Asian Growth and Trade Poles: India, China, and East and Southeast Asia

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Abstract

Using a new global general equilibrium trade model, this paper analyses the impact on the global economy, especially developing countries, of the dramatic expansion of trade by India, China, and an integrated East and Southeast (E&SE) Asia trade bloc. While both India and China are very large economies, the two "Asian Drivers" differ in economic structures and trade patterns. China is an integral member of the E&SE Asia bloc, with strong links through value chains and trade in intermediate inputs, while India is not part of any trade bloc. The analysis considers the importance of their different degrees of integration into regional and global economies, focusing on potential complementarities and competition with other developing countries.

1. Introduction

Since the end of World War II, the global economy has been characterised by major shifts in patterns of international trade. Over the entire post-war period, global trade has expanded much faster than global GDP. Initially, world trade was bipolar. Most international trade was between Europe and North America, with developing countries linked in a dependent, hub-and-spoke pattern with either Europe or the US, and trading little among themselves. This bipolar system splintered in the 1970s, and analysis of historical data on trade patterns indicates that three large trade blocs have emerged: (1) a bloc anchored by the United States, consisting of North America and Central America, (2) the European Union plus much of its periphery, and (3) a new trade bloc comprised of the countries in East and Southeast (E&SE) Asia.[1] The developing countries not included in these blocs have also expanded trade, with increased diversification in partners and traded commodities.

The Asian giants, China and India, are both expanding into the world economy —and can both be seen as "Asian Drivers"— but with different trade patterns and different impacts. While increasing trade in global markets, China is also an integral part of the regional trading bloc in E&SE Asia, with large and expanding trade in intermediate inputs across the region, and with regional production characterised by cross-country value chains. No comparable bloc has emerged in South Asia, and India is not closely integrated into cross-country production chains.

The restructuring of the world trading system to accommodate India, China, and the emergence of E&SE Asia has serious implications for other developing countries: global markets are expanding, but many countries are losing market share in the restructuring of global trade patterns. While trade is not a zero-sum game, and many studies indicate that trade liberalisation generates net gains, the same studies indicate that the benefits of expanded trade are not distributed equally, and there can be losers.

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[1] More recently, new blocs have emerged in South America (MERCOSUR) and Southern Africa (centred on South Africa). For analysis of the historical data and emergence of trade blocs, see Evans, *et al*., (2006) and World Bank (2005).

This study explores the impact on the global economy, particularly the least developed countries, of the emergence of the Asian Drivers. A multi-country, global trade model is used to simulate different scenarios, focusing on two broad issues: (1) the impacts of continued integration in E&SE Asia, including the potential inclusion of India in the bloc, and (2) the impacts of rapid growth in Asian economies. The analyses consider the importance of the differences between India and China, especially their differing integration into regional and global economies, focusing on potential complementarities and competition with other developing countries.

The paper is structured as follows. The next section provides a description of the current place of Asia in the global economy using data drawn from the study's database. This is followed by a description of the GLOBE model used in the analysis and the scenarios used to simulate continuing integration in E&SE Asia and differential growth in Asia. The results are presented and discussed in section four, and the paper ends with a concluding section that also considers directions for future research.

2. Asia and the Global Economy

The expansion of the economies of East, South East and South Asia over the last 15 to 20 years have heralded one of the most dramatic periods of economic growth and development the world has experienced. Internally these economies have experienced economic transformations at rates that have, arguably, never been witnessed before, yet they remain relatively small, although rapidly growing, parts of the global economy (see below). This section begins with a brief description of the emergence of the 'Asian Drivers' followed by a description of the database used in the study and analysis of the evolving role of Asia in the world economy.

2.1 Emergence of the 'Asian Drivers'

Regional integration has differed enormously across the world in ways that affect trade patterns. Two distinct patterns of regional integration can be identified. The first is that driven by formal government-to-government agreements (e.g. the EU or NAFTA), which can be called "regionalism". The second is a less "constructed" and market-driven form of integration, which can be called "regionalisation". E&SE Asia has followed a regional strategy based on

most-favoured-nation (MFN) liberalization, but without any formal cooperation agreements throughout most of the period. The Asia-Pacific Economic Cooperation (APEC) agreement embodies the principles of a non-discriminatory non-preferential approach to trade liberalization. This trajectory is closer to regionalisation than regionalism.

E&SE Asia's increasing trade and investment linkages are due in part to unilateral reforms, which started earlier than in other regions, and the fragmentation and relocation of production processes that has arisen since the mid-1980s. E&SE Asia's regional liberalisation strategy led to lower average tariff rates than most of the other regions throughout the period (see Lee and Park, 2005, and Lee and Shin, 2006, for a reviews of the impacts of East Asian RTAs, and Antkiewicz and Whalley, 2005, for a discussion of China's RTAs) . In addition, the periods of relocation of production processes coincided with periods of increased foreign direct investment (FDI) into the countries of relocation. E&SE Asian net inflows of FDI as a percent of GDP are higher than any region from the mid-1980s until the late-1990s

Even without the support of formal regional trading agreements, countries in E&SE Asia achieved lowered barriers to intra-regional trade, and a "virtuous circle" or synergistic interaction between open development strategies, increased trade both within the region and with world markets, diversification of production and trade, increased foreign direct investment, and growth.

South Asia reflects a somewhat different trajectory from E&SE Asia, with a greater emphasis placed on formal agreements ("regionalism") than market-driven integration ("regionalisation"). It adopted highly protectionist regimes after independence in the late 1940s. Unilateral liberalisation and domestic reforms that were gradually introduced, along with a rapid expansion in garment/textile exports, led to high growth rates for exports in the 1990-2000 period and an increasing share of exports in GDP, but from a very low base. South Asian exports as a share of the world trade have remained low throughout the 1980-2000 period. At the same time South Asia has maintained high levels of average applied tariffs. Consequently the region is also not integrated to the same extent as E&SE Asia in world capital markets, and net inflows of FDI, although higher than the early 1980s, are the lowest of all the regions.

Recently, political considerations, as well as concern about the expansion of trading arrangements in other regions, have led to an increase in the number of trade agreements in the region, the latest of which is the South Asia Free Trade Area (SAFTA) Agreement (January 2004) (see Baysan *et al*., 2006, for a review). In the 1980-2000 period, however, these trade agreements have had a minimal impact on regional trade, given continuing high levels of protection, (see Appendix Table A7 for average tariff rates in E&ES Asia and India) a lack of meaningful concessions, domestic political problems, and hostility between India and Pakistan.

Thus while China and India can both be seen as 'Asian Drivers' they are operating with different strategies and within different regional contexts. China is a strong member of the E&SE Asia bloc, with high intra-bloc trade shares and evidence of strong outward orientation, while India is not linked to a particular bloc, has lower trade shares and is less outwardly orientated. These differences reflect the fact that India lags behind China in opening to world trade, but also that India has not sought to join regional trade agreements or to engage in the kinds of informal deep integration evident in E&SE Asia, although in part this may be a reflection of the lack of near neighbours whose economies are as dynamic as India's.

2.2 An 'Asian Drivers' Database

The database for this study is derived from the GTAP database version 6.0, which is benchmarked to the year 2001 (see Dimanaran, 2006). The form of the database used for this study is a Social Accounting Matrix (SAM) representation of the Global Trade Analysis Project (GTAP) database version 6 (see McDonald and Thierfelder, 2004, for a detailed description of the core database). The GTAP project produces the most complete and widely available database for use in global computable general equilibrium (CGE) modelling; and the database has become generally accepted for global trade policy analysis. It is used by nearly all the major international institutions and many national governments. Hertel (1997) provides an introduction to both the GTAP database and its companion CGE model. The precise version of the database used as the starting point for this study is a reduced form global SAM representation of the GTAP data (see McDonald, 2006).

The aggregation used for this model includes 23 sectors (commodities and activities), 15 regions, and 5 factors of production. The accounts in the SAM are detailed in Table 1, and the aggregation mapping from the GTAP data is provided in the Appendix. The sectoral

aggregation seeks to achieve a balance across primary products – agriculture and extraction – manufacturing and services, while the regional aggregation emphasises Asia within a global context.

