

Jongwanich, Juthathip; E. James, William; J. Minor, Peter; Greenbaum, Alexander

Working Paper

Trade Structure and the Transmission of Economic Distress in the High-Income OECD Countries to Developing Asia

ADB Economics Working Paper Series, No. 161

Provided in Cooperation with:

Asian Development Bank (ADB), Manila

Suggested Citation: Jongwanich, Juthathip; E. James, William; J. Minor, Peter; Greenbaum, Alexander (2009) : Trade Structure and the Transmission of Economic Distress in the High-Income OECD Countries to Developing Asia, ADB Economics Working Paper Series, No. 161, Asian Development Bank (ADB), Manila,
<https://hdl.handle.net/11540/1812>

This Version is available at:

<https://hdl.handle.net/10419/109340>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<http://creativecommons.org/licenses/by/3.0/igo>

ADB Economics Working Paper Series



Trade Structure and the Transmission of Economic Distress in the High-Income OECD Countries to Developing Asia

Juthathip Jongwanich, William E. James, Peter J. Minor,
and Alexander Greenbaum

No. 161 | May 2009



ADB Economics Working Paper Series No. 161

Trade Structure and the Transmission of Economic Distress in the High-Income OECD Countries to Developing Asia

**Juthathip Jongwanich, William E. James, Peter J. Minor,
and Alexander Greenbaum**

May 2009

Juthathip Jongwanich is Economist, William E. James is Principal Economist, and Peter J. Minor and Alexander Greenbaum are Consultants in the Macroeconomics and Finance Research Division, Economics and Research Department, Asian Development Bank (ADB). This report was prepared as a background paper for ADB's *Asian Development Outlook 2009*. The paper represents the view of the authors and does not represent those of ADB, its Executive Directors, or the countries they represent.

Asian Development Bank

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org/economics

©2008 by Asian Development Bank
May 2009
ISSN 1655-5252
Publication Stock No.:

The views expressed in this paper
are those of the author(s) and do not
necessarily reflect the views or policies
of the Asian Development Bank.

The ADB Economics Working Paper Series is a forum for stimulating discussion and eliciting feedback on ongoing and recently completed research and policy studies undertaken by the Asian Development Bank (ADB) staff, consultants, or resource persons. The series deals with key economic and development problems, particularly those facing the Asia and Pacific region; as well as conceptual, analytical, or methodological issues relating to project/program economic analysis, and statistical data and measurement. The series aims to enhance the knowledge on Asia's development and policy challenges; strengthen analytical rigor and quality of ADB's country partnership strategies, and its subregional and country operations; and improve the quality and availability of statistical data and development indicators for monitoring development effectiveness.

The ADB Economics Working Paper Series is a quick-disseminating, informal publication whose titles could subsequently be revised for publication as articles in professional journals or chapters in books. The series is maintained by the Economics and Research Department.

Contents

Abstract	v
I. Introduction	1
II. Structure and Direction of Developing Asia's Trade	3
A. Structure of Trade in Parts and Components	8
B. Direction of Trade in Parts and Components versus Final Goods	13
III. Factors Leading to Changes in Developing Asia's Trade Patterns	18
A. Fundamental Factors	18
B. The Role of the Real Exchange Rate	22
IV. Impacts of the Global Economic Slowdown on Developing Asia	25
V. Impacts of Proposed Fiscal Stimulus Packages on Developing Asia	31
VI. Impacts of the Protectionist Threat on Developing Asia	34
VII. Conclusions and Policy Inferences	38
Appendix: The Global Trade Analysis Program (GTAP)	40
References	42

Abstract

This paper examines the structure and direction of developing Asia's trade over the past two decades. The impacts on developing Asia of the economic slowdown in 2009–2010 in high-income countries of the Organization for Economic Cooperation and Development (OECD), which includes the European Union (EU), Japan, and United States (US) are projected through a computable general equilibrium model (CGE) of world trade and production. In addition, the impacts of fiscal stimulus and the rise of protectionist sentiments within developing Asia are examined. The expansion of intraregional trade in Asia reflects the role of the People's Republic of China (PRC) as an assembly point and its reliance on demand from outside the region, the EU and the US in particular. The trade channel is crucial in transmitting economic distress from the OECD countries to developing Asia. The projection shows that developing Asia will continue to suffer from demand decline in OECD countries, with the PRC and India being the most impacted. Though Southeast Asia faces reduced exports to the OECD countries, its exports are reduced significantly to other Asian exporters, demonstrating the indirect trade linkages that now exist in the global economy. Fiscal stimulus from the largest economies (including PRC, EU, Japan, and US) could help boost trade and gross domestic product growth in developing Asia but it is not projected to offset entirely the negative impact from the global economic downturn. Protectionism has a negative impact on the countries and regions that take that course. Southeast Asia would be the most impacted by protectionism. If Southeast Asian countries were to raise their applied tariffs to the maximum most-favored nation bound rates under the World Trade Organization, the impact would be negative on real gross domestic product. Heavy manufactures followed by light manufactures, electronics, and textiles are most impacted.

I. Introduction

The global economic slowdown is having pronounced adverse impacts on developing Asian economies. The slowdown stemmed from the United States (US) subprime mortgage crisis and rapidly spread to European countries and Japan. There are two key channels through which recession in the high-income Organization for Economic Cooperation and Development (OECD)¹ has been transmitted to developing Asia, namely the trade and financial channels (James et al. 2008). So far, the impacts on developing Asia have been felt primarily through the trade channel rather than through the meltdown of financial institutions. By the fourth quarter of 2008, exports in developing Asia had noticeably contracted. The drop of export growth averaged nearly 30% in East and Southeast Asia and approached double digits in South Asia. As a result, real gross domestic product (GDP) growth decelerated throughout the region while unemployment increased significantly, especially in East Asia.

As the crisis has deepened, governments in both developed and developing countries have authorized economic stimulus packages to counter the impacts of declining consumption and investment with increased government expenditures. The price tags on stimulus packages range from less than 1% of GDP to several percentage points of GDP in developed countries. These are far more circumspect in their magnitude in developing countries, with People's Republic of China (PRC), Malaysia, and Singapore leading the way in Asia. Stimulus packages could help offset the contraction in trade volumes in developing Asia as domestic demand increases in these countries, pulling in imports from neighboring countries.

In addition, there is a growing wave of protectionist actions as economies around the world suffer from lower economic growth rates and rising levels of unemployment. The US has included "buy America" provisions in its economic stimulus legislation. Meanwhile, developing economies from Asia to Africa have only reluctantly embraced lower tariffs in the last 10 years and protectionist sentiments are rising. For example, Indonesia

¹ The high-income OECD countries include advanced western European countries, defined here as EU-15 unless otherwise specified, as well as Japan and the United States (US). The members of the EU-15 include Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

has restricted the import of certain goods to just a few ports and airports, while India has increased tax rebates for exporters. Although protectionist moves are viewed by proponents as a means to boost employment in their own economies, they discount the fact that economies are now highly globalized and that the production of local goods depends heavily on global supply chains. For example, automobile manufacturers in Indonesia depend upon component parts from Japan, and apparel producers in Cambodia import most of their fabric and materials from the PRC. Since few economies have completely integrated domestic supply chains, protectionism perhaps threatens more than it promises in terms of higher prices for intermediate goods (parts and components).

To date, there are limited empirical studies to investigate impacts of the above issues on trade and growth prospects in developing Asia. In addition, most projections relating to these issues have been derived using macroeconomic models of consumption and investment. While these models are appropriate for broad economic predictions, especially in terms of the ways in which they model money and finance, they lack crucial information on global industry structure and trade—the exact mechanisms by which developing Asia is likely to be impacted by the current crisis.

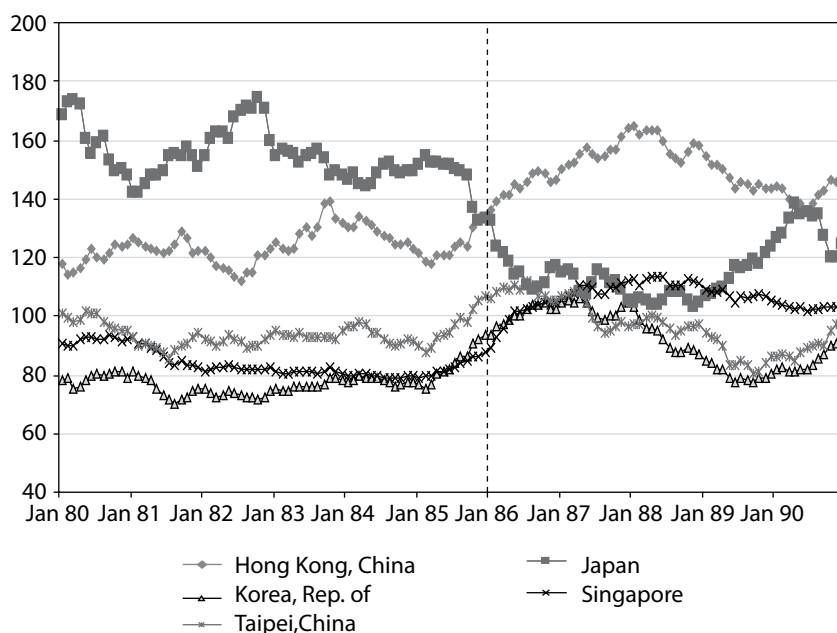
Thus, this study aims to examine impacts of OECD demand slowdown, fiscal stimulus packages from both OECD and developing countries, and a rise of protectionism on prospects of trade and real GDP growth in developing Asia in 2009–2010. A computable general equilibrium model (CGE) of world trade and production is employed instead of a macroeconomic model.² The next section of the paper discusses structure and direction of Asia's trade over the past two decades, particularly the increasing importance of global supply chains, to provide background information on how developing Asia has become more integrated and how the OECD markets are linked to developing Asia. This section also shows how the trade channel is crucial for developing Asia and how the slowdown in global demand is negatively affecting developing Asia, especially as a result of lower demand from OECD markets. Factors driving changes in trade structures through global supply chains are provided in Section III. Section IV examines impacts of the global economic slowdown, driven by the global financial crisis, on developing Asia. The impacts of fiscal stimulus packages are examined in Section V. In particular, we address the question, "What is the potential for fiscal stimulus packages in the largest economies (PRC, Europe, Japan, US) to impact trade and real GDP in developing Asian economies?" Section VI examines impacts of a rise in protectionist moves in developing Asia. The final section (Section VII) provides conclusions and policy inferences.

² The Global Trade Analysis Program (GTAP) based at Purdue University maintains a standard CGE model including global trade and production structures. The most current model is based on global trade, production, and prices in 2004. Since trade and production structure matter most in the following analysis, we updated the structure of trade shares to reflect a major shift in global textile and apparel trade precipitated by the elimination of global textile and apparel quotas in 2005.

II. Structure and Direction of Developing Asia's Trade

The emergence of Asian trade over the past four decades as the third hub of world trade next to Europe and North America has followed a distinctive pattern. Following Japan's export success in the 1950s and 1960s, the newly industrialized economies (NIEs), namely, Hong Kong, China; Republic of Korea (henceforth Korea); Singapore; and Taipei, China, began to enter export markets as Japan's industrial structure shifted away from labor-intensive to more sophisticated products. The 1985 Plaza Accord, which saw a sharp revaluation of the yen, also supported the NIEs in expanding their exports in the labor-intensive activities in which Japan was losing advantage (Figure 1). However, by the late 1980s, these economies were losing their edge in labor-intensive activities as a result of rising wage costs and attendant real currency appreciation. In addition, the imposition and gradual tightening of quantitative restrictions by industrial countries blunted penetration in textiles, garments, and footwear markets (Wells 1986).

Figure 1: Real Exchange Rates, 1980–1990



Note: An increase in the indexes reflects real depreciation (2000=100).

Source: Bank for International Settlements database, available: www.bis.org, downloaded 12 March 2009.

As profitability fell at home, producers from Japan and the NIEs began to move their production platforms to Southeast Asia. These countries were attractive to investors because of their relatively favorable macroeconomic conditions, trade, and investment policies. On the heels of direct inward investment, an export boom followed in labor-intensive manufacturing. At the same time, rapid advances in production technology

created the opportunity for investors to redesign production processes in ways that accentuated task specialization, i.e., splitting up fabrication and assembly processes and reducing production costs (Krugman 1995). This process occurred extensively in the electronics industry so that by the mid-1980s, Southeast Asian countries started exporting electronics and other more technologically sophisticated products. Later, in the early 1990s, the PRC emerged as a fast-growing exporter of labor-intensive manufacturers. Product lines “migrated” to the PRC from other countries in East and Southeast Asia, attracted by its large pool of cheap labor, rapidly improving infrastructure, and policies favoring exporters.

The evolution of trade patterns shows that rapid export growth in developing Asia has been underpinned by a pronounced shift in export structures away from primary commodities toward manufactures.³ Given the nature of their resource endowments, NIEs relied heavily on manufacturing for export expansion. Yet, beginning in the 1970s, a notable shift toward manufacturing has been observed across all countries at varying speed and intensity. Since the early 1990s, the share of manufactured exports to total exports in Southeast Asia (except in Indonesia and the Philippines) has exceeded 70%. In the Philippines, the share of manufactured exports to total exports increased significantly from 50% during 1991–1995 to more than 90% during 1996–2006. In Indonesia and Viet Nam, the share of manufactures in total exports is significantly lower at about 50%, reflecting both their comparative advantage, resource endowments, and their later adoption of export-oriented industrialization strategies.

Within manufacturing, machinery and transport equipment (SITC 7) has become the key export component in developing Asia. Table 1 shows that in 1992, the share of SITC 7 exports in total manufacturing exports in developing Asia was around 36%, and increased to 55% in 2006. Within SITC 7, information and communication technology (ICT) products (SITC 75, 76, 772, and 776) have been the most important, accounting for more than 70% of SITC 7 exports. The share of developing Asia in world ICT exports increased from 25% in 1992 to 50% in 2006 (Table 2). Electrical goods (SITC 77-772-776) comprise another major category of manufacturing exports. The level and the change over time of world market share in this product category among the developing Asian countries are strikingly similar to that of ICT products. The share of developing Asia in world electrical goods exports recorded an impressive increase to 36% in 2006, from 16% in 1992 (Table 2).

