's Strategic Participation in the Group of 20 for Global Economic Governance Reform: From the Perspective of International Trade"
by Taeho Bark and Moonsung Kang

75. "ASEAN's Free Trade Agreements with the People's Republic of China, Japan, and the Republic of Korea: A Qualitative and Quantitative Analysis"
by Gemma Estrada, Donghyun Park, Innwon Park, and Soonchan Park

76. "ASEAN-5 Macroeconomic Forecasting Using a GVAR Model"
by Fei Han and Thiam Hee Ng

77. "Early Warning Systems in the Republic of Korea: Experiences, Lessons, and Future Steps"
by Hyungmin Jung and Hoe Yun Jeong

78. "Trade and Investment in the Greater Mekong Subregion: Remaining Challenges and the Unfinished Policy Agenda"
by Jayant Menon and Anna Cassandra Melendez

79. "Financial Integration in Emerging Asia: Challenges and Prospects"
by Cyn-Young Park and Jong-Wha Lee

80. "Sequencing Regionalism: Theory, European Practice, and Lessons for Asia"
by Richard E. Baldwin

81. "Economic Crises and Institutions for Regional Economic Cooperation"
by C. Randall Henning

82. "Asian Regional Institutions and the Possibilities for Socializing the Behavior of States"
by Amitav Acharya

83. "The People's Republic of China and India: Commercial Policies in the Giants"
by Ganeshan Wignaraja

84. "What Drives Different Types of Capital Flows and Their Volatilities?"
by Rogelio Mercado and Cyn-Young Park

85. "Institution Building for African Regionalism"
by Gilbert M. Khadiagala

86. "Impediments to Growth of the Garment and Food Industries in Cambodia: Exploring Potential Benefits of the ASEAN-PRC FTA"
by Vannarith Chheang and Shintaro Hamanaka

87. "The Role of the People's Republic of China in International Fragmentation and Production Networks: An Empirical Investigation"
by Hyun-Hoon Lee, Donghyun Park, and Jing Wang

88. “Utilizing the Multiple Mirror Technique to Assess the Quality of Cambodian Trade Statistics”
by Shintaro Hamanaka

89. “Is Technical Assistance under Free Trade Agreements WTO-Plus?” A Review of Japan–ASEAN Economic Partnership Agreements”
by Shintaro Hamanaka

90. “Intra-Asia Exchange Rate Volatility and Intra-Asia Trade: Evidence by Type of Goods” by Hsiao Chink Tang

91. “Is Trade in Asia Really Integrating?”
by Shintaro Hamanaka

92. “The PRC’s Free Trade Agreements with ASEAN, Japan, and the Republic of Korea: A Comparative Analysis”
by Gemma Estrada, Donghyun Park, Innwon Park, and Soonchan Park

93. “Assessing the Resilience of ASEAN Banking Systems: The Case of the Philippines”
by Jose Ramon Albert and Thiam Hee Ng

94. “Strengthening the Financial System and Mobilizing Savings to Support More Balanced Growth in ASEAN+3”
by A. Noy Siackhachanh

95. ”Measuring Commodity-Level Trade Costs in Asia: The Basis for Effective Trade Facilitation Policies in the Region”
by Shintaro Hamanaka and Romana Domingo

96. “Why do Imports Fall More than Exports Especially During Crises? Evidence from Selected Asian Economies”
by Hsiao Chink Tang

97. “Determinants of Local Currency Bonds and Foreign Holdings: Implications for Bond Market Development in the People’s Republic of China”
by Kee-Hong Bae

98. “ASEAN–China Free Trade Area and the Competitiveness of Local Industries: A Case Study of Major Industries in the Lao People’s Democratic Republic”
by Leebeer Leebouapao, Sthabandith Insisienmay, and Vanthana Nolintha

99. “The Impact of ACFTA on People’s Republic of China-ASEAN Trade: Estimates Based on an Extended Gravity Model for Component Trade”
by Yu Sheng, Hsiao Chink Tang, and Xinpeng Xu

100. “Narrowing the Development Divide in ASEAN: The Role of Policy”
by Jayant Menon

101. "Different Types of Firms, Products, and Directions of Trade: The Case of the People's Republic of China"
by Hyun-Hoon Lee, Donghyun Park, and Jing Wang

102. "Anatomy of South–South FTAs in Asia: Comparisons with Africa, Latin America, and the Pacific Islands"
by Shintaro Hamanaka

103. "Japan's Education Services Imports: Branch Campus or Subsidiary Campus?"
by Shintaro Hamanaka

104. "A New Regime of SME Finance in Emerging Asia: Empowering Growth-Oriented SMEs to Build Resilient National Economies"
by Shigehiro Shinozaki

105. "Critical Review of East Asia – South America Trade "
by Shintaro Hamanaka and Aiken Tafgar

106. "The Threat of Financial Contagion to Emerging Asia's Local Bond Markets: Spillovers from Global Crises"
by Iwan J. Azis, Sabyasachi Mitra, Anthony Baluga, and Roselle Dime

107. "Hot Money Flows, Commodity Price Cycles, and Financial Repression in the US and the People's Republic of China: The Consequences of Near Zero US Interest Rates"
by Ronald McKinnon and Zhao Liu

108. "Cross-Regional Comparison of Trade Integration: The Case of Services"
by Shintaro Hamanaka

109. "Preferential and Non-Preferential Approaches to Trade Liberalization in East Asia: What Differences Do Utilization Rates and Reciprocity Make?"
by Jayant Menon

110. "Can Global Value Chains Effectively Serve Regional Economic Development in Asia?"
by Hans-Peter Brunner