Table 1 SAM and Model Accounts

Sectors		**Regions**
Crop agriculture	Electronic equipment	China
Animal agriculture	Machinery and equipment	Advanced East Asia
Coal	Other manufacturing	Middle East Asia
Oil and gas	Utilities	Other East Asia
Other minerals	Construction	India
Meat products	Trade and transport	Rest of South Asia
Other foods	Business services	NAFTA
Textiles	Other services	MERCOSUR plus
Wearing apparel		Rest of the Americas
Wood and paper products	**Factors**	European Union
Petroleum and coal products	Land	Middle East and North Africa (MENA)
Chemical rubber and plastic products	Unskilled labour	Southern Africa Customs Union (SACU)
Basic metal and mineral products	Skilled Labour	Rest of sub-Saharan Africa
Motor vehicles and parts	Capital	Rest of the World
Other transport equipment	Natural resources	

2.3 Structure of the Global Economy

The data provide important insights into production structure, and trade relationships at the global level. The Asian economies – China, Advanced East Asia, Middle East Asia, Other East Asia, India and Rest of South Asia – only account for some 25 percent of global GDP, despite accounting for the vast majority of the world's population. Moreover, Advanced East Asia alone accounts for some 17 percent of global GDP, while the booming economies of China, Middle East Asia and India only account for some 6.5 percent.[2] Although the 'Asian Drivers' have achieved very high growth rates of over the last 20 years, they still represent a relatively small proportion of the global economy.

[2] Not tabulated. A complete set of background tables is available from the authors upon request.

Table 2 Value added by factor (percent)

	Land	Unskilled Labour	Skilled Labour	Capital	Natural resources	Total
China	4.1	41.8	12.0	40.5	1.6	100.0
Adv E&SE Asia	0.5	35.5	21.5	42.2	0.3	100.0
Middle E&SE Asia	3.6	31.2	10.9	52.4	2.0	100.0
Other E&SE Asia	5.7	25.7	8.4	57.3	3.0	100.0
India	10.2	34.5	10.8	43.6	1.0	100.0
Rest of S Asia	9.6	38.3	11.0	39.7	1.4	100.0
NAFTA	0.5	34.2	23.4	41.5	0.4	100.0
MERCOSUR	1.5	34.5	17.6	45.6	0.9	100.0
Americas	2.4	31.4	13.3	51.0	1.9	100.0
EU	0.6	28.7	19.4	50.8	0.4	100.0
MENA	1.1	30.7	13.0	50.6	4.7	100.0
SACU	0.6	40.0	18.1	39.4	1.9	100.0
Rest of SSA	2.5	39.3	10.6	42.7	4.9	100.0
RoW	3.4	37.3	12.5	41.8	5.0	100.0

Source: model database form GTAP 6.

In terms of resources, Advanced East Asia, like other developed regions, is relatively skilled labour abundant (see Table 2). China is relatively unskilled labour abundant and has the highest value added share to unskilled labour among all regions used in the analysis. Like China, SACU and Rest of South Asia have high value added shares to unskilled labour. India is the most land abundant region and has a lower value added share to unskilled labour than does China.

Global trade is dominated by the OECD countries and particularly by the EU and NAFTA, which together with the Advanced East Asian economies, account for some three quarters of global exports and imports (see Table 3). However, E&SE Asia as a bloc (consisting of China, advanced East Asia, Middle East Asia, and Other East Asia) has a share of global trade (exports or imports) that is larger than NAFTA, reflecting the importance of the region in world markets. Both NAFTA and the Advanced East Asia regions are relatively closed economies, with relatively low trade dependencies, while the EU and other countries in E&SE Asia are more open. The less developed economies are much more trade orientated; in most cases having trade dependency ratios in excess of 0.7. The obvious exception is India, which remains a relatively closed economy (its trade dependency ratio is 0.3), although there is evidence that this is changing at an increasingly rapid rate.

Table 3 Global Trade Shares (percent)

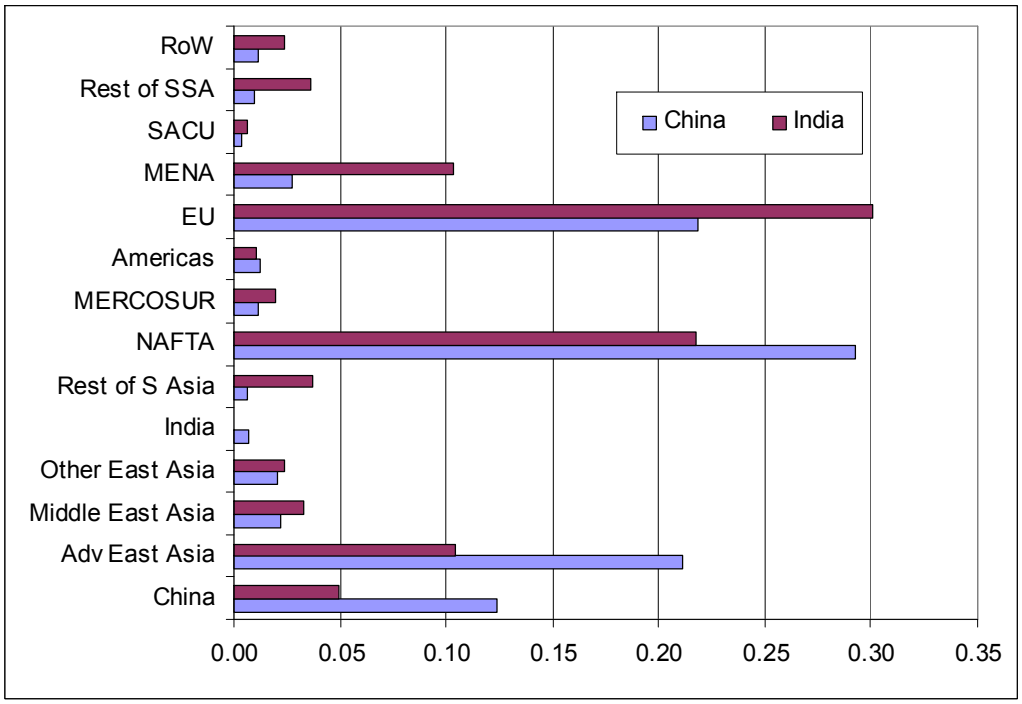
	Share of Total			
	Imports	**Exports**	**GDP**	**Trade Dependence**
China	5.80	6.85	4.14	0.71
Adv East Asia	12.80	14.28	17.21	0.37
Middle East Asia	2.25	3.08	0.76	1.64
Other East Asia	1.72	1.84	1.04	0.80
India	1.03	0.88	1.49	0.30
Rest of S Asia	0.50	0.40	0.46	0.46
NAFTA	23.37	18.86	36.69	0.27
MERCOSUR	1.97	1.94	2.93	0.31
Americas	1.98	1.57	1.45	0.57
EU	39.87	41.53	28.00	0.68
MENA	4.59	4.54	3.23	0.66
SACU	0.51	0.65	0.39	0.69
Rest of SSA	1.10	0.89	0.61	0.76
Row	2.51	2.70	1.61	0.76
Total	100.00	100.00	100.00	

Source: model database form GTAP 6.

Not only is India is much less dependent upon the global economy than is China, its exports are one-twelfth the value of China's exports. China's exports are skewed more heavily towards E&SE Asia (accounting for 39 percent of its total exports) and NAFTA (30 percent), while India is more oriented towards the EU, with 31 percent of its total exports going to the EU, 23 percent to NAFTA and 22 percent to East Asia (see Figure 1). [3]

[3] The region China includes China and Hong Kong. The trade between China and itself reported in Figure 1 is the trade between China and Hong Kong. In contrast, India is a single country; it has no trade with itself and there is only one bar reported in Figure 1 for India.

Figure 1 **Exports by partner for China and India** (%)



Source: model database form GTAP 6.

China is a major supplier of wearing apparel, accounting for 30.0 percent of global supply; other commodities in which China is an important source include other manufactured goods (17.8 percent), textiles (13.4 percent), and electronics (8.7 percent, results not tabulated). In contrast, India is a much smaller supplier, accounting for 3.7 percent of the global supply of textiles, 2.9 percent of other manufactured goods, 2.8 percent of apparel, and 0.1 percent of electronics.