³ The evolution of exports (and trade patterns) in the region is traced using detailed trade data, specifically the United Nations Commodity Statistics Database (UNCOMTRADE), based on Revision 3 of the Standard International Trade Classification (SITC, Rev. 3), and Bureau of Foreign Trade for Taipei, China. It is important that the data are tabulated using importer country records, which are considered more accurate compared to the corresponding exporter records for analyzing trade patterns for a number of reasons (Ng and Yeats 2003, Feenstra et al. 2005, Athukorala and Kohpaiboon, 2008). Partner-country records are admittedly less susceptible to double counting and erroneous identification of the source/destination country in the presence of entrepot trade, compared to data based upon reporting country records (e.g., the PRC’s trade through Hong Kong, China). In addition, some countries fail to properly report goods shipped from their own export processing zones. These exports are simply lumped into “special transactions” (SITC 9). Unless otherwise specified, trade data shown in this paper refer to manufacturing trade.

**Table 1: Commodity Composition of Manufacturing Exports in Developing Asia
(percent of manufacturing exports)**

		Chemicals (SITC 5)	Resource Based Products (SITC 6)	Textiles	Machinery and Transport Equipment (SITC 7)	ICT Products	Electrical Products	Miscellaneous Manufacturing (SITC 8)	Footwear and Clothing
Developing Asia									
	1992	5.2	20.5	9.5	36.4	24.2	4.4	37.9	16.0
	2006	7.3	14.0	3.7	54.8	38.5	6.2	24.0	7.8
East Asia									
	1992	5.2	20.6	10.5	31.8	18.4	4.7	42.4	16.5
	2006	6.1	14.1	3.7	54.2	36.5	7.0	25.7	7.2
PRC									
	1992	4.2	16.6	9.2	19.4	10.3	4.6	59.7	24.4
	2006	3.9	13.9	3.7	51.5	36.5	7.4	30.7	9.5
Hong Kong, China									
	1992	6.1	20.9	13.2	30.7	19.4	4.5	42.3	21.3
	2006	4.5	15.4	4.6	45.3	34.2	6.2	34.8	15.2
Korea									
	1992	6.5	26.2	11.2	39.8	24.7	4.5	27.5	11.7
	2006	10.3	12.3	2.8	67.6	39.3	4.5	9.8	0.8
Taipei, China									
	1992	5.1	22.0	10.0	44.1	24.7	5.4	28.8	5.4
	2006	13.4	17.7	5.1	53.1	32.9	8.8	16.1	0.7
Southeast Asia									
	1992	5.1	14.3	3.5	56.2	45.2	4.4	24.5	10.8
	2006	10.0	8.8	1.6	66.0	53.1	4.4	15.1	4.9
Indonesia									
	1992	4.4	46.2	11.4	8.0	4.4	1.2	41.4	20.7
	2006	9.6	23.7	6.1	38.4	23.4	6.7	28.2	13.4
Malaysia									
	1992	3.6	10.4	2.0	67.7	57.3	4.3	18.3	9.4
	2006	5.9	6.8	0.8	77.8	70.2	3.5	9.6	2.3
Philippines									
	1992	3.4	7.3	1.8	45.7	37.4	6.3	43.6	25.8
	2006	1.4	3.2	0.6	85.1	74.9	6.4	10.3	4.9
Singapore									
	1992	7.8	5.6	0.9	75.1	60.5	5.2	11.5	3.1
	2006	21.3	3.6	0.3	67.0	55.1	2.8	8.1	0.3

continued.

Table 1: *continued.*

Thailand									
	1992	3.3	17.5	5.5	42.2	30.9	4.7	36.9	13.3
	2006	9.5	12.9	2.2	62.4	39.8	5.2	15.2	4.7
Viet Nam									
	1992	2.3	14.8	5.7	3.2	0.4	0.6	79.7	63.9
	2006	2.6	10.6	3.5	18.5	8.8	4.4	68.3	26.2
South									
	1992	4.9	48.2	25.2	5.3	0.9	0.6	41.6	33.2
	2006	13.4	38.1	14.2	12.3	2.1	2.2	36.2	26.5
India									
	1992	7.4	50.6	17.9	7.4	1.2	0.7	34.6	24.4
	2006	17.6	40.7	10.1	16.1	2.8	2.8	25.6	14.0
Sri Lanka									
	1992	1.4	20.2	4.9	3.1	1.5	1.1	75.3	67.6
	2006	1.4	20.4	2.7	7.0	1.5	2.0	71.2	65.8
Bangladesh									
	1992	1.9	18.0	11.5	3.9	0.2	0.2	76.2	74.4
	2006	1.4	8.7	6.1	1.1	0.2	0.1	88.8	87.0
Pakistan									
	1992	0.5	63.8	57.3	1.2	0.1	0.2	34.5	27.7
	2006	2.7	58.9	54.5	1.4	0.3	0.1	37.0	29.5
Nepal									
	1992	0.7	67.1	62.7	1.3	0.2	0.3	30.9	28.8
	2006	14.6	46.8	34.8	3.2	0.4	1.3	35.4	24.7

Note: The corresponding code of textiles is SITC 64; ICT products is SITC 75+76+772+776; Electrical products is SITC 77-772-776 and footwear and clothing is SITC 84+85.

Source: Compiled from UNCOMTRADE Database, downloaded October 2008.

Within developing Asia, the share of SITC 7 exports has increased significantly in East and Southeast Asia (Table 1). The share of SITC 7 in total manufacturing exports in these countries was more than 50% in 2006. In Malaysia and the Philippines, the share of this component in their manufacturing exports was about 80% in 2006 while it was around 70% in Korea and Singapore. Indonesia and Viet Nam, where SITC 7 accounted only for 38% and 18% of total manufacturing exports in 2006, were exceptions. In South Asia the share of SITC 7 showed an increasing trend, but accounted for just 12% of total manufacturing exports in 2006.

For ICT products, the key component in SITC 7 exports, East and Southeast Asia, account for more than 80% of the growth in developing Asian exports. In particular, in 2006, the PRC alone accounted for 24% of total world ICT exports, increasing from 3% in 1992, while exports from Malaysia and Korea accounted for 6–7% in 2006, respectively (Table 2). The share of the PRC in world electronic goods also increased noticeably from 4% in 1992 to 21% in 2006, while the shares of Korea and Taipei, China in world electronic goods were stable at around 4% apiece in 1992–2006. This trend reinforces

the view that international trade is facilitating industrialization and structural change in the region as these countries are evolving in line with the previously observed pattern of industrial development of developed countries such as Japan by moving into higher skill and technology exports.

SITC 7 has dwarfed the traditional labor-intensive manufacturing exports of textiles (SITC 64) and clothing (SITC 84) and footwear (SITC 85) in the mid-1980s. In 2006, the share of these products in developing Asia had declined to 11% of total manufacturing exports, from 25% in 1992 (Table 1). This pattern is found in almost all Asian countries, except Bangladesh and Pakistan. In Bangladesh, the share of these items accounted for 93% of total manufacturing exports in 2006, increasing from 86% in 1992 while in Pakistan, the share was relatively stable at around 84% during this period (Table 1). In India, Sri Lanka, and Viet Nam, although the share of these two items declined continuously, they still accounted for a high proportion of total manufacturing exports. In Sri Lanka, the share of these products was 68% of total manufacturing exports in 2006, down from 72% in 1992.

However, these labor-intensive products from developing Asia are still important in the world market. The share of developing Asia in total world clothing and footwear exports increased to almost 52% in 2006, from 41% in 1992 (Table 2). The PRC has accounted for much of this increase in world market share, but in contrast to ICT exports, the geographic participation has been broader. A number of low-income countries in Southeast and South Asia, including Bangladesh, India, Indonesia, Sri Lanka, and Viet Nam have all recorded impressive gains in the world market share of these products.

Table 2: World Export Shares of Selected Manufacturing Products (percent)

	Machinery and Transport (SITC 7)		ICT Products		Electrical Products		Textiles, Clothing and Footwear (SITC 64, 84, 85)	
	1992	2006	1992	2006	1992	2006	1992	2006
Developing Asia	11.9	29.1	25.2	50.5	16.5	35.8	40.7	52.4
PRC	1.6	13.7	2.8	23.9	4.4	21.4	13.9	30.0
Hong Kong, China	1.2	0.6	2.5	1.1	2.1	0.9	6.7	2.3
Korea	1.8	4.5	3.6	6.5	2.3	3.3	5.1	2.1
Taipei, China	2.6	2.2	4.6	3.4	3.5	4.0	4.4	2.1
Indonesia	0.1	0.5	0.1	0.7	0.1	0.9	1.6	2.1
Malaysia	1.4	2.7	3.8	5.9	1.0	1.3	1.2	0.9
Philippines	0.3	1.1	0.7	2.5	0.4	0.9	0.8	0.6
Singapore	2.1	1.9	5.5	3.8	1.7	0.8	0.6	0.1
Thailand	0.7	1.5	1.5	2.4	0.8	1.4	1.4	1.4
Viet Nam	0.0	0.1	0.0	0.1	0.0	0.3	0.1	1.4
India	0.1	0.3	0.0	0.1	0.1	0.5	2.2	3.7
Sri Lanka	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.7
Bangladesh	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.2
Pakistan	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.9
Nepal	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1

Source: Compiled from UNCOMTRADE Database, downloaded October 2008.

In terms of imports, the share of manufactures was around 80% of total imports in 1992–2000. SITC 7 accounted for the highest proportion of manufacturing imports and the share has increased continuously to 60% of total manufacturing imports in 2006 (Table 3). While the share of chemical products (SITC 5) has been relatively stable at around 15%, resource base (SITC 6) and miscellaneous manufacturing (SITC 8), particularly textiles (SITC64) and footwear and clothing (SITC 84 and 85), have become less important in manufacturing imports. Among SITC 7 imports, ICT products recorded a notable rise. The share of this product in developing Asia increased to 36% of total SITC 7 imports in 2006 from 20% in 1992. The significant rise of ICT products in import baskets is found in almost all Asian countries. Other than Bangladesh and Viet Nam, the rising importance of ICT and electronic goods has replaced imports of machinery, including both general (SITC 74) and specialized (SITC 72) industrial machinery.

Table 3: Commodity Composition of Manufacturing Imports in Developing Asia (percent)

	Developing Asia		East Asia		Southeast Asia		South Asia	
	1992	2006	1992	2006	1992	2006	1992	2006
Chemicals (SITC 5)	12.5	13.2	12.8	13.3	10.9	12.1	20.8	16.7
Resource based products (SITC 6)	21.6	14.8	22.7	13.6	18.1	13.9	30.6	27.6
Textiles	7.3	3.5	8.6	3.4	4.8	2.7	8.1	6.5
Machinery and transport equipment (SITC 7)	51.6	60.6	47.1	60.5	61.7	64.7	41.7	47.6
ICT products	20.6	35.9	18.3	37.4	27.7	38.0	6.5	16.0
Electrical products	4.2	5.4	4.3	5.8	4.3	5.0	3.1	3.5
Specialized industrial machinery	6.5	4.3	6.3	4.1	6.4	4.1	10.0	7.2
General industrial machinery	6.0	4.6	5.5	4.1	7.1	5.2	6.2	6.2
Miscellaneous manufacturing (SITC 8)	14.2	11.4	17.5	12.6	9.3	9.3	6.9	8.1
Apparel and footwear	2.9	1.5	4.3	1.8	0.9	1.1	0.4	0.5

Source: Compiled from UNCOMTRADE Database, downloaded October 2008.

A. Structure of Trade in Parts and Components

The ongoing process of global production sharing—in which developing Asia economies are increasingly integrated into international production networks (global supply chains)—lies behind Asia’s rapid growth in the trade of manufactured products such as machinery and transport equipment (SITC 7).⁴ The proportion of parts and components in developing Asia has increased continuously since the early 1990s. In terms of exports, it increased from 16% of total manufacturing exports in 1992 to 25% in 2006 (Table 4). Countries in East and Southeast Asia stand out in developing Asia for their

⁴ Parts and components are separable from final goods within the UNCOMTRADE at the 5-digit level of the SITC. The lists of parts and components are extended from Athukorala (2006). There are 269 items classified as parts and components in which 221 products are in SITC 7 and 59 products are in SITC 8.

heavy dependence on parts and components for export dynamism. The share of parts and components in total manufacturing exports of Southeast Asia increased to 40% in 2006, from 26% in 1992 while in East Asia, the share reached 26% in 2006, from 16% in 1992. In the Philippines, the share of parts and components doubled to almost 70% in 2006. Also, in the PRC, parts and components accounted for 19% of total manufacturing exports, rising from 4% in 1992. In Korea and Taipei, China, the relative importance of components in total manufacturing exports has increased, contradicting the popular belief that these economies had shifted palpably from assembly activities to final goods production. Parts and components exports are mostly concentrated in ICT products and electrical machinery.

In contrast, parts and components exports are limited in South Asia. Among these countries, India has great potential to benefit from this new form of international specialization, given its relatively low cost and trainable labor and its location in the region. However, India remains a tiny participant in global production networks. The share of parts and components in total manufacturing exports was only 7% in 2006, increasing from 3% in 1992. Sri Lanka also saw a small but notable increase in parts and components exports. The share of these products doubled to 4% in 2006. Apart from these two countries, the share of parts and components was very small, i.e., less than 1% in 2006. A number of supply-side factors such as quality and quantity of infrastructure, investment climate, including political instability in the region, could constrain the region's participation in the global production network.

Parts and components also are an increasing proportion of developing Asia's import basket (Table 4). The share of parts and components imports in manufacturing imports increased to 36% in 2006 from 22% in 1992, and more than 96% of parts and components imports are in SITC 7. Parts and components imports are limited in South Asia, compared to East and Southeast Asia. Parts and components imports in South Asia accounted for 17% of total manufacturing imports, and they were around 37% and 42% in East and Southeast Asia. The share of parts and components in the PRC rose from only 19% of total manufacturing imports in 1992 to 42% in 2006.