111. "Exporting and Innovation: Theory and Firm-Level Evidence from the People's Republic of China"
by Faqin Lin and Hsiao Chink Tang

112. "Supporting the Growth and Spread of International Production Networks in Asia: How Can Trade Policy Help?"
by Jayant Menon

113. "On the Use of FTAs: A Review of Research Methodologies"
by Shintaro Hamanaka

114. "The People's Republic of China's Financial Policy and Regional Cooperation in the Midst of Global Headwinds"
by Iwan J. Azis

115. "The Role of International Trade in Employment Growth in Micro- and Small Enterprises: Evidence from Developing Asia"
by Jens Krüger

116. "Impact of Euro Zone Financial Shocks on Southeast Asian Economies"
by Jayant Menon and Thiam Hee Ng

117. "What is Economic Corridor Development and What Can It Achieve in Asia's Subregions?"
by Hans-Peter Brunner

118. "The Financial Role of East Asian Economies in Global Imbalances: An Econometric Assessment of Developments after the Global Financial Crisis"
by Hyun-Hoon Lee and Donghyun Park

119. "Learning by Exporting: Evidence from India"
by Apoorva Gupta, Ila Patnaik, and Ajay Shah

120. "FDI Technology Spillovers and Spatial Diffusion in the People's Republic of China"
by Mi Lin and Yum K. Kwan

121. "Capital Market Financing for SMEs: A Growing Need in Emerging Asia"
by Shigehiro Shinozaki

122. "Terms of Trade, Foreign Direct Investment, and Development: A Case of Intra-Asian Kicking Away the Ladder?"
by Konstantin M. Wacker, Philipp Grosskurth, and Tabea Lakemann

123. "Can Low Interest Rates be Harmful: An Assessment of the Bank Risk-Taking Channel in Asia"
by Arief Ramayandi, Umang Rawat, and Hsiao Chink Tang

124. "Explaining Foreign Holdings of Asia's Debt Securities"
by Charles Yuji Horioka, Takaaki Nomoto, and Akiko Terada-Hagiwara

125. "South Caucasus–People's Republic of China Bilateral Free Trade Agreements: Why It Matters"
by Hasmik Hovhanesian and Heghine Manasyan

126. "Enlargement of Economic Framework in Southeast Asia and Trade Flows in Lao PDR"
by Sithanonxay Suvannaphakdy, Hsiao Chink Tang, and Alisa DiCaprio

127. "The End of Grand Expectations: Monetary and Financial Integration After the Crisis in Europe"
by Heribert Dieter

128. "The Investment Version of the Asian Noodle Bowl: The Proliferation of International Investment Agreements (IIAs)"
by Julien Chaisse and Shintaro Hamanaka

129. "Why Do Countries Enter into Preferential Agreements on Trade in Services?: Assessing the Potential for Negotiated Regulatory Convergence in Asian Services Markets"
by Pierre Sauvé and Anirudh Shingal

130. "Analysis of Informal Obstacles to Cross-Border Economic Activity between Kazakhstan and Uzbekistan"
by Roman Vakulchuk and Farrrukh Irnazarov

131. "The Nexus between Anti-Dumping Petitions and Exports during the Global Financial Crisis: Evidence on the People's Republic of China"
by Faqin Lin, Hsiao Chink Tang, and Lin Wang

132. "Study of Non-Notified Trade Agreements to WTO: The Case of Asia-Pacific"
by Shintaro Hamanaka

133. "Equity Home Bias Financial Integration and Regulatory Reforms"
by Cyn-Young Park and Rogelio V. Mercado, Jr.

134. "Financial Monitoring in New ASEAN5 Countries"
by Se Hee Lim and Noel G. Reyes

135. "Has Regional Integration Led to Greater Risk-Sharing in Asia?"
by Thiam Hee Ng and Damaris Lee Yarcia

136. "How Capital Flows Affect Economy-Wide Vulnerability and Inequality: Flow-of-Funds Analysis of Selected Asian Economies"
by Iwan J. Azis and Damaris Yarcia

137. "The Progress of Paperless Trade in Asia and the Pacific: Enabling International Supply Chain Integration"
by Sung Heun Ha and Sang Won Lim

138. "World Trade Organization Agreement on Trade Facilitation: Assessing the Level of Ambition and Likely Impacts"
by Shintaro Hamanaka

139. "Business Cycle Synchronization in Asia: The Role of Financial and Trade Linkages"
by Yuwen Dai

140. "From Spaghetti Bowl to Jigsaw Puzzle? Addressing the Disarray in the World Trade System"
by Jayant Menon

141. "Trade Policy Challenges in a Small, Open, Fragile, Post-conflict Economy: Cambodia"
by Hal Hill and Jayant Menon

*These papers can be downloaded from
(ARIC) http://aric.adb.org/archives.php? section=0&subsection=workingpapers or
(ADB) http://www.adb.org/publications/series/regional-economic-integration-working-papers

Global Value-Chains and Connectivity in Developing Asia
- with application to the Central and West Asian region

The 21st century world economy is characterized by global value chains along which tasks are broken down and produced in different countries. Central and West Asia remain largely untouched by the phenomenon, because their economies are characterized by high costs of doing business and of crossing international borders. This paper analyzes why some Asian economies have flourished by participating in global value chains, and what the Central and West Asian countries need to do to take advantage of such opportunities.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to approximately two-thirds of the world's poor: 1.6 billion people who live on less than $2 a day, with 733 million struggling on less than $1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

ADB

ASIAN DEVELOPMENT BANK
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org
Publication Stock No. WPS146976-2

Printed in the Philippines