Other developing countries, while not large suppliers to global markets, depend on exports to markets in which China is an important player. For example, SACU exports 55 percent of the other manufactured goods it produces, 49 percent of its electronics, and 46 percent of its apparel (not tabulated). Likewise, in the Rest of sub-Saharan Africa, 29 percent of apparel production and 38 percent of electronics production are exported.

3. The GLOBE Model

3.1 The GLOBE Model

The GLOBE model is a member of the class of multi-country, computable general equilibrium (CGE) models that are descendants of the approach to CGE modeling described by Dervis *et al*., (1982). The model is a SAM-based CGE model, wherein the SAM serves to identify the agents in the economy and provides the database with which the model is calibrated. Since the model is SAM based, it contains the important assumption of the law of one price, i.e., prices are common across the rows of the SAM. The SAM also serves an important organisational role since the groups of agents identified in the SAM structure are also used to define sub-matrices of the SAM for which behavioural relationships need to be defined.[4] The implementation of this model, using the GAMS (General Algebraic Modeling System) software, is a direct descendant and extension of the single-country and multi-country CGE models developed in the late 1980s and early 1990s.[5]

International Trade

Trade is modeled using a treatment derived from the Armington "insight"; namely domestically produced commodities are assumed to be imperfect substitutes for traded goods, both imports and exports. Import demand is modeled via a series of nested constant elasticity of substitution (CES) functions; imported commodities from different source regions to a destination region are assumed to be imperfect substitutes for each other and are aggregated to form composite import commodities that are assumed to be imperfect substitutes for their counterpart domestic commodities The composite imported commodities and their counterpart domestic commodities are then combined to produce composite consumption commodities, which are the commodities demanded by domestic agents as intermediate inputs and final demand (private consumption, government, and investment). The presumption of imperfect substitutability between imports from different sources is relaxed where the imports of a commodity from a source region account for a 'small' (value) share of imports of that

[4] As such the modelling approach has been influenced by Pyatt's "SAM Approach to Modeling" (Pyatt, 1987).

commodity by the destination region.[6] In such cases the destination region is assumed to import the commodity from the source region in fixed shares: this is a novel feature of the model introduced to ameliorate the terms of trade effects associated with small trade shares.

Export supply is modelled via a series of nested constant elasticity of transformation (CET) functions; the composite export commodities are assumed to be imperfect substitutes for domestically consumed commodities, while the exported commodities from a source region to different destination regions are assumed to be imperfect substitutes for each other. The composite exported commodities and their counterpart domestic commodities are then combined to produce composite production commodities; properties of models using the Armington insight are well known.[7] The use of nested CET functions for export supply implies that domestic producers adjust their export supply decision in response to changes in the relative prices of exports and domestic commodities. This specification is desirable in a global model with a mix of developing and developed countries that produce different kinds of traded goods with the same aggregate commodity classification, and yields more realistic behaviour of international prices than models assuming perfect substitution on the export side.[8]

Agents are assumed to determine their optimal demand for and supply of commodities as functions of relative prices, and the model simulates the operation of national commodity and factor markets and international commodity markets. Each source region exports commodities to destination regions at prices that are valued free on board (fob). Fixed quantities of trade services are incurred for each unit of a commodity exported between each and every source and destination, yielding import prices at each destination that include carriage, insurance and freight charges (*cif*).[9] The *cif* prices are the 'landed' prices expressed in global currency units. To these are added any import duties and other taxes, and the resultant price converted into domestic currency units using the exchange rate to get the source region specific import price. The price of the composite import commodity is a weighted aggregate of the region-specific

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5 The GLOBE model is described in more detail in McDonald, *et al*., (2006). For examples of earlier models, see Robinson *et al*., (1990), Devarajan *et al*., (1990), and Lewis *et al*. (1995). The World Bank global CGE model described in van der Mensbrugghe (2006) has a common heritage.

6 The import shares defined as small are cases specific and defined by the model user.

7 See de Melo and Robinson (1989) and Devarajan *et al*., (1990).

8 While the nested CET specification is widely used in both single and multi-country trade-focused CGE models, it is not used in the GTAP model.

9 Bilateral data on trade margins are not available in the GTAP database. Instead, trade margin services are assumed to be a homogeneous good; they are not differentiated by country of origin.

import prices, while the domestic supply price of the composite commodity is a weighted aggregate of the import commodity price and the price of domestically produced commodities sold on the domestic market.

The prices received by domestic producers for their output are weighted aggregates of the domestic price and the aggregate export prices, which are themselves weighted aggregates of the prices received for exports to each region in domestic currency units. The fob export prices are then the determined by the subtraction of any export taxes and converted into global currency units using the regional exchange rate.

There are two important features of the price system in this model that deserve special mention. First, each region has its own numéraire such that all prices within a region are defined relative to the region's numéraire. We specify a fixed aggregate consumer price index to define the regional numéraire. For each region, the real exchange rate variable ensures that the regional trade-balance constraint is satisfied when the regional trade balances are fixed. Second, in addition, there is a global numéraire such that all exchange rates are expressed relative to this numéraire. The global numéraire is defined as a weighted average of the exchange rates for a user defined region or group of regions. In this implementation of GLOBE the basket of regions approximates the OECD economies.

Fixed country trade balances must be seen as specified in "real" terms defined by the global numéraire. So, if the US exchange rate as fixed to one, the global numéraire is defined as US dollars, and all trade balances can be seen as "real" variables defined in terms of the value of US exports. If the weighted exchange rate for a group of regions is chosen as global numéraire, trade balances can be seen as a "claim" against a weighted average of exports by the group of regions.

Production and Demand

The production structure is a two stage nest. Intermediate inputs are used in fixed proportions per unit of output —Leontief technology. Primary inputs are combined as imperfect substitutes, according to a CES function, to produce value added. Producers are assumed to maximize profits, which determines product supply and factor demand. Product markets are assumed to be competitive, and the model solves for equilibrium prices that clear the markets.

Neoclassical CGE models typically assume the labour supply is fixed for each labour category, and the real wage adjusts to clear the market —an assumption we use for factor markets in developed countries. Such an assumption, however, seems unreasonable for many developing countries, and we assume instead that certain countries (China, India, Other East Asia, Rest of South Asia, SACU, and Rest of sub-Saharan Africa) are characterised by excess supplies of unskilled labour. In these countries, the real wage is held constant and the supply of unskilled labour adjusts following a shock. Any shock that would tend to cause a rise in the equilibrium real wage of unskilled labour will instead cause an increase in aggregate employment.

Final demand by the government and for investment is modelled under the assumption that the relative quantities of each commodity demand by these two institutions is fixed—this treatment reflects the absence of a clear theory that defines an appropriate behavioural response by these agents to changes in relative prices. For the household there is a well developed behavioural theory; and the model contains the assumption that households are utility maximisers who respond to changes in relative prices and incomes. In this version of the model, the utility functions for private households are assumed to be Cobb-Douglas.

Macroeconomic Closure

All economy wide models must incorporate the standard three macro balances: current account balance, savings-investment balance, and the government deficit/surplus. How equilibrium is achieved across these macro balances depends on the choice of macro "closure" of the model. For this exercise, we are exploring the impact on national and international commodity markets of different scenarios regarding India and China, and are not considering their effect on macro balances. So, we specify a "neutral" or "balanced" set of macro closure rules. [10]

Current account balances are assumed to be fixed for each region (and must sum to zero for the world). Regional real exchange rates adjust to achieve equilibrium, as discussed earlier. The underlying assumption is that any changes in aggregate trade balances are determined by macroeconomic forces working mostly in asset markets, which are not included in the model, and these balances are treated as exogenous. Changes in aggregate absorption are assumed to be shared equally (to maintain the shares evident in the base data) among private consumption,

government, and investment demands. The underlying assumption is that there is some mix of macro policies that ensures an equal sharing of the benefits of any increase in absorption or the burden of any decrease among the major macro "actors": households, government, and investment.