Table 4: Share of Parts and Components in Manufacturing Trade (percent)

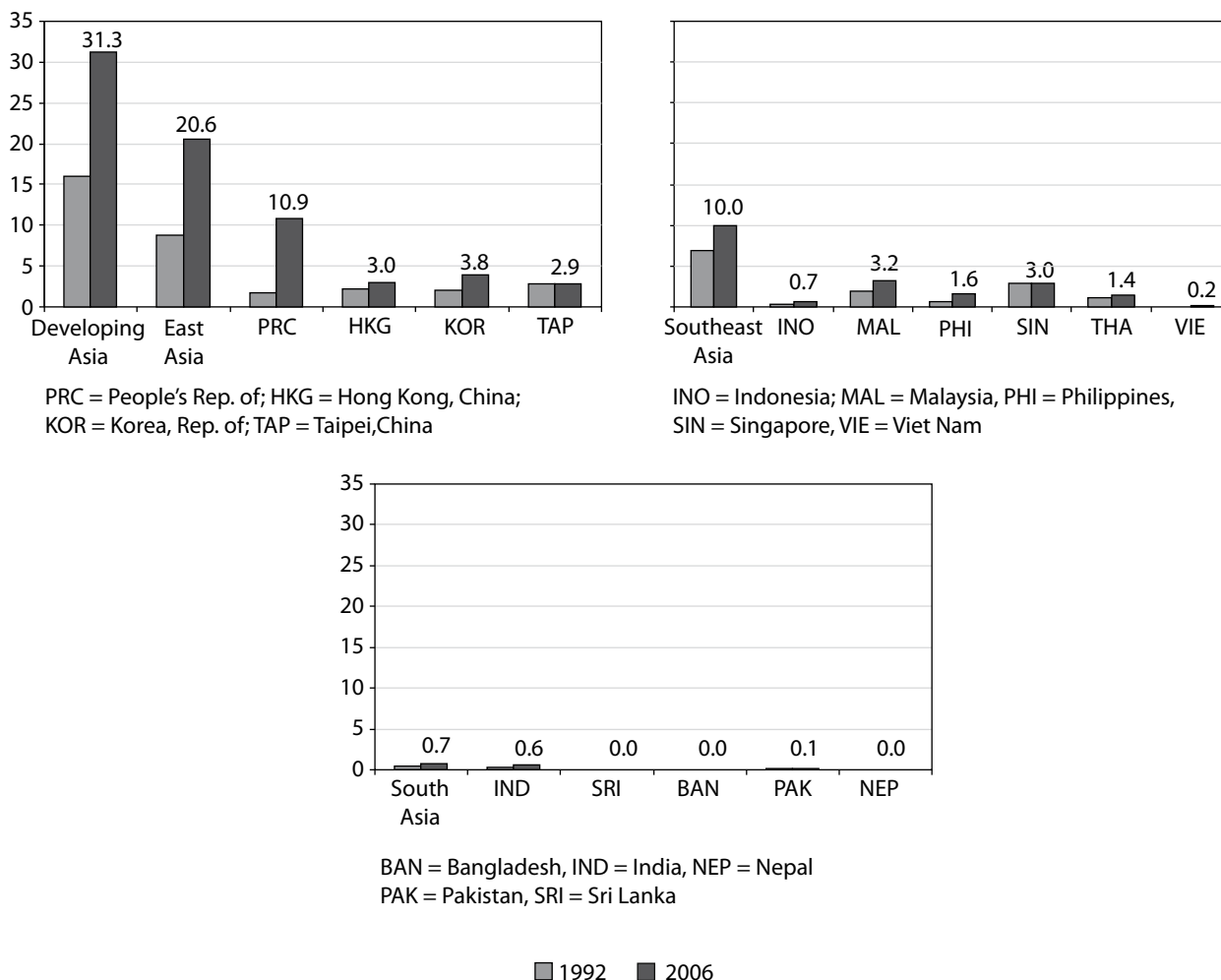
	Exports				Imports			
	Total P&C		ICT products		Total P&C		ICT products	
	1992	2006	1992	2006	1992	2006	1992	2006
Developing Asia	15.6	25.4	11.9	20.5	23.2	36.0	14.4	26.7
East Asia	13.0	22.7	9.1	17.6	19.8	36.5	11.8	28.0
PRC	4.3	18.5	2.4	14.1	18.6	41.5	7.8	30.6
Hong Kong, China	17.3	24.1	12.9	19.6	17.3	36.5	9.9	29.2
Korea	16.7	32.7	13.5	26.6	25.7	28.9	14.1	19.4
Taipei,China	19.8	32.6	11.9	24.7	25.7	33.5	18.0	27.1
Southeast Asia	25.9	40.2	22.2	35.5	31.9	42.1	22.2	30.9
Indonesia	3.0	18.2	1.4	11.1	20.6	28.4	6.2	13.6
Malaysia	32.9	46.7	30.1	44.1	38.2	49.9	28.7	40.8
Philippines	32.7	66.5	26.4	61.3	31.4	48.7	21.5	40.1
Singapore	31.3	42.3	26.8	38.1	35.8	43.5	27.6	32.4
Thailand	18.7	25.4	15.0	19.0	25.9	35.5	14.0	22.9
Viet Nam	0.8	8.4	0.3	3.1	7.1	16.3	2.3	7.4
South Asia	2.3	5.5	0.5	1.3	15.0	17.0	4.3	6.8
India	3.3	7.1	0.6	1.6	17.2	18.6	5.2	7.7
Sri Lanka	2.7	4.0	1.4	1.6	9.3	10.1	2.7	3.9
Bangladesh	0.2	0.8	0.1	0.1	7.4	10.6	2.1	5.1
Pakistan	0.4	0.7	0.1	0.2	15.6	16.0	3.9	4.7
Nepal	1.2	1.0	0.2	0.1	13.2	8.9	4.1	2.7

P&C = parts and components, ICT = information and communications technology.

Source: Compiled from UNCOMTRADE Database, downloaded October 2008.

Developing Asia's share in world trade in parts and components increased from 16% in 1992 to 31% in 2006 (Figure 2). This resulted from a significant increase in the share of developing East Asia, especially the PRC followed by Korea and Hong Kong, China. In Southeast Asia, all countries, except Singapore, have recorded increases in world market shares. In Singapore, the global production networks in high-tech industries have clearly shifted from standard assembly and testing activities to product design, capital- and technology-intensive tasks in the production process, and providing headquarter services. Some of these activities are not captured in the data on merchandise trade (Athukorala and Kohpaiboon 2008) thereby underestimating the share of Singapore's parts and components trade in the world market. In South Asia, although the share of parts and components in world trade rose, it was less than 1% of total world parts and components trade.

Figure 2: Share of Developing Asia’s Parts and Components in World Trade (percent)



Source: Compiled from UNCOMTRADE Database, downloaded October 2008.

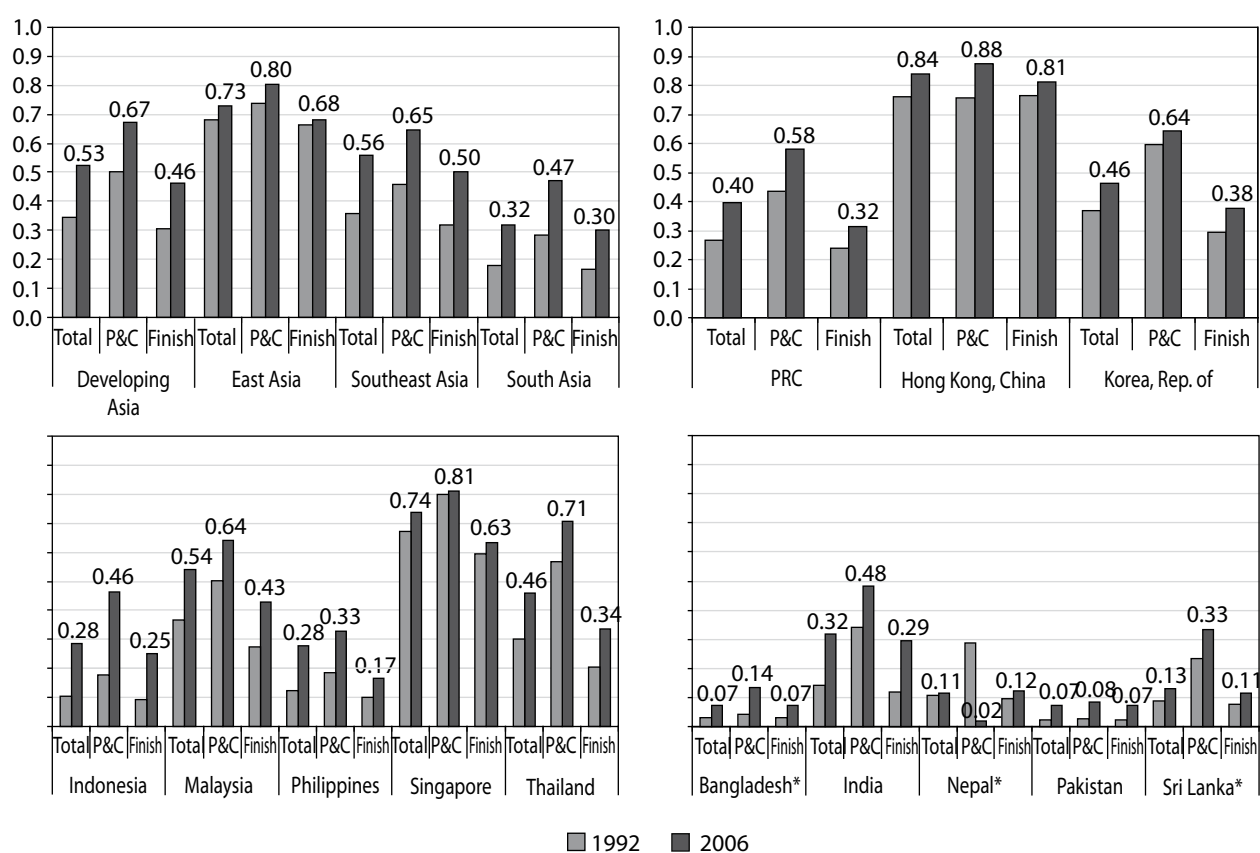
A comparison of the data on the share of parts and components in total exports and imports points to an important difference between the PRC and other developing Asian countries. In the PRC, parts and components account for a much larger share of imports compared to the share in exports. In other developing Asian countries the percentage share of parts and components exports tends to be higher than imports. These different patterns imply the increasingly important role played by the PRC as a final product assembler using parts and components procured from countries in the region, with Southeast Asian countries among them playing an increasingly important role.

In addition, the increasing importance of parts and components trade results in a rise of intra-industry trade—trade in which a country simultaneously imports and exports similar products, defined here as belonging to the same SITC 5 product group. Intra-industry

trade in developing Asia, measured by the Grubel-Lloyd index (see Box 1), has risen significantly over the past 15 years, from less than 0.35 in 1992 to more than 0.50 in 2006, and parts and components trade has contributed noticeably to the increase (Figure 3). Although intra-industry trade was more pronounced in East Asia, it sharply increased in Southeast Asia, particularly in Malaysia and Thailand.

Within East Asia, the most notable rise in intra-industry trade (IIT) was found in the PRC where the overall IIT index increased by 13 percentage points and the IIT index of parts and components rose by 14 percentage points. Intra-industry trade was less significant in South Asia, although the IIT index showed an increasing trend. Excluding India, the IIT index in this region was only around 0.10 in 2006. In India, the overall IIT index rose to 0.32 in 2006, from 0.14 in 1992. In contrast to other countries in East and Southeast Asia, finished products tended to contribute the most to the increase in intra-industry trade in South Asia.

Figure 3: Intra-industry Trade Index



P&C = parts and components, ICT = information and communications technology.

Note: Because of data limitation, the end period of Bangladesh, Nepal, and Sri Lanka is 2004, 2003, and 2005, respectively.

Source: Author estimates.

Box 1: The Grubel-Lloyd Index

Intra-industry trade is the value of exports of goods from an industry matched by the value of imports of goods to the same industry. The Grubel-Lloyd index is a common measure of intra-industry trade (Grubel and Lloyd 1975).

For a given industry i in an economy, let X_i denote the value of exports and M_i the value of imports at some point in time (t). The value of Intra-industry ($I_{i,t}$) is then as

$$I_{i,t} = (X_{i,t} + M_{i,t}) - |X_{i,t} - M_{i,t}| \quad (1)$$

The value of intra-industry trade in equation (1) is then normalized by total trade ($X_i + M_i$) to give

$$IIT = \left(1 - \frac{|X_{i,t} - M_{i,t}|}{(X_{i,t} + M_{i,t})} \right) \quad (2)$$

The index ranges between zero and one. If the country simultaneously imports and exports the same amount of products in industry i , $|X_{i,t} - M_{i,t}|$ is equal to zero and the index of intra-industry trade is equal to one, signifying pure intra-industry trade. By contrast, if the country only imports or exports products in industry i , $|X_{i,t} - M_{i,t}|$ is equal to total trade, $(X_{i,t} + M_{i,t})$, then the intra-industry trade index is equal to zero, signifying pure inter-industry trade.

B. Direction of Trade in Parts and Components versus Final Goods

The data on the direction of trade are generally consistent with the view that Asia has become increasingly integrated through merchandise trade (Table 5). The share of intraregional trade in total trade of developing Asia increased to 48% in 2005–2006, from 40% in 1994–1995. Intraregional trade was far higher than extraregional trade with North American Free Trade Agreement (NAFTA), EU-15, and Japan individually, where the share of manufacturing trade in total trade was 18%, 16%, and 13%, respectively, in 2005–2006. The increasing importance of intraregional trade mainly came from East and Southeast Asian countries. There are, however, notable differences in the degree of regional integration in exports and imports within Asian trade and all regional subgroups of countries, with export trade showing a lesser degree of regional integration than on the import side.

The decomposition of manufacturing trade into final products and parts and components shows that intraregional trade in Asia is mostly concentrated on parts and components trade. Compared to only an 8 percentage point increase in total manufacturing trade, the intraregional share of Asian parts and component trade rose by almost 20 percentage points, increasing to 62% in 2005–2006 (Table 6). The difference is consistently large across the subgroups of countries within the Asian region (except South Asia). In contrast to other countries, an increase in intraregional trade in the PRC came only from the import side while for the other countries, exports also contributed to the increase. While

the share of PRC's intraregional exports in parts and components has been relatively stable over the past decade, intraregional imports in parts and components rose to 73% in 2005–2006, from only 56% in 1994–1995. For other Asian countries, the PRC has become a key export destination of their parts and components. These differences in the geographic patterns of imports and exports also reflect the increasingly important role played by the PRC as a final product assembler for advanced country markets using components procured in countries within the region.