To satisfy the savings-investment balance, the household savings rate adjusts to match changes in investment. Government savings is held constant; direct income taxes on households adjust to ensure that government revenue equals government spending plus government savings. The tax replacement instrument, direct taxes on households, is likely to be less distorting than the trade taxes that it replaces but there are reasons to be skeptical about its appropriateness in the context of many least developed economies (see Greenaway and Milner, 1991). One potential consequence of this assumption is that the results for the least developed economies may be more positive than otherwise.

This macro closure is intended to focus the model on the effects of changes in relative prices on the structure of production, employment, and trade. While it may be of interest to examine the impact of trade liberalisation on, for example, asset markets and macro flows, such a focus is better studied using macro-econometric models which incorporate asset markets than using a CGE model which focuses on changes in equilibrium relative prices in factor and product markets.[11] The strength of the multi-country CGE model is that it elegantly incorporates the features of neoclassical general equilibrium and real international trade models in an empirical framework, but it also abstracts from macro impacts working through the operation of asset markets.

Exogenous Shocks

To explore the effects of regional integration and growth in East and South East Asia and India, five scenarios are considered.[12] The first 2 scenarios consider regional trade agreements (RTA) in East Asia:

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10 Other alternatives were explored but are not discussed in this paper.

11 Lance Taylor, for example, has long advocated using "structuralist" macro models to analyze the impact of changes in trade policy. See Taylor and von Arnim (2007) for a critique of the use of multi-country CGE models from this perspective.

12 Multiple other scenarios were explored and while the results are of interest and influence the development of discussion of the results presented in this paper they are not detailed here.

1. An RTA in East Asia that completely liberalises trade between China, Advanced East Asia, Middle East Asia, and Other East Asia (all of E&SE Asia).
2. An RTA between E&SE Asia and India that completely liberalises trade between China, Advanced East Asia, Middle East Asia, Other East Asia and India.

The first of these RTA scenarios reflects the on-going processes of integration in E&SE Asia and therefore could be considered a situation that might be expected in the not too distant future.[13] An extension of this RTA to include India is much more speculative; although there is some evidence of preliminary discussions between China and India, they are apparently at an early stage. However the scenario can be justified on two grounds; first it demonstrates the differences between India and S&SE Asia, and second, it provides a basis for comparison with the second set of scenarios that are concerned with growth in E&SE Asia **and** India.

The second group of three scenarios specifies a 10 percent improvements in total factor productivity in the value added functions for non-agricultural sectors in:

1. China;
2. India, and
3. Developing Asia (i.e., the regions China, India, Middle East Asia, and Other East Asia).

These scenarios seek to reflect the increasing competitiveness of the economies of E&SE Asia and India, and are designed to reflect differences in costs structures in circumstances where other growth factors, e.g., physical and human capital accumulation, are held constant. In that context the shocks applied here can be considered relatively short term in the sense that they produce differences in GDP levels that are consistent with the differences in growth rates between the economies of E&SE Asia and the rest of the world that have been experienced over two or three years.

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[13] As with most RTAs the likely outcome will be some form of partial bilateral liberalisation wherein a number of 'sensitive' commodities retain some degree of bilateral protection.

4. Results and Analyses

The discussion of the results begins with a consideration of the impacts of a regional trade agreement (RTA) in East and South East Asia (E&SE Asia) and an extended RTA that also includes India. Thereafter the discussion turns to the impacts of efficiency gains in the developing Asian economies, i.e., China, India, Middle (Income) East Asia, and Other East Asia, focusing on the impacts of such efficiency gains upon the least developed regions in the model, i.e., the Rest of South Asia, SACU and the Rest of sub-Saharan Africa. In all cases the emphasis is on the results where the closure settings assumed unemployment in the developing world. By necessity only a subset of possible results is presented, but references are made to other results where they provide additional insights.[14]

4.1 Regional Trade Agreements in Asia

The summary macroeconomic and welfare results for the two RTAs considered here indicate that the absorption and welfare gains for the members are relatively small, while non members experience marginal declines in welfare, see Table 4.[15] The expansion of an E&SE Asia RTA to include India not only reverses the loses in welfare to India, but also produces substantial increases in the gains to other members of the RTA; these are most pronounced for Middle (income) East Asia and Other East Asia, where the welfare gains nearly double, but interestingly the increases in aggregate trade flows are much smaller, except of course for India. These results are not unusual for such a regional trade agreement. Also typical of an RTA, trade for member countries expands and there are negligible declines for non-members.

With an RTA, the supply of unskilled labour increases in member countries with unemployment. In non-RTA members, employment of unskilled labour declines. Some of the welfare gains to RTA members can be attributed to the employment gains. Indeed, despite

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[14] A full set of the results is available from the authors on request.

[15] The measure of welfare used is the equivalent variation in welfare across all domestic final demand institutions using a Slutsky approximation. The limitations in the welfare theoretic properties of such measures in the presence of unemployment are well known, and hence the percentage changes in real absorption are also reported.

terms of trade losses for China, Other East Asia, and India there are welfare gains from an E&SE Asia and India RTA.[16]

[16] For comparison, when the same RTA scenario is run against a base model with full employment, welfare declines slightly for China, Other East Asia, and India due to terms-of-trade losses. The employment gains dominate the terms-of-trade effects.

Table 4 Summary Macroeconomic and Welfare Results for Regional Trade Agreements

	Base	East & South East Asia RTA				E&SE Asia & India RTA			
	Absorption ($US bn)	Absorption (%)	Welfare ($US bn)	Import demand (%)	Export supply (%)	Absorption (%)	Welfare ($US bn)	Import demand (%)	Export supply (%)
China	1,224	0.74	9.00	3.98	4.05	0.76	9.32	4.06	4.07
Adv East Asia	5,266	0.24	12.47	2.81	1.46	0.26	13.48	2.92	1.47
Middle East Asia	182	0.50	0.91	3.23	1.98	0.99	1.80	3.56	1.82
Other East Asia	317	0.22	0.70	3.04	3.45	0.44	1.41	3.31	3.26
India	476	-0.14	-0.65	-0.60	-0.18	0.05	0.22	3.57	6.95
Rest of S Asia	150	-0.23	-0.35	-0.75	-0.35	-0.27	-0.40	-0.82	-0.31
NAFTA	11,764	-0.01	-1.32	-0.11	-0.04	-0.01	-1.51	-0.12	-0.04
MERCOSUR	917	-0.03	-0.29	-0.19	0.00	-0.04	-0.41	-0.26	0.01
Americas	485	-0.04	-0.19	-0.15	-0.03	-0.07	-0.33	-0.23	-0.01
EU	8,668	-0.02	-1.81	-0.10	-0.04	-0.02	-2.02	-0.10	-0.04
MENA	1,017	-0.01	-0.12	-0.08	-0.06	-0.02	-0.16	-0.10	-0.07
SACU	113	-0.14	-0.16	-0.23	-0.01	-0.24	-0.27	-0.43	0.01
Rest of SSA	207	-0.08	-0.17	-0.15	-0.08	-0.08	-0.17	-0.15	-0.09
RoW	492	-0.04	-0.18	-0.13	-0.03	-0.04	-0.20	-0.15	-0.04

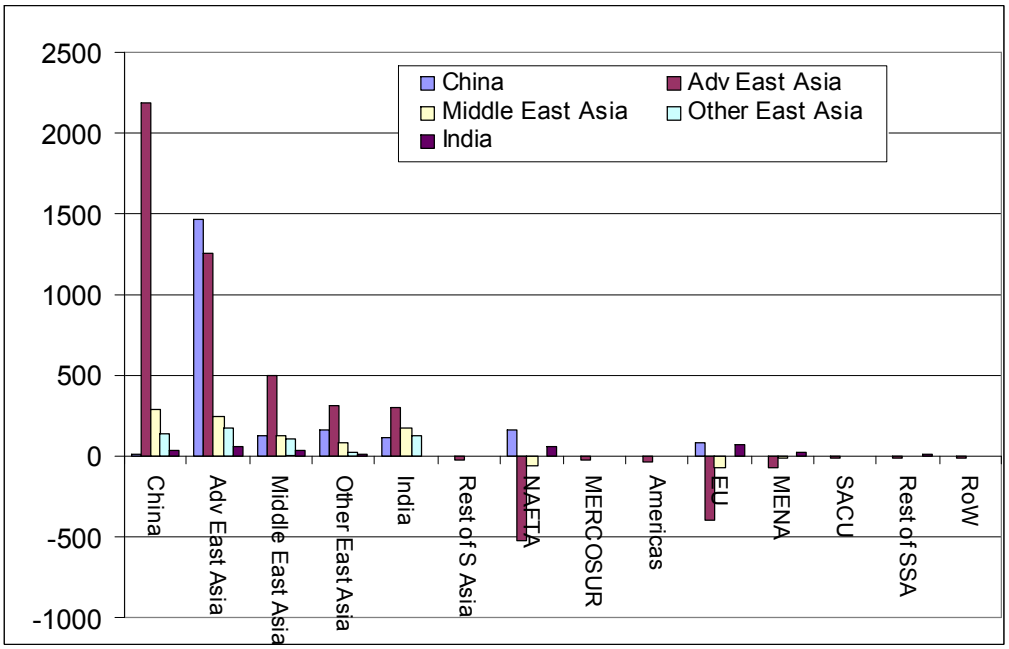
Source: results from E&SE Asia RTA and E&SE and India RTA scenarios.