In contrast to other countries, the share of manufacturing exports from the PRC to developing Asia dropped noticeably during 1994–2006 while NAFTA and EU-15 have become increasingly important export markets. The share of NAFTA increased to 31% in 2005–2006 from 26% in 1994–1995, while that of the EU increased to 20% from 15% during the same period. In contrast to the PRC, for the other developing Asian countries, NAFTA and EU shares in manufacturing exports have declined. The PRC share in other Asian developing countries' manufacturing exports has risen but this is almost entirely due to parts and components exports. The geographic patterns of manufacturing and parts and components exports and imports confirm that the rise of the PRC as the final assembler has contributed to reliance on extraregional demand, especially for final products. The lower level of intraregional integration from the export side mentioned earlier also reflects the dependence of Asia on extraregional markets for export-led growth.

For labor-intensive products such as textiles and clothing, NAFTA and the EU-15 have become even more crucial as developing Asia's main export destinations (Table 7). In East Asia, NAFTA and EU-15 accounted for 42% of total textile and clothing exports in 2005–2006, increasing from 35% in 1994–1995. This increase was mainly due to an increase in exports from the PRC, where the share of exports to NAFTA and the EU-15 increased by 10 percentage points, reaching 42% of the PRC's total textile and clothing exports in 2000–2006. In Southeast Asia, more than 70% of total textile and clothing products were exported to NAFTA and the EU-15 in 2005–2006, up from 65% in 1994–1995. This reveals that any exogenous decline of developed countries' demand could significantly affect export performance of developing Asia, not only through technology-intensive products, which rely on extraregional demand for final products, but also through final demand for labor-intensive products.

Table 5: Direction of Developing Asia's Manufacturing Trade (percent)

	NAFTA	EU-15	Japan	Developing Asia	East Asia	PRC	Southeast Asia	South Asia
Developing Asia								
Exports								
1994-95	28.1	17.9	10.8	37.6	24.3	3.3	12.5	0.8
2005-06	25.8	18.5	8.4	38.4	26.6	11.3	10.2	1.5
Imports								
1994-95	13.8	17.1	26.8	43.0	28.5	7.1	13.6	0.9
2005-06	10.4	13.7	19.3	57.8	40.5	15.2	16.2	1.2
East Asia								
Exports								
1994-95	26.8	15.8	11.2	39.3	29.7	4.1	8.9	0.7
2005-06	26.8	18.0	8.8	37.1	28.5	11.7	7.3	1.3
Imports								
1994-95	14.2	15.6	27.0	45.0	36.6	10.0	7.7	0.7
2005-06	9.9	12.6	21.2	59.5	48.1	17.0	10.5	0.9
PRC								
Exports								
1994-95	26.1	15.2	12.9	41.5	37.4		3.5	0.5
2000-05	30.5	19.5	10.0	30.9	19.0		5.3	1.2
Imports								
1994-95	8.6	15.0	18.4	55.5	52.2		3.1	0.1
2000-05	8.1	14.2	18.7	64.3	55.0		8.7	0.6
Southeast Asia								
Exports								
1994-95	30.9	19.0	10.8	37.5	14.9	2.0	21.8	0.8
2005-06	22.4	17.1	8.5	46.6	24.6	12.0	20.1	1.8
Imports								
1994-95	13.9	16.1	28.8	42.1	18.1	2.8	23.3	0.7
2005-06	11.9	12.4	18.1	58.3	26.4	11.4	30.3	1.5
Exports								
1994-95	28.2	38.0	6.2	17.0	9.4	0.9	5.5	2.1
2005-06	28.4	31.6	1.9	17.6	9.7	3.5	5.3	2.5
Imports								
1994-95	9.4	39.6	11.9	28.6	15.6	4.7	9.5	3.5
2005-06	9.1	29.8	6.0	39.8	23.9	13.9	12.4	3.6

Note: NAFTA: The North American Free Trade Agreement comprises Canada, Mexico, and US.

EU-15 comprises Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Source: Compiled from UNCOMTRADE Database, downloaded October 2008.

Table 6: Direction of Developing Asia's Parts and Components Trade (percent)

	NAFTA	EU-15	Japan	Developing Asia	East Asia	PRC	Southeast Asia	South Asia
Developing Asia								
Exports								
1994-95	29.8	15.1	9.0	44.8	20.9	2.8	23.4	0.5
2005-06	17.4	12.6	8.7	59.3	40.6	18.9	17.8	0.9
Imports								
1994-95	18.1	12.6	31.4	41.5	22.6	2.3	18.7	0.2
2005-06	11.7	10.2	18.3	64.4	41.6	10.9	22.6	0.2
East Asia								
Exports								
1994-95	29.5	15.1	10.1	41.9	25.0	4.1	16.5	0.4
2005-06	18.1	11.9	9.2	57.9	44.0	20.3	13.1	0.8
Imports								
1994-95	18.0	12.6	32.8	41.8	31.2	3.7	10.5	0.1
2005-06	9.7	9.1	19.0	67.9	51.8	12.4	16.1	0.1
PRC								
Exports								
1994-95	22.5	14.2	11.2	50.7	42.7		7.2	0.8
2000-05	20.8	12.9	9.7	52.9	41.3		10.7	0.9
Imports								
1994-95	9.4	16.1	16.6	56.4	53.7		2.6	0.0
2000-05	6.3	10.1	16.1	72.7	62.1		10.5	0.1
Southeast Asia								
Exports								
1994-95	30.4	14.9	7.7	48.8	15.8	1.3	32.4	0.5
2005-06	16.1	13.3	7.8	62.8	35.6	16.8	26.2	1.0
Imports								
1994-95	18.3	11.1	30.8	42.4	15.2	0.9	27.0	0.2
2005-06	16.0	10.8	17.5	59.3	23.1	8.2	35.9	0.3
South Asia								
Exports								
1994-95	16.4	34.6	2.8	28.8	5.9	0.5	19.5	3.3
2005-06	24.0	32.9	3.7	18.7	6.9	4.1	9.8	1.9
Imports								
1994-95	16.4	39.1	18.0	21.5	9.9	3.8	10.5	1.1
2005-06	11.1	31.0	9.9	40.1	18.4	9.0	20.6	1.1

Source: Compiled from UNCOMTRADE Database, downloaded October 2008.

Table 7: Direction of Developing Asia's Textile Trade (percent)

	NAFTA	EU-15	Japan	Developing Asia	East Asia	PRC	Southeast Asia	South Asia
Developing Asia								
Exports								
1994–95	24.8	20.6	13.5	33.2	27.0	3.3	5.2	1.0
2005–06	27.9	23.9	10.6	25.4	19.6	4.4	4.2	1.5
Imports								
1994–95	13.8	17.1	26.8	43.0	28.5	7.1	13.6	0.9
2005–06	10.4	13.7	19.3	57.8	40.5	15.2	16.2	1.2
East Asia								
Exports								
1994–95	21.3	14.2	15.9	40.4	34.4	4.2	5.0	1.0
2005–06	22.4	19.3	13.7	31.8	25.8	5.5	4.5	1.5
Imports								
1994–95	14.2	15.6	27.0	45.0	36.6	10.0	7.7	0.7
2005–06	9.9	12.6	21.2	59.5	48.1	17.0	10.5	0.9
PRC								
Exports								
1994–95	16.8	14.0	22.8	40.1	37.7		2.0	0.3
2000–05	21.4	20.9	16.8	28.5	24.8		2.5	1.1
Imports								
1994–95	8.6	15.0	18.4	55.5	52.2		3.1	0.1
2000–05	8.1	14.2	18.7	64.3	55.0		8.7	0.6
Southeast Asia								
Exports								
1994–95	36.0	29.1	10.3	19.8	9.7	1.2	9.2	0.9
2005–06	46.3	23.9	6.3	14.6	6.5	2.0	6.5	1.5
Imports								
1994–95	13.9	16.1	28.8	42.1	18.1	2.8	23.3	0.7
2005–06	11.9	12.4	18.1	58.3	26.4	11.4	30.3	1.5
South Asia								
Exports								
1994–95	31.7	44.6	4.5	9.9	6.5	0.9	2.1	1.2
2005–06	35.7	43.3	1.2	7.5	4.8	1.8	1.2	1.5
Imports								
1994–95	1.8	6.5	4.0	86.1	54.6	10.3	16.3	15.2
2005–06	1.5	6.4	1.6	87.0	62.7	43.4	12.0	12.4

Source: Compiled from UNCOMTRADE Database, downloaded October 2008.

III. Factors Leading to Changes in Developing Asia's Trade Patterns

A. Fundamental Factors

The structural shift of trade toward machinery and transport equipment (SITC 7), particularly trade in parts and components, has been largely underpinned by three mutually reinforcing developments over the past few decades. The first factor is related to rapid advancement in production technology that has allowed companies to “unbundle” the stages of production into finer, portable components so that different tasks can be performed in different places. Second, technological innovations in transportation and communications have improved the speed, efficiency, and economy of coordinating geographically dispersed production processes. This has facilitated establishment of “service links” to combine various fragments of the production process in a timely and cost-efficient manner (Jones and Kierzkowski 2001). Third, liberalization policy reforms in both home and host countries have considerably lowered barriers to trade and investment (Athukorala 2006). Tariff and nontariff barriers in manufacturing have declined continuously over the past few decades, resulting in a reduction in costs of production, thus spurring manufacturing trade. Trade expansion helps attract foreign direct investment (FDI), especially efficiency-seeking FDI.⁵ Trade liberalization in the information communication and technology (ICT) industry has helped to reduce costs of production and spur trade in machinery and transport equipment (see Box 2 for detailed information of trade liberalization in the ICT industry). Under international product fragmentation, where production/assembly in each country is linked through vertically integrated production processes, even small reductions of tariffs significantly reduce production costs through the so called “magnification effects” (Yi 2003).

In terms of the ICT industry, two successful landmark agreements (see Box 2) have been completed in the World Trade Organization (WTO). First is the Information Technology Agreement (ITA), reached at the WTO's inaugural Ministerial gathering in December 1996 providing for the elimination of tariffs on a range of ICT products in both developed and developing member-countries. The decline in tariffs on ICT products in developed countries helps to stimulate extraregional demand for developing Asia. The ITA cut tariffs on computers in the EU and the US to 2% or less, and cut tariffs in East and Southeast Asia to less than 10% (Fliess and Sauv e 1997). Second is the agreement liberalizing the provision of basic telecommunication services within the General Agreement on Trade in Services. There is little doubt that ITA-related liberalization will serve to reinforce the procompetitive gains flowing from the ongoing deregulation in national telecommunications markets.

In addition to trade liberalization, reform of investment policy regimes contributed to a

⁵ This is referred to as the FDI-led export-oriented paradigm.

surge of establishment of multinational enterprises (MNEs) in developing Asia and a shift of trade patterns to machinery and transport equipment. The upsurge in FDI to developing countries in the 1990s was caused by the unilateral liberalization of their FDI policies and regulatory regimes (Brooks et al. 2004). Most countries offer incentives to attract FDI, especially efficiency-seeking FDI that helps to promote exports in developing countries. These often include tax concessions, tax holidays, tax credits, accelerated depreciation on plant and machinery and export subsidies and import entitlements. The investment promotion regimes may, in fact, influence investment location decisions only at the margin. More important to most potential investors is the overall investment climate in a country including: the size and expected growth rate of the market to be served, the long-term macroeconomic and political stability of the host country, the supply of skilled or trainable workers, and the presence of modern transportation and communication infrastructure. Once these criteria are satisfied, financial incentives may then influence investor choice at the margin.

It is noteworthy that the preeminence of East and Southeast Asia as locations of global production sharing, compared to other subregions and countries, is underpinned by the following additional factors. As the firstcomers in this area of international specialization, countries in these subregions tend to offer considerable agglomeration advantages for companies that are already located there (Athukorala and Kohpaiboon, 2008) Site selection decisions of MNEs operating in assembly activities are strongly influenced by the presence of other key market players in a given country or neighboring countries. Against the backdrop of a long period of successful operation in the region, many MNEs, particularly US-based MNEs, have significantly upgraded technical activities of production networks in the region and assigned global production responsibilities to affiliates located in these subregions. In other words, the Asian experience is consistent with the view that MNE affiliates have a tendency to become increasingly embedded in host countries the longer they are present there and the more conducive the overall investment climate of the host country becomes over time.

In addition, despite rapid growth, manufacturing wages in countries in these regions still remain lower than or comparable to those in the European periphery and Latin American countries. Significant differences in wages among the countries within these regions have provided the basis for rapid expansion of an intraregional production sharing system, giving rise to increased cross-border trade in parts and components. The emergence of the PRC as the prime low-cost assembly center of a wide range of electrical and electronics products has boosted component production and assembly activities in other Asian countries.

However, there are concerns that some incentives provided by governments could result in distortions favoring export markets over the domestic market or manufacturing over the services sector, or both. In fact, the objective of, for example, export processing zones is to promote manufacturing exports through MNE investment in order to directly provide

jobs and alleviate unemployment, and obtain foreign exchange earnings. In addition, such zones are aimed at providing indirect effects in terms of knowledge spillovers that can take place in many ways⁶ and backward linkages when companies begin to buy more inputs from host countries.

Both direct and indirect effects could further generate domestic consumption and investment in host countries. Nevertheless, some empirical studies (e.g., Furby 2005, Rondinelli 2006) show limited positive impacts from these zones since the zones primarily employ low-wage, unskilled workers; create employment that can only be maintained if demand for exports holds up; transfer little modern technology or know-how; and have weak links to domestic manufacturers. In addition, governments in many countries deliberately provide preferential tax treatment and other incentives to export-oriented manufacturers, limiting knowledge spillovers and backward linkages. Thus, benefits to host countries, especially in promoting domestic consumption and investment, are limited.

Box 2: The Information Technology Agreement and the Basic Telecommunication Service Agreement in the WTO

The Information Technology Agreement (ITA) had its genesis in late 1994 and early 1995 when the US-based Information Technology Industry Council (ITI), the European Association of Manufacturers of Business Machines and Information Technology Industry, and the Japanese Electronic Industry Development Association jointly developed recommendations for the G-7 Ministerial Conference on the Global Information Society that took place in February 1995. The complete elimination of customs duties on products that formed an essential basis for the realization of the Global Information Infrastructure had been negotiated in the conference. The initiative was taken up next by the “Quad” group of leading trading nations—Canada, EU, Japan, and US—that began to explore the potential content and modalities of an ITA in early 1996 to enlist other WTO members to join an agreement. The ITA became a central issue at the WTO’s first Ministerial meeting in Singapore on 9–13 December 1996 and was finalized in March 1997 in Geneva where the formal ITA had been launched. Under this accord, tariffs on most industrial ICT products would be eliminated and almost 40 countries, accounting for over 90% of world trade in the ICT sector, signed on. Tariff cuts started in July 1997 and were completed in four stages up to January 2000. The ICT product and country coverage are presented in Box Table 2.1. It is important to note that consumer electronics products—one of the three main segments of the electronics industry alongside industrial electronics equipment and electronic components and devices—are exempted. This means that more than 10% of total worldwide ICT production remains outside the scope of the ITA. Not surprisingly, Japan and other Asian members of the Asia-Pacific Economic Cooperation favored the inclusion of consumer electronics products, while the US and the EU prefer to exclude these products and focus instead on products in the industrial equipment and components segments.

continued.

⁶ For example, local firms may improve productivity by adopting technology from MNEs or through former employees who start their own factories.

Box 2: *continued.*

Box Table 2.1: Product and Country Coverage under the ITA

Main Products Covered by the ITA	Coverage
<ul style="list-style-type: none"> • Computers, e.g., supercomputers, mainframe computers, work stations, personal computers, laptops, computer peripheral devices • Telecommunication equipment, e.g., telephone sets, cordless phones, video phones, cellular phones, computer network equipment • Semiconductors, e.g., all semiconductors including memory chips, microprocessors • Semiconductor manufacturing equipment, e.g., vapor deposition apparatus, spin dryers, handling and transport apparatus. • Software, e.g., application-type software, multimedia software products, unrecorded floppy disks and other software media. • Scientific instruments and other products, e.g., measuring and checking devices, chromatographs, spectrometers, optical radiation devices, electrophorensic equipment, passive and active components (capacitors, resistors, certain electronics switches, certain connection devices, certain electric conductors), automatic teller machines (cash registers, calculators, electronic translator, digital still cameras and certain photocopiers) 	Albania; Australia; Bahrain; Bulgaria; Canada; PRC; Costa Rica; Croatia; Dominican Republic; Egypt; El Salvador; European Communities; Georgia; Guatemala; Honduras; Hong Kong, China; Iceland; India; Indonesia; Israel; Japan; Jordan; Korea; Kyrgyz Republic; Macao, China; Malaysia; Mauritius; Moldova; Morocco; New Zealand; Nicaragua; Norway; Oman; Panama; Philippines; Romania; Saudi Arabia; Singapore; Switzerland; Taipei, China; Thailand; Turkey; Ukraine; United Arab Emirates; United States; Viet Nam

Source: Fliess and Sauve (1997).

Telecommunication services can be divided into two categories, namely basic telecommunications and value-added services. The former includes all telecommunication services that involve end-to-end transmission of customer supplier information, e.g., voice telephone services, packet-switched data transmission services, telex services, mobile data services, teleconferencing, and satellite-based mobile services. Such basic telecommunication services are provided through cross-border supply and through establishment of foreign firms or commercial presence. The value-added telecommunication services are telecommunications for which suppliers “add value” to the customer’s information by enhancing its form or content or by providing for its storage and retrieval, e.g., online data processing, online database storage and retrieval, electronic data interchange, email and voice mail.

The telecommunications negotiations lasted from 1986 to 1997. Commitments in telecommunications services were first made during the Uruguay Round (1986–1994), mostly in value-added services. In 1994–1997, members negotiated on basic telecommunication services. On 15 February 1997, an agreement among 69 member countries was reached and on 5 February 1998, the Fourth Protocol entered into force. Since then, new commitments have been made either by new members upon accession or in a unilateral fashion by an existing member. The key market access and national treatment commitments and country coverage are summarized in Box Table 2.2.

continued.

Box 2: *continued.*

Box Table 2.2: Key Market Access and National Treatment Commitments and Country Coverage under the Telecommunication Services Agreement

Key Market Access and National Treatment Commitment	Country Coverage
<p>The key area of deregulation and liberalization in the telecommunication service agreement is as follows:</p> <ul style="list-style-type: none"> • Commitments to liberalize at least partially the provision of voice telephony, including international voice services, national long-distance services, and local services • Commitments on data transmission services • Commitments on leased lines • Commitments on cellular/mobile telephony services and other types of mobile services • Commitments on cellular/mobile telephony services and other types of mobile services • Commitments on mobile satellite services or transport capacity and on fixed satellite services • Commitments to permit foreign ownership or control of all telecommunications services and facilities. According to the US trade representative, liberalization of these countries accounted for 97% of total basic telecommunication services revenue of WTO members. 	<p>Antigua & Barbuda; Argentina; Australia; Bangladesh; Barbados; Belize; Bolivia; Brazil; Brunei Darussalam; Bulgaria; Canada; Chile; Colombia; Côte D'ivoire; Cyprus; Czech Republic; Dominica; Dominican Republic; Ecuador; El Salvador; European Communities; Ghana; Grenada; Guatemala; Hong Kong, China; Hungary; Iceland; India; Indonesia; Israel; Jamaica; Japan; Republic of Korea; Malaysia; Mauritius; Mexico; Morocco; New Zealand; Norway; Pakistan; Papua New Guinea; Peru; Philippines; Poland; Romania; Senegal; Singapore; Slovak Rep; South Africa; Sri Lanka; Suriname; Switzerland; Thailand; Trinidad & Tobago; Tunisia; Turkey; United States; Venezuela</p>
<p>Note: Some countries, notably India, South Africa, Turkey, Indonesia, Malaysia, Philippines, and Thailand retained a foreign investment limit while others such as Canada, France, Israel, Mexico, and Portugal left foreign investment limits on certain services. In addition, certain countries retained limits on foreign participation in the local incumbents, including Australia, Japan and New Zealand. Source: Bronckers and Larouche (2005).</p>	

B. The Role of the Real Exchange Rate

Movements of the real exchange rate (RER)⁷ have tended to play a minor role in influencing the structural shift of trade toward machinery and transport equipment (SITC 7). The importance of RERs seem to be diluted for machinery and transport equipment that contains a high proportion of parts and components trade (Jones and Kierzkowski 2001, Arndt and Huemer 2004, Athukorala 2004, Jongwanich 2009), since parts and components exports involve a high proportion of imported parts and components. The depreciation of a currency lowers the foreign currency price of exports but also increases the home currency prices of component imports.

⁷ The real exchange rate is a broad summary measure of the prices of one country relative to the prices of another country or group of countries, both expressed in a common currency. That is $RER = eP^*/P_d$, where e is the nominal exchange rate defined as a unit of home currency equivalent to a unit of a foreign currency, P^* denotes the foreign (world market) price level, and P is the domestic price level.

To the extent that import content costs rise, this will offset any expansion in demand induced by depreciation. In addition, it has been argued that international product fragmentation requires the establishment of “service links” in order to connect the various fragments of a production process in a seamless, rapid, and cost-efficient manner. Thus, the locational decisions of MNEs conducting assembly activities within an international production network are strongly influenced by the presence of other key variables such as infrastructure, logistic capabilities, availability of skilled workers, and modern technical and managerial skills as mentioned earlier. In these circumstances, RER changes are but one part of a far wider set of considerations about where to locate production facilities.

However, the RER by itself could still influence a country’s export and trade performance. RER appreciation deteriorates a country’s cost competitiveness, potentially reducing exports and the country’s trade surplus (or increasing the country’s trade deficit), especially for labor-intensive products. See Box 3 for the relationship between the RER and real exports.

All in all, the structure and direction of developing Asia’s trade shows that the trade channel can be effective in transmitting the slowdown of OECD countries to developing Asia. Although intra-industry trade has increased over the past two decades, its increase has been mainly contributed to parts and components trade. The PRC emerged as the assembly location for the final goods produced in developing Asia. The region still has to rely on extraregional demand, especially in the EU and the US, through its forward linkages to the PRC. To estimate the impacts of OECD demand contraction on developing Asia through the trade channel, a CGE model is applied in Section IV. While macroeconomic models are appropriate for projection of aggregate economic performance, especially the way in which they model money and finance, they lack a full complement of information on global industry and trade—the exact mechanisms through which developing Asia is likely to be hit by the current crisis. In addition to the global economic slowdown scenario, impacts of fiscal stimulus and a rise of protectionism are examined in Sections V and VI, respectively. Projections of trade and GDP growth in 2009–2010 are provided in these three sections.

Box 3: Exports and the Real Exchange Rate in East and Southeast Asia

This box shows the relationship between the RER and real exports in eight East and Southeast Asian countries, namely PRC; Korea; Malaysia; Philippines; Singapore; Taipei,China; and Thailand. To emphasize the increasing importance of parts and components trade, export equations are estimated for three different export categories—total merchandise exports, manufacturing exports, and exports of machinery and transport equipment (SITC 7). The analysis is based on data during 1993–2008, a period over which parts and components trade burgeoned.

To examine the role of the RER, “reduced form” export equations derived from both demand for and supply of exports are estimated for total merchandise, total manufacturing, and SITC 7 exports. According to this reduced form, real exports are set as a function of the RER, world demand, production capacity and FDI. Under the different order of integration, the fashionable cointegration econometric procedures, such as the two-step residual-based procedure adopted by Engle-Granger (1987), and the system-based reduced rank regression approach due to Johansen (1988) for modeling nonstationary data are inappropriate. The econometric analysis in this study is based on the General to Specific Model procedure (Wickens and Breusch 1988, Hendry 1995).

In general, the long-run RER coefficients of machinery and transport equipment (SITC 7) exports are the lowest (or insignificant) while the coefficients of total merchandise exports are the highest, with those of manufacturing exports coming in between. These results indicate that exports of manufactured final products, especially labor-intensive products, are more responsive to changes in the RER than are exports of SITC 7 products, which have to rely to a greater extent on imported parts and components. RER coefficients vary across the eight economies. In general, the RER has the least impact on the Philippines's exports while the impact is the greatest in Indonesia. In the Philippines, the long-run coefficients of the RER in all three categories are statistically insignificant while in the short run, the coefficients are equal to 0.2 for total merchandise exports. In the case of Indonesia, by contrast, they are greater than one in total merchandise and manufacturing exports (both in the short and long run) and less than one in SITC 7 exports, i.e., 0.72 in the short run and 0.97 in the long run. This is consistent with the fact that exports and imports in the Philippines have been dominated by parts and components over the past decade. In contrast, Indonesia has much greater product diversification in its export basket.

The coefficient on manufacturing export volume with respect to changes in the RER in Korea; Singapore; and Taipei,China are all relatively low in both the short and long run. In the long run, the RER coefficient corresponding to SITC 7 in these economies is insignificantly different from zero. In the short run, it is statistically insignificant in the case of Korea and Taipei,China while it is around 0.5 in Singapore. In addition to the high degree to which parts and components are represented in the export basket, RER coefficients will also be influenced by the technological sophistication and complexity of exports. More advanced and sophisticated products may offer fewer opportunities for substitution, resulting in the lower response of exports to changes in the RER. In Malaysia and Thailand, the long-run RER coefficients of total exports are comparatively high. This may reflect a more diversified export structure.

continued.

Box 3: *continued.*

Box Table 3.1: RER Coefficients in Eight East and Southeast Asian Countries

	Short-run Coefficient			Long-run Coefficient		
	Total Merchandise (TE)	Manufacturing (ME)	SITC 7 (SITC7)	Total Merchandise (TE)	Manufacturing (ME)	SITC 7 (SITC 7)
PRC	0.60*	0.69*	0.61*	0.50**	0.50**	-
Indonesia	1.17*	1.44**	0.72*	4.52*	2.15*	0.97*
Malaysia	0.64*	0.65*	0.48*	1.48*	1.37*	1.06*
Philippines	0.20**	n.a.	n.a.	n.a.	n.a.	n.a.
Korea	1.12*	n.a.	n.a.	1.17*	0.14***	n.a.
Singapore	n.a.	0.89(-2)***	0.53 (-2)**	n.a.	n.a.	n.a.
Thailand	0.34*	0.18*	0.14*	0.70*	0.39***	n.a.
Taipei,China	0.38 (-3)**	0.33 (-3)***	n.a.	n.a.	n.a.	n.a.

* Significant at the 5% level; ** significant at the 10% level; *** significant at the 15% level.
 Note: The values in the parentheses show the lag period of the significance. See details of export equations in Jongwanich (2009).

IV. Impacts of the Global Economic Slowdown on Developing Asia

This section examines impacts of the global economic slowdown, driven by the unfolding global financial crisis, on developing Asian countries. Table 8 provides baseline assumptions of real GDP growth (or contraction) of OECD countries in 2009 and 2010 based on macroeconomic projections contained in the *Asian Development Outlook 2009* (ADB 2009). The consensus in the *Outlook* is of a deepening of the crisis through 2009 with recovery taking hold in 2010. The projected GDP growth in these countries is lower than the average growth rate for the 5-year period 2002–2007.⁸ In order to simplify the analysis, all industries used in the Global Trade Analysis Program (GTAP) are aggregated into 11 groups and the world is split into 13 country groupings. A summary of these groupings can be found in Table 9. Details of the GTAP model are provided in the Appendix.

OECD countries import heavily from Asia. Based on GTAP model simulations, it is projected that had the global financial crisis not taken hold, OECD countries would have generated annual GDP growth in Asia between 2.3% and 4.0% through demand for

⁸ We note that the financial crisis affected GDP growth estimates as early as February 2007 when HSBC's mortgage unit issued a staggering writedown of subprime mortgage assets valued at over US\$10 billion. By the end of 2007, over 100 mortgage banks in the US had filed for bankruptcy and the chief executive officers of Citigroup and Merrill Lynch resigned after massive writedowns. At the same time, the commodities bubble swelled as investors sought safety in these assets. Although the depths of the crisis were not felt on main street until 2008, GDP forecasts were already being downgraded for 2009 and 2010 as of early 2007.