The results also indicate that there are substantial changes in the structure and volume of trade in the RTA members. In the case of an E&SE Asia and India RTA, manufacturing exports in particular increase substantially for most members of the RTA (not tabulated), while primary and tertiary commodity exports show generally smaller changes; the outlier is crop exports from China, which increase by 39 percent (from a low base). In large part these changes in export volumes are concentrated in trade between members of the RTA (see Figure 2). As such the results of the RTA scenarios are typical of results from RTAs; expanding trade flows between members of the RTA (trade creation), usually associated with some evidence of some redirection of trade flows from trade partners outside the RTA.

However, the creation of an E&SE Asia RTA, with or without India, does contain a striking and unusual result. Advanced East Asia substantially increases its exports to members of the E&SE Asia and India RTA. It experiences the largest absolute increases in bilateral exports with all members of the RTA, with at least some of this coming from a redirection of trade between the countries within Advanced East Asia, while at the same time experiencing appreciable reductions in it exports to the other rich economies, NAFTA and the EU.[17] This amounts to a sizable redirection of the trading relationships of the Advanced East Asian economies which will serve to reinforce the development of a strong trade bloc in E&SE Asia.

[17] Note that Advanced East Asia's exports to all non-RTA regions decline between 1.6 and 2.6 percent, depending on the region. Its exports to NAFTA and the EU decline by such a dramatic absolute amount because it initially has high export shares to those regions (27 percent to NAFTA and 19 percent to the EU). Advanced East Asia's exports to all other non-RTA members are quite low, less than four percent.

Figure 2 **Change in Exports by Source and Destination** ($(US) m)



Source: results from E&SE and India RTA scenarios.

Exports from other members of the E&SE Asia and India RTA to the non Asia rich economies —NAFTA and the EU—increase, but not by enough to offset the loss from Advanced East Asia. Underlying these combined effects is the fact that the RTA results in substantial cost reductions for the members that enhance their competitiveness and hence their penetration of the markets in rich non-Asia regions.[18]

These changes in trade volumes are mirrored by restructuring of production within the members of the RTA. Most of the changes in the shares of value added by activity are less than 2 percent, although there are some large changes (e.g., wearing apparel in India increases it share by 10.2 percent while the coal activity's share drops by 7.9 percent).

The least developing regions—Rest of South Asia, SACU, and Rest of sub-Saharan Africa—experience a slight decline welfare following the formation of either RTA as trade declines and unemployment increases. As a result of the E&SE Asia and India RTA, the nominal value added shares for natural resource based products expand slightly; the nominal

[18] China and Other East Asia are able to expand exports so dramatically, in part, because the supply of unskilled labour increases, see Table A8.

value added shares of textiles and apparel decline; and the nominal value added shares of most other manufactured goods expand slightly (the change is less than one percent, see figure A2).

4. Efficiency Gains in Developing Asia

The summary macroeconomic measures demonstrate that the gains from productivity growth within India and China in isolation are largely concentrated within that region (see Table 5); and while the spillover effects on other regions are limited they are positive. Most of this gain is generated by the expansion of exports by the growing region, since a region becomes more competitive with productivity growth, and this produces some small declines in export volumes by other regions: only one region, NAFTA, experiences a marginal increase. These summary measures are supported by the detailed estimates of the changes in bilateral trade flows.

Table 5 Summary Macroeconomic and Welfare Results for Growth Scenarios

	Absorption ($US bn)	Absorption (%)			Welfare ($US bn)	Export supply (%)		
	Base	India 10% growth	China 10% growth	Developing Asia 10% growth	Developing Asia 10% growth	India 10% growth	China 10% growth	Developing Asia 10% growth
China	1,224	0.00	8.98	9.06	110.83	-0.01	10.60	10.54
Adv East Asia	5,266	0.00	0.12	0.21	10.93	0.01	0.08	0.14
Middle East Asia	182	0.10	0.37	6.93	12.61	-0.01	-0.04	8.61
Other East Asia	317	0.05	0.21	7.75	24.56	-0.07	-0.20	9.86
India	476	7.95	0.00	7.91	37.69	11.25	-0.14	11.00
Rest of S Asia	150	0.07	0.01	0.09	0.13	-0.04	-0.16	-0.34
NAFTA	11,764	0.01	0.06	0.09	10.64	0.01	0.02	0.01
MERCOSUR	917	0.01	0.05	0.09	0.79	-0.01	-0.04	-0.08
Americas	485	0.05	0.07	0.16	0.76	-0.04	-0.09	-0.19
EU	8,668	0.01	0.05	0.09	7.95	0.00	-0.02	-0.04
MENA	1,017	0.08	0.20	0.45	4.60	-0.05	-0.17	-0.35
SACU	113	0.07	0.15	0.26	0.29	-0.01	-0.06	-0.09
Rest of SSA	207	0.15	0.33	0.68	1.41	0.00	-0.06	-0.06
RoW	492	0.04	0.17	0.28	1.36	-0.03	-0.09	-0.17

Source: results from China growth, India growth, and Developing Asia growth scenarios.

There are few surprises in the results considered so far. In general, the prospective members of an RTA gain while non members lose small amounts, and the impacts of growth —efficiency gains— far outweigh the potential static benefits of integration. The impacts on other regions are mixed: generally positive in welfare and import terms but somewhat negative in terms of exports, as the regions that are not experiencing efficiency gains lose

competitiveness. The terms-of-trade results are also consistent with these patterns in the results (Table 6) in that the terms of trade deteriorate for those regions experiencing efficiency gains, but appreciate slightly for those regions not experiencing the efficiency gains. Consequently, the percentage increases in absorption for growing fall short of the efficiency gains.

The terms of trade for sub groups of commodities, i.e., agricultural, natural resource, food, manufacturing, utility and service commodities, follow much the same pattern, with the deterioration in the terms of trade more marked for the broad commodity groups where the efficiency gains are realised (food, manufacturing, utility, and service commodities). It is notable that the terms-of-trade effects are most pronounced in those groups of commodities that are least traded.

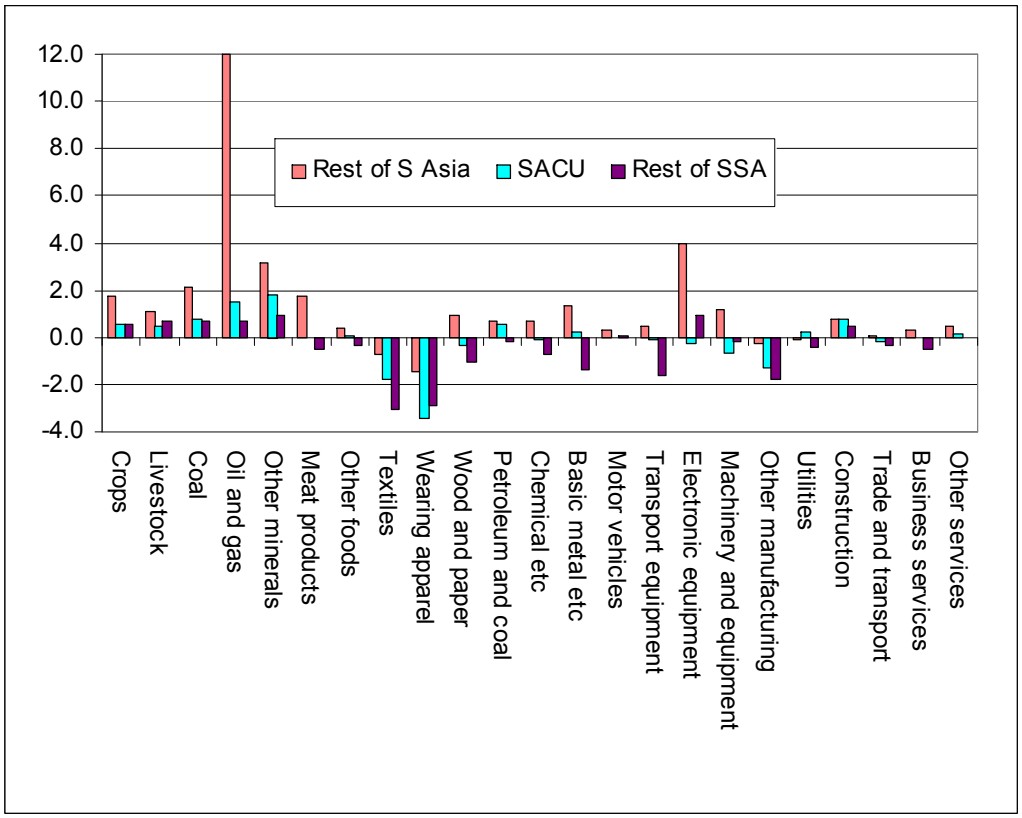
Table 6 Terms of Trade – Productivity Growth in Developing Asia

	Overall	Agriculture	Natural Resources	Food	Industry	Utility	Service
China	95.7	98.5	96.0	97.9	96.2	98.1	94.3
Adv East Asia	101.1	101.3	100.9	100.8	101.5	100.4	101.2
Middle East Asia	96.3	99.6	99.1	98.7	96.7	96.5	93.7
Other East Asia	96.3	99.2	98.0	98.5	95.6	94.2	92.9
India	94.7	98.7	92.6	98.8	95.7	92.7	93.0
Rest of S Asia	100.5	100.1	101.8	100.6	100.6	100.4	100.9
NAFTA	100.6	100.4	100.0	100.3	100.5	100.1	101.1
MERCOSUR	100.5	100.4	100.4	100.1	100.2	100.1	100.8
Americas	100.6	100.0	100.9	100.1	100.2	100.1	100.8
EU	100.3	99.9	100.0	100.1	100.2	100.0	100.9
MENA	101.3	100.1	100.9	100.3	100.9	100.0	100.7
SACU	100.5	99.9	100.3	100.3	100.4	99.8	100.7
Rest of SSA	101.3	100.3	100.8	100.2	100.8	100.1	100.6
RoW	100.6	100.3	100.2	100.2	100.5	100.1	100.9

Source: results from Developing Asia growth scenario.

Efficiency gains in developing Asia affect the least developed regions. The small magnitudes of the macroeconomic implications of efficiency gains in developing Asia for other regions suggest that the impacts upon their economies are likely to be small. For the least developed regions —Rest of South Asia, Rest of sub Saharan Africa and SACU— the welfare gains is only $(US) 1.8bn, which while positive is less than an 0.4 percent increase, although in proportionate terms it is some 3.5 times the proportionate gains experienced by other non-growing regions. Much of the benefit that accrues to regions that are not experiencing efficiency gains comes through declining import prices.

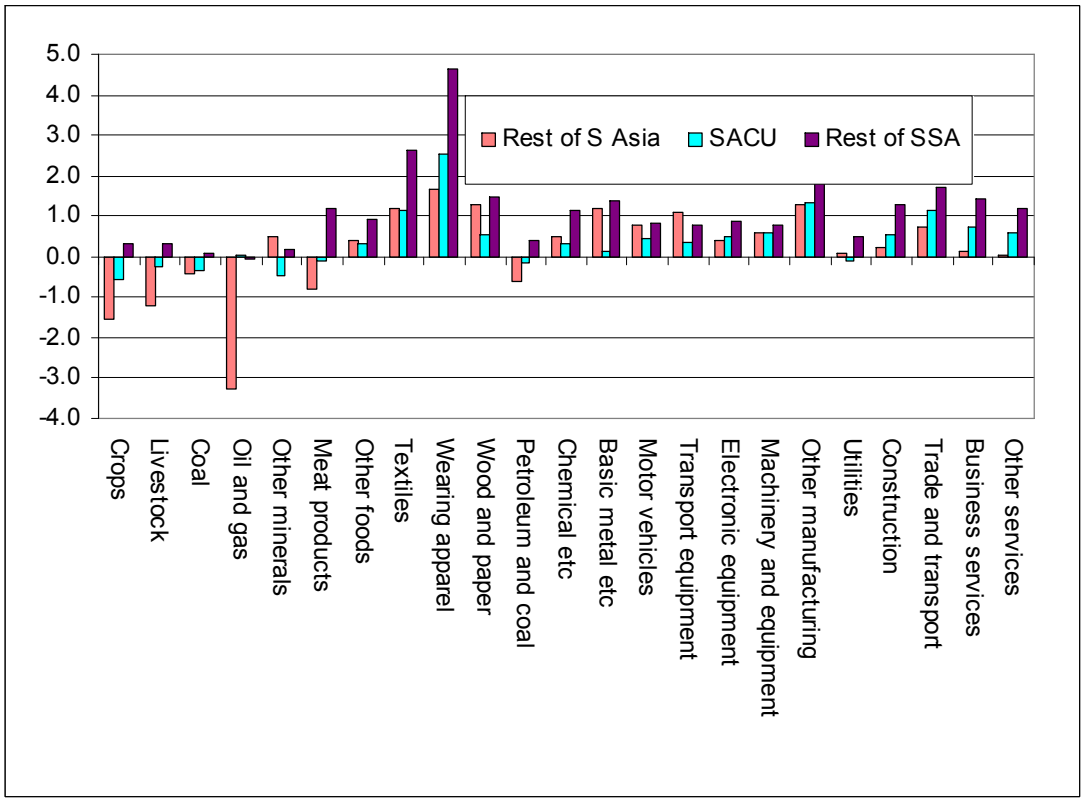
Figure 3 **Aggregate Exports by Least Developed Regions** (% change)



Source: results from Developing Asia growth scenario.

Trade patterns change in least developed regions as a result of growth in developing Asia. Figures 3 and 4 illustrate the proportion changes in trade volumes by commodity for the least developed regions. While overall export volumes decline by small amounts (Table 5), the declines in export volumes are concentrated in manufactured commodities, while there are appreciable increases in primary commodity exports (the change for oil and gas from the Rest of South Asia is misleading since it is from a small base). There is evidence from the export data that the experiences of least developed countries in Asia will differ from those in Africa. The Asian regions see increases in exports across most commodities, with declining exports concentrated in textiles and wearing apparel that accounted for nearly 60 percent of exports in the base period. Consequently there is evidence to suggest that the least developed countries will become less able to compete in those sectors that they are currently seeking to expand, and will be encouraged to expand production in primary commodity sectors.

Figure 4 **Aggregate Imports by Least Developed Regions** (% change)



Source: results from Developing Asia growth scenario.