Asian imports in the OECD in 2009 and 2010. We call this the potential growth baseline (see Table 10, columns A and B). The PRC and India would have been the biggest beneficiaries of trade with the high-income markets, but other developing Asia, South Asia, and Southeast Asia, which also rely on OECD countries' consumption to boost their GDP, would have also experienced significant positive impacts. As a result of the global financial crisis, for 2009, the contraction of OECD GDP is projected to lower GDP growth in Asian countries by between 2.8% and 4.1% in 2009 (Table 10, column C). Projections for 2010 are positive (Table 10, column D), but are still significantly below the potential growth baseline. It is important to note that these estimates are not based on a country by country evaluation of financial and political conditions but rather they are the result of linkages revealed in trade flows. Many countries will experience impacts resulting from the crisis, depending on factors such as total debt, political stability, and fiscal and monetary policies of the country being considered. Estimates in Table 10 are those that would be experienced primarily through trade channels, all other conditions held constant.⁹

Table 8: Projected GDP Estimates for OECD Countries, 2009 and 2010

Country Region	Baseline Average 2002–2007	2009	2010
North America OECD	3.0	–2.4	1.6
European OECD	1.8	–2.6	0.5
Japan	2.2	–3.5	1.1

Source: ADB (2009).

The final column in Table 10 (column G) provides the real impacts of the financial crisis and recession in the OECD on GDP growth of developing Asian economies. By the end of 2010, most Asian economies are projected to have real GDP levels that are between 6.3% and 10.2% lower than if the financial crisis had not occurred. The PRC and India will be impacted most heavily by the end of 2010 with their real GDP reduced by 9.0% and 10.2%, respectively from their baseline potential. Although the PRC and India are similarly impacted, the source and structure of impacts are different. The impacts on India result from its export relationship with the EU, where EU exports make up a high percentage of total exports. The impacts on the PRC, on the other hand, arise principally from its reliance on the United States as an export market. Furthermore, the impacts on India are transmitted largely through a mix of exports of services, manufactures, and agricultural products while the impacts on the PRC are transmitted principally through the export of manufactured products (Table 11). In contrast to the PRC where its exports rely on imported components for a third of their value, India's supply chains are reliant on domestic sources for components and materials. The impact on India's GDP is, therefore, marginally worse than the impact on the PRC's GDP (Table 10).

⁹ The model has been modified to reduce shifts in investment between countries to a minimum, but not all investment effects can be eliminated as the model requires a complete accounting of savings and investment. Additionally, for the short-run projections, most factor prices are held constant, in contrast to medium- and longer-run models (2–3 year projections) where factor prices are considered flexible.

Table 9: Sectors and Regions

Sectors	Countries/Regions
Agriculture	Asia
Raw Agricultural Products	Japan (OECD)
Processed Food	PRC
Nonagricultural Products (NAMA)	East Asia (Hong Kong, China; Republic of Korea; Macau, Mongolia; North Korea; Taipei,China)
Mining and Extractive Industries	Singapore
Textiles and Clothing	Malaysia
Motor Vehicles, Parts, and other Transport Equipment	South East Asia (Brunei Darussalam, Cambodia, Indonesia, Lao, Myanmar, Philippines, Thailand, Timor-Leste, Viet Nam)
Light Manufacturing	India
Electronics	Other South Asia (Bangladesh, Bhutan, Nepal, Sri Lanka, Rest of South Asia)
Heavy Manufacturing	Other Developing Asia (Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Georgia, Oceania, Pakistan, Other Asia)
Services	Non-Asia
Amenities and Communications Services	Oceania (Australia, New Zealand)
Recreation Services	North America (Canada, México, US) — OECD
Other Services	Europe OECD (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, United Kingdom, Switzerland, Norway, Turkey) Rest of World

Source: The GTAP Model and database.

Table 10: Impacts of High-Income OECD Countries Growth on Asia (percent of Real GDP)

Country/Region	Potential Contribution of OECD Countries to Growth (potential growth baseline) ¹		Projections (%) ²		GDP GAP (%) ³		
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	2009	2010	2009	2010	2009	2010	Cummulative Gap in GDP (%) ³
PRC	3.5	3.5	-3.9	1.4	-7.1	-2.0	-9.0
Other Developing Asia	2.3	2.3	-2.8	0.9	-4.9	-1.4	-6.3
East Asia	3.3	3.4	-3.8	1.4	-6.9	-1.9	-8.7
India	4.0	4.0	-4.1	1.3	-7.8	-2.6	-10.2
Malaysia	3.0	3.0	-3.4	1.2	-6.2	-1.8	-7.9
Singapore	2.8	2.9	-3.3	1.1	-6.0	-1.7	-7.6
South Asia	3.3	3.4	-3.6	1.2	-6.7	-2.2	-8.8
South East Asia	2.9	3.0	-3.4	1.2	-6.2	-1.7	-7.8

¹ The potential contribution to growth is estimated from historical growth and assumes the financial crisis had not occurred (see Table 8).

² Projected GDP is the impact on Asian countries of lower growth in the OECD countries: actual growth may be greater or less depending on the policies of individual countries, such as fiscal stimulus or protectionism.

³ The GDP gap is the difference between potential or precrisis growth and current projections. Cumulative growth is the loss in real economic output for the 2- year period when compared with the historical (baseline) growth in the OECD countries. Cumulative numbers are not the simple addition of the two years, but reflect compounding.

Source: Estimates based on data in table 9 projected using the GTAP model and database.

Table 11 illustrates projected changes in real exports, by region and commodity. The simulation results project a drop in exports in all commodities, underscoring the trade linkages between OECD countries and Asia. Impacts of export reduction differ across commodities; basic agricultural goods (necessary goods) being least impacted, as opposed to luxury or normal goods such as electronics and heavy manufacturing being impacted severely. In absolute terms, exports of agriculture products for developing Asia drop by US\$1.4 billion, compared to over US\$20.7 billion for electronics and heavy manufacturing. The next largest projected impacts are for light manufactures and textiles, apparel, and leather products, each with Asian export declines of between US\$8.1 billion to US\$9.2 billion.

In absolute terms, the PRC's exports are projected to be impacted most negatively due to lower economic growth in OECD countries, with a projected drop of over US\$27.7 billion in exports to the world. The PRC is followed by East Asia with a loss of exports of US\$24.3 billion and Southeast Asia (excluding Malaysia and Singapore) of over US\$11.2 billion in exports.

As was mentioned earlier, international trade has evolved into complex global supply chains, with many interdependent countries and regions and industries. Table 12 illustrates these linkages: exporting countries or regions are shown as row headings on the left, and importing regions are shown in columns along the top. Column D shows the total decline in exports. Columns A, B, and C show the total exports to East and Southeast Asia, South and Central Asia, and the OECD countries, respectively. Over two thirds of the PRC's export declines are directly attributable to the decline in demand in the OECD countries for imports from the PRC (column C/D). Though we also project a decline in the demand for East Asian and Southeast Asian exports, the major source of the decline is different from that of the PRC. The majority of the trade impacts of the financial crisis are channeled indirectly through third countries, most notably the PRC, demonstrating the strong regional trade linkages between the PRC and the rest of East and Southeast Asia.

In contrast, South Asia and India have much weaker regional trade linkages. The majority of impacts for South Asia and India are projected to be channeled through direct drops in demand by OECD countries, much in the same way that the PRC's exports are projected to be impacted. However, in contrast to the PRC, these regions do not import enough intermediate goods to drive strong knock-on effects to other regions. There are benefits and costs to this structure. While South Asia and India likely retain most of the gains from trade and value-added to their exports to OECD countries, it also means they are likely to experience more of the direct impacts of a reduction in OECD demand for their exports as lower demand for exports is transmitted more strongly through the local supply chains.

Table 1: Projected 2009 Change in Real Exports by Region and Commodity
(millions of US dollars, 2004 prices and percent change)

	Australia/ New Zealand	PRC	Other Developing Asia	East Asia	India	Malaysia	Singapore	South Asia	Southeast Asia	Total*
Agriculture	-365 (-1.7)	-233 (-2.0)	-56 (-1.1)	-57 (-2.5)	-341 (-5.4)	-17 (-1.6)	-12 (-2.3)	-42 (-3.2)	-347 (-2.3)	-1,470
Electronics	-48	-7,018	-4	-6,683	-34	-2,578	-1,799	-2	-2,535	-20,700
Extraction	(-2.9)	(-3.8)	(-3.2)	(-3.7)	(-3.1)	(-3.4)	(-3.3)	(-3.6)	(-3.5)	
	-709	-516	-702	-336	-302	-356	-328	-7	-1,094	-4,351
	(-2.6)	(-2.9)	(-2.6)	(-3.3)	(-3.2)	(-3.1)	(-3.3)	(-1.4)	(-3.4)	
Heavy Manufacturing	-1,024	-7,774	-344	-7,594	-870	-1,136	-1,478	-68	-2,588	-22,874
	(-3.1)	(-4.1)	(-3.3)	(-3.9)	(-3.4)	(-3.6)	(-3.4)	(-4.0)	(-3.7)	
Light Manufacturing	-216	-4,984	-63	-1,235	-622	-424	-171	-47	-1,405	-9,166
	(-2.9)	(-4.0)	(-3.3)	(-3.7)	(-3.0)	(-3.5)	(-3.3)	(-4.3)	(-3.6)	
Motor and Transport Equipment	-143	-1,003	-38	-1,912	-105	-80	-111	-6	-420	-3,818
	(-3.1)	(-4.0)	(-3.3)	(-3.7)	(-3.2)	(-3.6)	(-3.4)	(-3.9)	(-3.7)	
Other Services	-326	-435	-126	-1,440	-410	-115	-618	-61	-237	-3,768
	(-3.2)	(-3.8)	(-3.3)	(-3.6)	(-3.1)	(-3.5)	(-3.3)	(-3.7)	(-3.1)	
Processed Foods	-339	-628	-80	-189	-117	-306	-78	-53	-818	-2,609
	(-2.4)	(-4.0)	(-3.0)	(-3.5)	(-2.8)	(-3.2)	(-2.7)	(-4.4)	(-3.6)	
Textile, Apparel, Leather	-61	-3,895	-328	-1,711	-449	-101	-50	-473	-1,043	-8,110
	(-2.4)	(-3.6)	(-2.9)	(-3.4)	(-2.6)	(-3.1)	(-2.8)	(-3.8)	(-3.4)	
Transport and Construction	-553	-1,111	-183	-3,008	-151	-187	-443	-75	-636	-6,346
	(-3.1)	(-3.6)	(-3.3)	(-3.5)	(-3.1)	(-3.2)	(-3.2)	(-4.0)	(-3.4)	
Travel, Recreation and Tourism	-107	-127	-8	-156	-10	-76	-20	-8	-91	-602
	(-3.2)	(-3.9)	(-2.4)	(-3.8)	(-3.3)	(-3.5)	(-3.2)	(-4.6)	(-3.7)	
Total	-3,889	-27,725	-1,932	-24,320	-3,411	-5,375	-5,107	-843	-11,212	-83,814
	(-2.7)	(-3.8)	(-2.8)	(-3.7)	(-3.2)	(-3.4)	(-3.3)	(-3.8)	(-3.5)	

*Totals are for countries and regions listed and differs from the global total.

Note: Numbers in parentheses show declines of exports in terms of percentage changes.

Source: Authors' estimates from GTAP model.

Table 12: Regional Trade Volume Impacts 2009 (millions of constant 2004 dollars)

Exporter	Importer											(D) Total	
	East And Southeast Asia					South Asia and Central Asia					(C) High Income OECD		
	PRC	East Asia	Southeast Asia	Singapore	Malaysia	(A) Total East and Southeast Asia	India	South Asia	Other Developing Asia	(B) Total South and Central Asia			
PRC	-	-2,858	-1,079	-517	-383	-4,837	-299	-104	-211	-613	-17,841	-2,849	-26,140
East Asia	-7,083	-1,642	-1,143	-531	-428	-10,827	-262	-84	-116	-462	-10,014	-2,252	-23,554
Southeast Asia	-1,255	-1,007	-658	-593	-444	-3,957	-134	-50	-50	-234	-5,301	-976	-10,468
Singapore	-622	-521	-728	-	-448	-2,319	-113	-44	-47	-204	-2,008	-435	-4,966
Malaysia	-876	-413	-411	-540	-	-2,240	-110	-26	-30	-166	-2,269	-474	-5,148
India	-249	-206	-183	-95	-60	-794	-	-168	-37	-206	-2,513	-1,031	-4,543
South Asia	-7	-17	-9	-9	-2	-44	-46	-6	-7	-59	-600	-73	-776
Other													
Developing Asia	-107	-60	-36	-8	-6	-217	-13	-35	-78	-125	-892	-580	-1,814

Note: When a region is listed as exporting or importing from itself, the values represent intraregional trade among countries in the given region.
Source: Authors' estimates derived from GTAP model.

V. Impacts of Proposed Fiscal Stimulus Packages on Developing Asia

As the global financial crisis has deepened, governments around the world have responded by announcing large fiscal stimulus packages to counter decreases in demand. The goal of these programs is to increase local demand for goods and services and put people and capital back to work and back on track for long-term growth. To support these programs, governments either have to be able to raise large sums of money or they have to have large reserves to call on. At the same time, fiscal packages have to be substantial to maintain the credibility of having the potential to broadly impact the economy. Table 13 lists four of the largest country/region stimulus packages as a percentage of GDP: Japan, PRC, North America, and European OECD, respectively. Numerous sources were called upon in compiling these estimates. Where possible, we used actual government estimates; however, it was often imperative to use other sources such as financial analysts' estimates of "double counting" provided by the Institute for International Finance (IIF 2008) and news reports to try and verify that those numbers are correct and current. Unfortunately, verification was not always possible. We then used the estimates in Table 13 to shock the GTAP model to project the impacts of proposed fiscal stimulus packages on developing Asia's real GDP growth and trade.

Table 13: Fiscal Stimulus Packages, Percent GDP Estimates for Japan, PRC, North America, and OECD Europe, 2009 and 2010

Country/Region	2009	2010
Japan	1.0	0.9
PRC	6.1	5.5
North America OECD*	1.9	2.1
European OECD	0.9	0.2

*Analysis of US fiscal stimulus package by year can be found in the Congressional Budget Office Letter to the Speaker of the House of Representatives on the Investment and Economic Recovery Act of 2009, 13 February 2009. Available: cbo.gov/doc/cfm?index=9989. Twenty-five percent of the US fiscal package will be expended in 2009. This estimate does not include US programs to assist banks and insurers dispose of subprime assets from balance sheets.