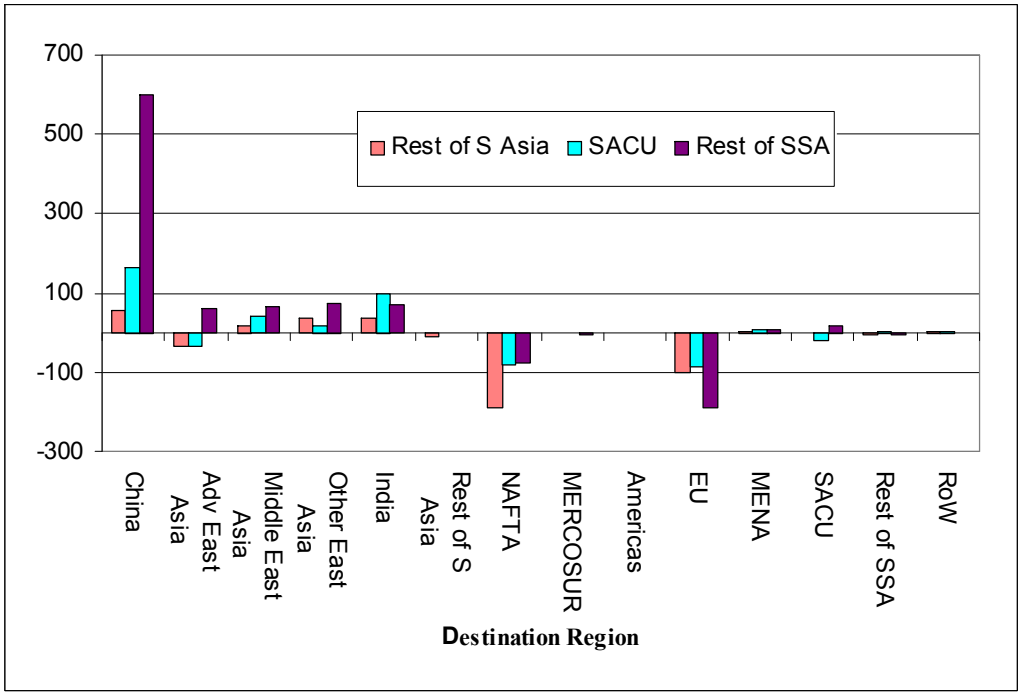
This is further emphasised by the imports results (Figure 4), which indicate increasing imports across nearly all non-primary commodities for all least developed regions, together with declining imports of primary commodities. These results are consistent with greater penetration of the secondary and tertiary markets in least developed regions, which induce shifts towards the primary commodity sectors; shifts that are further encouraged by growing demand for primary commodity inputs in the growing regions.

The results for the direction of trade flows, Figures 5 and 6, demonstrate that the least developed countries will increasingly source imports from, and direct exports to, the developing Asian economies. To a large extent this is achieved by re-directing exports from the traditional markets of the EU and NAFTA, while shifting resources towards the primary commodity sectors (see below).[19] An examination of the bilateral trade results shows that the dominant factors are the declining prices of exports of commodities from the developing Asian

[19] The Rest of South Asia and SACU also reduce imports from the EU and NAFTA.

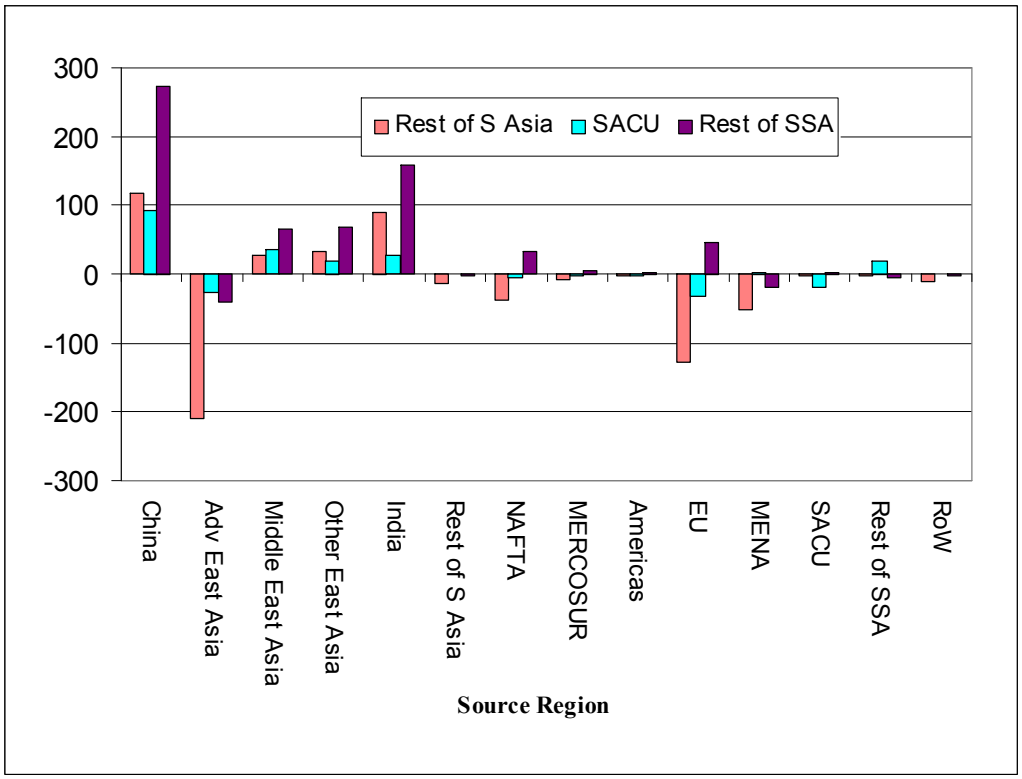
economies coupled with an escalating demand by those economies for inputs of primary commodities. Indeed total supply of coal, oil and gas and other minerals to the developing Asian economies increases by nearly 10 percent. Notably, agricultural commodity supplies increase by less than half the rates for fuel and mineral commodities.

Figure 5 **Changes in Exports by Destination from Least Developed Regions**
($US millions)



Source: results from Developing Asia growth scenario.

Figure 6 **Changes in Imports by Source to Least Developed Regions** ($US millions)

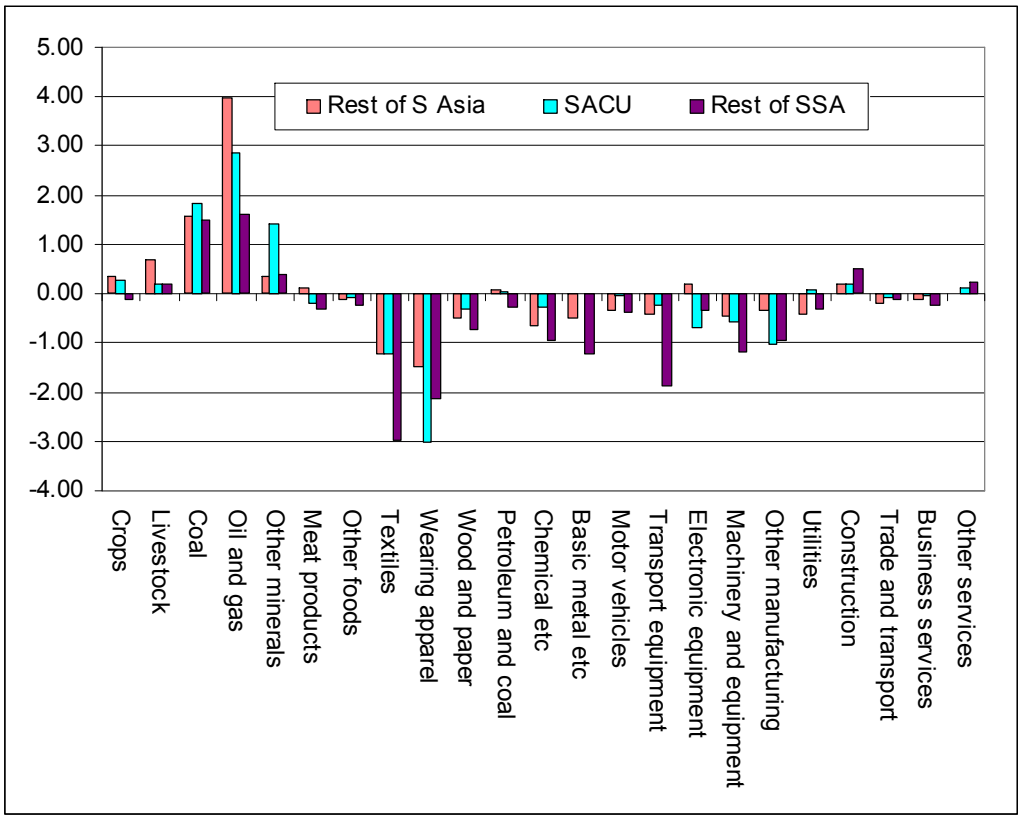


Source: results from Developing Asia growth scenario.