Note: GDP estimates based on IMF World Economic Outlook Database October 2008 projections for 2009 and 2010.

Source: Authors' estimates.

Table 14 illustrates the impacts on developing Asia's economies of the fiscal stimulus in the four countries/regions above. For convenience, columns A and B have been carried over from Table 10. These columns show the projected impacts on growth from reduced demand in the OECD resulting from the crisis. Columns C and D show the impacts of the fiscal stimulus packages on Asian growth. Finally, columns E and F show the gap between projected GDP impacts resulting from the crisis and the growth projected from the fiscal packages. The projected impacts of the stimulus packages modeled add between 0.2% and 6% to GDP growth in 2009 and between 0.9% and 5.5% in 2010. Even though the stimulus packages are large, and the impacts on growth are positive,

the stimulus packages will not reverse the impacts of the crisis in 2009. The exception is the PRC, which benefits from its own large stimulus package. Our projections show that with the stimulus in Table 13, the PRC's growth will be boosted by more than the amount the financial crisis would take away. All countries and regions, except other developing Asia, will experience positive growth at the end of 2010 despite the financial crisis. Other developing Asia has a small decline of 0.3% of GDP by the end of 2010, despite the fiscal stimulus packages.

Note that while sources of funds for stimulus packages are crucial, we assume that for PRC, Europe, and Japan where saving rates are positive and large, their stimulus packages are financed by their domestic savings. By contrast, as the US has been a net debtor nation, the increase in US government expenditure modeled here assumes that the stimulus package will come from an increase in foreign debt, not from increased taxes in the US. As a result, government expenditure is found to "crowd out" investment elsewhere in the world. Other developing Asia and South Asia are found to experience slight negative impacts on their 2009 and 2010 GDP due to the US stimulus package and the crowding out of investment. Lower investment will also have negative impacts on long-term growth, as the capital stock of these nations will be lower as a result of the US stimulus package.

Table 14: Impacts of Stimulus Packages on Asian GDP Growth, 2009 and 2010 (percent of real GDP)

Country/Region	Projected GDP Impacts from Economic Slowdown in OECD (a)		Projected Fiscal Stimulus Impacts (b)		Gap (c)		
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	2009	2010	2009	2010	2009	2010	Cumm. Gap
PRC	-3.9	1.4	6.0	5.5	2.1	6.9	9.1
Other Developing Asia	-2.8	0.9	0.2	1.5	-2.6	2.4	-0.3
East Asia	-3.8	1.4	3.5	3.0	-0.3	4.4	4.1
India	-4.1	1.3	3.2	2.4	-0.9	3.7	2.8
Malaysia	-3.4	1.2	0.9	0.9	-0.7	3.7	3.0
Singapore	-3.3	1.1	2.7	2.5	-1.0	3.3	2.3
South Asia	-3.6	1.2	2.3	2.2	-2.0	3.3	1.2
South East Asia	-3.4	1.2	1.6	2.1	-1.2	3.4	2.2

(a) From Table 10 columns C and D.

(b) Projected GDP is the static impact on the Asian countries of fiscal stimulus packages where actual growth may be greater or less depending on the policies of individual countries, such as fiscal stimulus or protectionism.

(c) The potential gap is the difference between the impacts from the economic slowdown and the impacts from the projected fiscal stimulus packages. Cumulative numbers are not the simple addition of the two years but are compound growth rates.

Source: Estimates based on data in table 14 projected using the GTAP database.

**Table 15: Projected 2009 Change in Real Exports by Region and Commodity
(millions of US dollars, 2004 prices and percent changes)**

	Other										Total*
	Australia/ New Zealand	PRC	Developing Asia	East Asia	India	Malaysia	Singapore	South Asia	Southeast Asia		
Agriculture	-397 (-1.9)	2,391 (21.3)	-127 (-2.6)	-41 (-1.8)	113 (1.8)	-5 (-0.5)	2 (0.3)	-7 (-0.5)	-124 (-0.8)	1,806	
Extraction	17 (0.1)	1,468 (8.3)	-48 (-0.2)	173 (1.7)	174 (1.9)	253 (2.2)	195 (2.0)	-2 (-0.5)	632 (2.0)	2,861	
Processed Foods	-24 (-0.2)	1,621 (10.4)	-1 (0.0)	72 (1.3)	132 (3.2)	180 (1.9)	29 (1.0)	19 (1.6)	340 (1.5)	2,368	
Textile, Apparel	-16 (-0.7)	5,910 (4.6)	13 (0.1)	993 (2.0)	392 (2.2)	42 (1.4)	10 (0.6)	157 (1.3)	429 (1.5)	7,931	
Motor and Transport Equipment	72 (1.5)	959 (3.9)	15 (1.3)	1,709 (3.3)	138 (4.2)	61 (2.8)	79 (2.4)	3 (2.1)	294 (2.6)	3,331	
Light Manufacturing	54 (0.7)	6,754 (5.5)	20 (1.1)	968 (2.9)	669 (3.3)	257 (2.1)	95 (1.9)	27 (2.4)	862 (2.2)	9,707	
Heavy Manufacturing	635 (1.9)	9,386 (5.1)	175 (1.7)	8,074 (4.1)	937 (3.7)	991 (3.1)	1,130 (2.6)	50 (2.9)	2,060 (3.0)	23,438	
Electronics	24 (1.4)	8,251 (4.5)	2 (1.6)	6,564 (3.6)	39 (3.6)	2,246 (3.0)	1,316 (2.4)	2 (2.3)	1,775 (2.5)	20,218	
Transport and Construction	258 (1.4)	932 (3.1)	83 (1.5)	2,309 (2.7)	132 (2.7)	112 (1.9)	242 (1.7)	46 (2.4)	392 (2.1)	4,506	
Other Services	326 (3.2)	-726 (-6.5)	123 (3.2)	1,652 (4.1)	588 (4.5)	119 (3.6)	540 (2.9)	65 (3.8)	278 (3.6)	2,966	
Travel and Tourism	47 (1.4)	70 (2.2)	5 (1.4)	93 (2.3)	9 (2.9)	46 (2.1)	8 (1.4)	5 (2.6)	59 (2.4)	342	
Total	997 (0.7)	37,015 (5.1)	260 (0.4)	22,565 (3.4)	3,324 (3.1)	4,302 (2.7)	3,647 (2.4)	365 (1.7)	6,998 (2.2)	79,475	

*Totals are for countries and regions listed and differ from the global total

Note: Numbers in parentheses show declines of exports in terms of percentage changes.

Source: Authors' estimates from GTAP model.

Table 15 illustrates the changes in trade flows resulting from the stimulus packages. Most countries/regions are projected to experience a significant boost in their exports, especially for manufacturing products such as heavy manufacturing, electronics, light manufacturing, and textiles and apparel. Services and agriculture exports are also projected to increase. Surprisingly, the PRC is projected to see a significant rise in agriculture and processed food exports but a reduction in services exports. These results flow from the same source, which is the composition of consumption by the PRC government represented in the GTAP model (over 90% of government consumption is in the services industries). Therefore, the projected shift in consumption represented by the fiscal stimulus package decreases the demand for agricultural and processed food products relative to other products, freeing them up for export. The opposite is the case for services, which the PRC government is projected to consume in great quantities as a result of the stimulus package, leaving fewer available services for export. This analysis underscores the importance of improved data on exactly what the PRC stimulus package will be spent on.

VI. Impacts of the Protectionist Threat on Developing Asia

When economic growth is slow or negative, public opinion often moves toward protectionism and a reduction in imports as a way of boosting local demand and preserving local jobs. The WTO sought to limit these types of risks in the Uruguay Round (UR) of tariff negotiations, which concluded in 1995. A major goal of the UR was to “bind” tariff levels worldwide, so that waves of protectionism would not threaten the trading system from time to time. Before 1995, most developing country WTO members had a substantial number of tariff lines “unbound” and hence outside WTO rules and without commitment to limit tariffs to a ceiling level. During the UR, developing countries were asked to “bind” nearly all of their tariff levels with ceiling rates, even if the rate was higher than their current applied most favored nation (MFN) tariff. The result of this process has been that many developing countries have what is referred to as “binding overhang” (Bchir, Jean, and Laborde 2005), a situation where the applied tariffs are significantly below their WTO bound (ceiling) rates. In recent Doha negotiations, this binding overhang was the focus of negotiations, with many developed countries seeking to lock in applied tariff rates, rather than accept the high binding tariffs. However, the Doha Round failed and many countries are still capable of increasing their tariff rates to binding levels while maintaining their WTO commitments.

Table 16 illustrates the degree of binding overhang for selected countries in the Asia region and for selected OECD countries. While Bangladesh and the PRC have MFN tariffs at their bound rates, most Asian countries have a significant number of tariff lines for which the applied MFN tariff is below the WTO bound rate to which they are

committed. Therefore, many countries in Asia could raise their tariffs and still maintain their WTO commitments, relieving other WTO members of the right to retaliate.

Table 16: Bound Tariff Rates within the Asia Region

Country	MFN* Tariff Lines Below Bound Rates (%)	Country	MFN* Tariff Lines Below Bound Rates (%)
US	2	India	49
United Kingdom	3	Indonesia	94
Japan	2	Kyrgyzstan	17
		Malaysia	61
Bangladesh	4	Pakistan	28
PRC	4	Papua New Guinea	95
Hong Kong, China	0	Philippines	61
		Singapore	46
		Sri Lanka	7
		Thailand	51

*Most Favored Nation Tariffs (MFN) are those offered to all WTO members.

Source: WTO CTS database and MacMap. Based on HS6 tariff line counts.

Although the WTO permits these countries to raise their most favored tariff rate to the bound level, free trade agreements have trumped WTO commitments on binding rates—taking their place in situations where they exist. Preferential trade agreements (PTAs), such as the ASEAN Free Trade Area and the South Asia Free Trade Area, and bilateral agreements such as the Singapore–Japan, and Singapore–India PTAs, now govern the ability of countries party to these agreements to raise their tariffs between each other. The result is that the rising protectionism will be restrained by these agreements; nonetheless, these restraints will increase the regionalism they promote by raising tariffs to non-PTA parties, while maintaining current tariffs for PTA partners. Using a database of worldwide applied, MFN, and WTO bound rates, we estimate the potential impacts of a new protectionist wave throughout the developing world.

Table 17 illustrates the potential impacts of increasing tariffs from WTO MFN-applied rates to WTO binding rates for all countries, subject to the limitations from PTAs. The countries being impacted are listed in the rows and the contribution of increased protectionism in other countries is listed in the columns. The impacts sum to the total impacts as a percent of GDP. The principal diagonal is the impact of a country's or region's increased protectionism on itself. For example, Southeast Asia/Southeast Asia, which equals -1.0 , show that if this region increased its tariffs, it would reduce its own real GDP by 1% in the medium run.¹⁰ In general, protectionism has a negative impact on the countries and regions that take that course. India and Southeast Asia stand out for the fact that they could impact other regions should they raise their tariffs to binding levels. The PRC stands out for its lack of protectionist potential from increasing applied tariffs to binding rates in the Asia region.

¹⁰ The trade protectionism scenario is not modeled year by year as in the earlier fiscal and crisis impacts. Instead, the impacts are measured as medium run, which would take place in 2–3 years or at the end of 2010 at the earliest.

Table 17: Impacts of Increased Protectionism in Developing Countries on Real GDP (millions of dollars and percent change)

	Percent Change in Real GDP	Millions of US\$ Dollars*	Sources of GDP Impacts											
			Australia/ New Zealand	PRC	Other Developing Asia	East Asia	India	Malaysia	Singapore	South Asia	Southeast Asia	Rest of World		
Australia/ New Zealand	-0.5	-3,790	-0.4	-	-	-	-0.1	-	-	-	-	-	-	-
PRC	0.0	706	-	-	-	-	-	-	-	-	-	-	-	0.2
Other														
Developing Asia	-0.5	-1,009	-	-	-0.5	-	-	-	-	-	-	-	-	0.1
East Asia	-0.3	-3,808	-	-	-	-0.2	-	-	-	-	-	-	-	-
India	-0.4	-2,476	-	-	-	-	-0.4	-	-	-	-	-	-	-
Malaysia	-0.4	-494	-0.1	-	-	-	-	-0.6	-	0.1	-	-	0.2	-
Singapore	-0.1	-129	-	-	-	-	-	-	-	-0.4	-	-	0.3	-0.1
South Asia	-0.1	-97	-	-	-	-	-	-	-	-	-	-0.3	-	0.2
Southeast Asia														
Asia	-0.9	-5,050	-	-	-	-	-	-	-	-	-	-	-1.0	0.1

*Millions of dollars at 2004 prices.

Note: Numbers may not add due to rounding.

Source: Authors' analysis with GTAP model.

Table 18: Change in Country/Regional Exports Due to Increased Protectionism (millions of US dollars and percent changes)

	Agriculture	Extraction	Processed Foods	Textile, Apparel, and Leather	Vehicles and Transport Equipment	Light Manufactory	Heavy Manufactory	Electronics	Transport and Construction	Other Services	Travel and Tourism	Total
Australia/ New Zealand	-341 (-1.8)	49 (0.2)	-294 (-2.3)	-72 (-3.1)	-776 (-17.0)	-629 (-9.5)	-3,826 (-12.1)	-119 (-7.2)	-641 (-3.2)	-322 (-3.2)	-114 (-3.5)	-7,086
PRC	227 (2.3)	-26 (-0.2)	-87 (-0.6)	-723 (-0.6)	-35 (-0.2)	-526 (-0.5)	-2,101 (-1.2)	-142 (-0.1)	39 (0.1)	205 (1.8)	19 (0.6)	-3,149
Other Developing Asia	-66 (-1.6)	30 (0.1)	-37 (-1.6)	-422 (-4.2)	52 (4.7)	-257 (-14.4)	-591 (-6.0)	-35 (-27.9)	-210 (-2.8)	-100 (-2.6)	-9 (-2.8)	-1,645
East Asia	7 (0.3)	74 (0.8)	8 (0.2)	-2,519 (-5.5)	-2,604 (-5.2)	-1,037 (-3.3)	-3,311 (-1.8)	-621 (-0.4)	-491 (-0.4)	371 (0.9)	-17 (-0.4)	-10,140
India	72 (1.3)	2 (0.0)	-9 (-0.2)	-693 (-4.2)	-245 (-7.8)	-2,252 (-11.3)	-3,604 (-15.0)	-77 (-7.4)	-152 (-1.7)	-44 (-0.3)	-11 (-3.6)	-7,012
Malaysia	3 (0.3)	66 (0.6)	-7 (-0.1)	38 (1.3)	16 (0.8)	-402 (-3.7)	-15 (-0.1)	-823 (-1.1)	-119 (-1.4)	-26 (-0.8)	-18 (-0.8)	-1,287
Singapore	-3 (-0.6)	-34 (-0.4)	-14 (-0.5)	-64 (-4.1)	-42 (-1.3)	210 (4.3)	976 (2.4)	-631 (-1.2)	-472 (-1.6)	-288 (-1.5)	-12 (-2.0)	-375
South Asia	7 (0.6)	-2 (-0.5)	-9 (-0.8)	-111 (-1.0)	-28 (-18.2)	-50 (-4.8)	124 (7.8)	-17 (-26.0)	-35 (-1.7)	-17 (-1.0)	-4 (-2.5)	-145
Southeast Asia	-54 (-0.4)	187 (0.6)	-322 (-1.6)	-2,456 (-9.1)	-315 (-2.9)	-3,199 (-9.0)	-4,772 (-7.4)	-1,706 (-2.4)	-298 (-1.4)	-58 (-0.8)	-69 (-2.8)	-13,062
Total	-149	345	-772	-7,022	-3,977	-8,143	-17,119	-4,172	-2,378	-279	-236	-43,901

*Totals are for countries and regions listed and differ from global total

Note: Numbers in parentheses show declines of exports in terms of percentage changes.

Source: Authors' estimates from GTAP model.

Table 18 shows the impacts on exports by product and region. Although some countries and regions experience a rise in exports, resulting from trade diversion created by accentuating tariff preferences for regional trade partners, the overwhelming effect is to reduce trade. In absolute value, exports in developing Asia drop by US\$36.8 billion. Heavy manufactures followed by light manufactures, electronics, and textiles are most impacted. Southeast Asia's exports decrease the most, followed by East Asia.

VII. Conclusions and Policy Inferences

The importance of international trade to developing Asia has grown tremendously over the last few decades. The expansion of intraregional trade in Asia reflects the PRC's role as an assembly point and its greater reliance on demand from outside the region, the US and the EU in particular. Through its forward linkages to the PRC, the rest of the region also remains dependent on external sources of final demand. The expansion of trade in parts and components (intermediate goods) tends to dilute the importance of RERs since parts and components exports involve a high proportion of imported parts and components. It also makes developing Asia more vulnerable to the effects of the global financial crisis, through its trade links with OECD countries.

The projections/simulations in this paper also support the view that trade links can be effective for transmitting lower growth in OECD countries to developing Asia. Asia will continue to suffer lower growth rates due to lower trade with the OECD countries. The PRC and India will be most impacted. Though Southeast Asia faces reduced exports to the OECD countries, its exports are reduced significantly to other Asian exporters, demonstrating the indirect trade linkages that now exist in the global economy. Overall, we project Asian economic growth to be between 6% and 10% lower at the end of 2010 than it would have been had the OECD countries continued to grow at the same rate as the average for 2002–2007.

Fiscal stimulus packages now being considered or implemented in the major markets hold the potential to put Asia back on an improved growth path. However, growth is projected to be less than historical averages, with the exception of the PRC. The current fiscal stimulus package announced in the PRC is sufficient to reverse the impacts of lower growth due to lower exports to the OECD countries. However, the impacts of these stimulus packages should be considered carefully, since they may not actually represent additions to government expenditure, but rather a “double counting” of existing expenditures. If this is found to be the fact, the projected impacts would be lower. Our analysis also finds that on what governments spend their fiscal stimulus packages is important to determining trade and income transmission.

Protectionism through the world is growing and there is considerable room for many developing countries to increase their tariffs to non-PTA partners and still maintain their WTO commitments. Our projections show that countries that resort to protectionism will suffer negative impacts to GDP growth. Notably, Southeast Asia would be the most impacted by protectionism. If Southeast Asian countries were to raise their tariffs to WTO MFN-bound rates, the impact would be negative on real GDP.

The simulation results imply that a protectionist spiral should be avoided to ensure that the fiscal stimulus packages can work well to cushion the impacts of the global economic slowdown in the short run and to rebalance Asia's growth pattern in the medium to long run. To promote economic recovery, a "stand-still" on new protectionist measures should be agreed upon. In cases where temporary measures discriminating against foreign products have been imposed, the appropriate review mechanism should be conducted to ensure the orderly unwinding of such measures after the crisis. In addition, the WTO Doha round should also be resumed to resist protectionist tendencies and liberalize global trade.

Appendix: The Global Trade Analysis Program (GTAP)

The GTAP computable general equilibrium (CGE) model is in wide use throughout the world in government and nongovernment institutions. A CGE model combines data on world trade and production with economic demand and production theory to simulate the workings of an economy.¹¹ In this analysis, the global economy is modeled as 13 regions and 11 sectors (Table 9). The analysis for our purposes makes projections of 1–2 years (2009 or 2010), unless otherwise noted. This period of projection is referred to by economists as the “short term”. In practice, the short-term is reflected in a CGE model in three ways:

- (i) inflexibility of factor prices;
- (ii) unemployment of resources (labor and capital); and
- (iii) limits on the growth of capital stocks resulting from investment.

Regarding the first point, our analysis starts from the observation of falling factor utilization (unemployment) modeled by fixing factor prices. Fully flexible factor prices, in contrast, imply full utilization of resources. Capital stocks, the other determinant of the short term in the model, are not permitted to expand in response to investment.¹² At the same time capital stocks do not adjust, investment is permitted to vary. What does it mean for investment to occur without capital stocks changing? The difference can be viewed as construction on a building (investment), which contributes to economic activities (through carpenters and engineers), but the construction does not yet provide rental incomes (capital stocks) through stores or factory space.

Modeling the current economic crisis requires careful consideration of conventional short-term assumptions used in CGE modeling. What is under way is not simply an economic slowdown in a single country, or average expansion, it is a worldwide recession, where most economies are contracting in real terms. Under the more limited scope of an economic downturn, CGE economists often allow capital prices to remain flexible, despite the short-term nature of the analysis. Capital resources, therefore, are fully employed, as a matter of convention, even in the short run. The reasoning is simple, owners of capital will forego profits to maintain output, and by reducing profits, they reduce the rental price of capital. So, in the short run, convention has dictated capital prices to be flexible, reflecting the marginal ebb and flow of profits through economic upturns and downturns. The current crisis, in contrast, is without many precedents, and capacity utilization rates are falling as businesses are going bankrupt on a wide scale. Moreover, banks are reluctant to renegotiate loans or provide working capital to distressed businesses. We, therefore, model capital rental rates with fixed prices, allowing for unemployment of this resource (reduced capacity utilization). Permitting capital rental rates to decline would reduce the projected impacts, but then so would allowing other factor prices to fall; however, it would then be hard to justify unemployment of labor or capital. In the short run, rapid declines in factor prices are not likely to occur unless from nominal currency depreciations, a factor not modeled here.

¹¹ The current GTAP model is benchmarked to 2004 prices, trade, and production. Our analysis includes an adjustment to the base 2004 data structure to account for changes to textile and apparel trade resulting from the phase-out of WTO quotas on these products in 2005. We adjusted market shares for these products to reflect 2008 trade shares.

¹² The ability for investment to impact capital stock is also a characteristic of the fact that the model is comparative static.

Finally, an assumption must be made about the movement of investment between countries. In the current crisis, investment capital has largely “frozen”. If there has been a tendency for capital to move, it has been led by demand for security, found in the form of government guarantees and insured deposits. Despite the fact that the US mortgage sector is recognized as the source of the financial crisis, this fact has not resulted in widespread capital flight from the US. In fact, the US dollar has returned as the “reserve” currency of the world, reflecting investors’ confidence in the US government’s guarantee to pay debts. The net effect on investment flows has been to maintain the status quo, with significant investment being channeled to the US. We, therefore, limit investment flows in the model, to reflect the “freezing of capital markets”. By generally accepted macroeconomic accounting, trade balances are fixed (relative to real income) to reflect limited international investment flows.^{13,14}

¹³ The accounting equation referred to is the familiar $(S-I) = (X-M)$ in macro accounting. Investment levels that exceed savings can only be financed through a current account deficit.

¹⁴ The analysis in this paper was not found to be sensitive to the fixed trade balance assumption, and the conclusions hold, even if trade balances are allowed to vary. This results from our practice of holding factor and capital rental rates constant in the short term, limiting the change in relative returns between countries.

References

- ADB. 2009. *Asian Development Outlook 2009*. Asian Development Bank, Manila.
- Arndt, S. W., and A. Huemer. 2004. "Trade, Production Networks and the Exchange Rate." Available: Lowe Institute of Political Economy, Claremont McKenna College, California.
- Athukorala, P. 2004. "Post-crisis Export Performance in Thailand." *ASEAN Economic Bulletin* 211:19–36.
- . 2006. "Product Fragmentation and Trade Patterns in East Asia." *Asian Economic Paper* 43:1–27.
- Athurkoralala, P., and A. Kohpaiboon. 2008. "Trade and Investment Patterns in Asia: Implications for the Debate on Multilateralizing Regionalism." Paper presented at the Conference on Multilateralizing Asian Regionalism, Asian Development Bank Institute, 18-19 September, Tokyo.
- Bchir, M. H., S. Jean, and D. Laborde. 2005. Binding Overhang and Tariff-Cutting Formulas. CEPII Working Paper, Centre d'Etudes Prospectives et d'Informations Internationales, Paris.
- Bronckers, M., and P. Larouche. 2006. "Telecommunications Services." In P. Macrory, A. E. Appleton, and M. G. Plummer, eds., *The World Trade Organization: Legal, Economic, and Political Analysis* Volume I. New York: Springer. Available: www.wto.org/english/tratop_e/serv_e/telecom_e/telecom_e.htm.
- Brooks, D. H., E. Xiaoqin, and L. R. Sumulong. 2004. "Foreign Direct Investment: Recent Trends and the Policy Context." In D. Brooks and H. Hill, eds., *Managing FDI in a Globalizing Economy*. London: Palgrave, Macmillan for the Asian Development Bank.
- Engle, R. F. and C. W. J. Granger. 1987. "Co-integration and Error Correction: Representation, Estimation, and Testing." *Econometrica* 55(2):251–76.
- Feenstra, R. C., R. E. Lipsey, H. Deng, A. C. Ma, and H. Mo. 2005. World Trade Flows: 1962–2000. NBER Working Paper No. 11040, National Bureau of Economic Research, Cambridge, MA. Available: www.nber.org/paper/w11040.
- Fliess, B. A., and P. Sauvé. 1997. "Of Chips, Floppy Disks and Great Timing: Assessing the Information Technology Agreement." Paper prepared at the Institute Francais des Relations Internationales (IFRI) and the Tokyo Club Foundation for Global Studies, 8 October.
- Furby, M. 2005. Evaluating the Malaysian Export Processing Zones with Special Focus on the Electronic Industry. School of Economics and Management, Department of Economics, Lund University, Lund. Unpublished thesis.
- Grubel, H. G., and P.J. Lloyd. 1975. *Intra-Industry Trade in Differentiated Products*. London: Macmillan.
- Hendry, D. F. 1995. *Dynamic Econometrics*. Oxford: Oxford University Press.
- Institute for International Finance. 2008. "Fiscal Policy Turns Expansionary." *Global Economic Monitor*. 28 January.
- James, W. E., D. Park, S. Jha, J. Jongwanich, A. Terada-Hagiwara, and L. R. Sumulong. The US Financial Crisis, Global Financial Turmoil, and Developing Asia: Is the Era of High Growth at an End? ADB Economics Working Paper Series No. 139, Economics and Research Department, Asian Development Bank, Manila.
- Johansen, S. 1988. "Statistical Analysis of Cointegration Vectors." *Journal of Economic Dynamics and Control* 12(2, 3):231–54.
- Jones, R. W., and H. Kierzkowski. 2001. "A Framework for Fragmentation." In S. W. Arndt and H. Kierzkowski, eds., *Fragmentation: New Production Patterns in the World Economy*. New York: Oxford University Press.
- Jongwanich, J. 2009. "Determinants of Export Performance in East and Southeast Asia." *World Economy*. Forthcoming.

- Krugman, P. 1995. "Growing World Trade: Causes and Consequences." *Brooking Papers on Economic Activity* (25th Anniversary Issue):327–77.
- Ng, F., and A. Yeats. 2003. Major Trade Trends in East Asia: What Are Their Implications for Regional Cooperation and Growth? Policy Research Working Paper 3084, World Bank, Washington, DC.
- Rondinelli, D. A. 2006. "Export Processing Zones and Economic Development in Asia: A Review and Reassessment of a Means of Promoting Growth and Jobs. *American Journal of Economics and Sociology* 46: 89–106. Available: www3.interscience.wiley.com/journal/119468185/abstract.
- Wells, L. T. Jr. 1986. "Investment Incentives: An Unnecessary Debate." *TNC Reporter* 22 Autumn:12–6.
- Wickens, M. R., and T. S. Breusch. 1988. "Dynamic Specification, the Long-Run and the Estimation of Transformed Regression Models." *Economic Journal* 98(390): 189–205.
- Yi, K. M. 2003. "Can Vertical Specialization Explain the Growth of World Trade?" *Journal of Political Economy* 111:52–102.

About the Paper

Juthathip Jongwanich, William E. James, Peter J. Minor, and Alexander Greenbaum examine changes in the structure of international trade in developing Asia over the past two decades and find that, despite a sharp increase in intraregional trade, developing Asia continues to be vulnerable to a demand collapse in the G3 countries. The rise in intraregional trade largely reflects increasing fragmentation of production with trade in intermediate goods and assembly of final products in the People's Republic of China, leaving the region still dependent on external demand in the European Union, Japan, and United States. Simulations indicate the crisis may decrease real income in the region by 6–10% over the next two years largely as a result of a fall in exports. Although fiscal stimulus may mitigate these losses, a resurgence of protectionism would work in the opposite direction.

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 substantially reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two thirds of the world's poor: 1.8 billion people who live on less than \$2 a day, with 903 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.

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org/economics
ISSN: 1655-5252
Publication Stock No.:

Printed in the Philippines