These changes in trade patterns and the changes in prices that drive the changes, prompt substantial structural adjustments in the least developed economies (see Figure 7 which reports the percent change in the nominal value added shares). Typically primary commodity producing sectors expand, and in particular those sectors producing fuels and minerals, while secondary and tertiary sectors decline contract, most notably in the textiles and wearing apparel sectors. The one obvious exception is the construction sector, which since there are only marginal changes in the investment price index, is due primarily to the growth effect. This is consistent with 'Dutch Disease' type effects wherein a boom in demand for primary commodities appreciates the exchange rate and thereby adversely impacts upon the prospects of manufacturing sectors, but at the same time generates a positive income effect that allows

for increases in absorption, which, given the behavioural assumptions underlying this model, produces increases in investment.[20]

Figure 7 **Shares of Value Added by Activity in Least Developed Region** (% change)



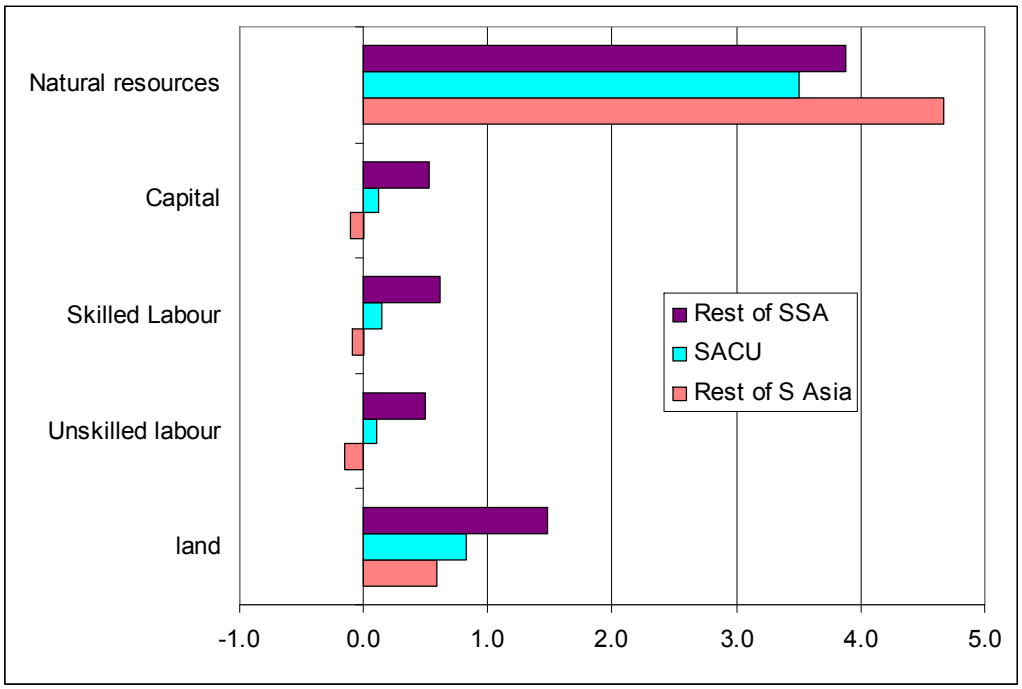
Source: results from Developing Asia growth scenario.

It is notable that in this case the exchange rates appreciate for the African regions but depreciate for the Rest of South Asia, which is consistent with the relative importance of primary commodity exports in those regions. Overall there is an expansion of trade between the least developed regions and the developing Asia regions, but the increases in absolute trade export values are appreciably greater for the African regions than the Rest of South Asia, which is a reflection of the greater presence of the African regions as sources of natural resource based primary commodities.

[20] This evidence supports the concerns raised by Goldstein et al., (2006) about the potential for 'Dutch Disease' effects in Africa.

The overall impacts are realised through the changes in factor incomes in the least developed regions (see figure 8).[21] Incomes for land and, especially, natural resources increase markedly while income changes for other factors increase more slowly, or in the case of the Rest of South Asia, decline, which emphasises the potential for differences in the responses by different least developed countries. Noticeably the changes in labour and capital incomes are inversely related to the level of development within the least developed regions.

Figure 8 Factor Incomes in Least Developed Regions (% change)



Source: results from Developing Asia growth scenario.

5. Concluding Comments

This study has considered the empirical implications, particularly for developing countries, of the continuation of two strong trends in the global economy: (1) the continued integration of the E&SE Asia trading bloc, and (2) the continued rapid growth of important

[21] The percentage change in factor incomes combines the effects of changes in wage rates and the supply of factors. Where a factor is fully employed the change is solely due to changes in wages rates and where there are unemployed factors a fixed (real) wage rate the changes are due to changes in employment.

countries in Asia, with increasing pressure on world markets for manufactures and primary commodities. The results indicate that:

- The continued integration of E&SE Asia, with the effective creation of a free trade area, would increase welfare in the region and generate small losses for countries outside the bloc.
- The inclusion of India in the trade bloc would lead to a welfare gain for India, and also additional substantial gains for existing bloc members. The impacts on countries outside the bloc are small.
- Continued integration involves significant changes in the structure of production in, and trade by, the E&SE Asia bloc. Advanced Asian countries redirect exports from the EU and the US toward countries within the bloc, while other members increase their exports to the EU and US.
- Increased growth in the developing countries in Asia leads to significant terms-of-trade and welfare gains for the other developing countries, as their import prices fall and world prices of primary exports rises.
- Improvements in the terms of trade lead to Dutch Disease problems for developing countries which export primary commodities. These countries will be less able to compete in world markets for manufactures, where they have been seeking to expand exports, and gain instead from expanding primary exports. While there are increases in welfare, the changes in the structure of trade and production away from manufactures may hinder development in the longer term, particularly in Africa.

The GLOBE model used in this study is neoclassical in spirit and provides a simulation laboratory for analysing the impact of global shocks such as changes in trade policy and differential growth in a consistent, multi-region, general equilibrium framework. While the results indicate significant impacts from differential growth and tariff policy, the model is narrowly focused on standard competitive market mechanisms, omitting many complications. For example, the study assumes that further integration in E&SE Asia involves only the elimination of trade barriers (i.e., 'shallow integration'), and makes no allowance for deeper transformations in the patterns of production and trade linked to behind-the-border institutional changes (i.e., 'deep integration'), which are likely to be an important part of the process of

further integration in the region.[22] The inclusion of issues of institutional change, externalities, and deep integration into empirical trade models is a new and difficult area of active research, with much to be done, but also much to be gained in terms of deeper understanding of the links between expanded trade and economic performance.

With respect to the least developed regions, the study concentrates on broad regional aggregates, which obscures the variety of experience likely to confront the least developed regions. In particular the Dutch Disease effects identified in the analyses indicate that those regions that are rich in natural resources are likely to gain appreciably from increases in world prices of primary commodities, and that these gains will counteract the loses associated with reducing competitiveness in other commodity markets. However, within these regional aggregates, countries that are not natural resource rich are likely to suffer losses far greater than implied by this study. Aggregation is always a difficult issue in empirical models, with tradeoffs between expanding the domain of applicability of the model, straining data sources, and adding complexity that makes analysis of the major forces at work more difficult.

The changes in the global patterns of production and trade associated with the very high growth rates in the Asian Drivers are producing a period of major structural readjustment in the global economy. While the emerging Asian economies remain a relatively small part of the global economy, they are growing rapidly and expanding their role in global markets. Although trade expansion is typically a positive-sum game, the benefits of the gains are not distributed equally, and there is no *a priori* reason that all regions will gain. The results from this study indicate that some economies will in fact lose, and since many of the economies likely to lose are the least developed regions of the world, it is argued that it is important to develop the analytical capacity to understand the forces unleashed by the current period of rapid structural adjustment.

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[22] Consider, for example, the sorts of institutional and structural changes that have been part of the process of deep integration in the EU.

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Appendix

Table A1 Commodity and Activity Account Mappings

GTAP Accounts	Model Accounts	GTAP Accounts	Model Accounts
Paddy rice	Crop agriculture	Wood products	Wood and paper products
Wheat	Crop agriculture	Paper products publishing	Wood and paper products
Cereal grains nec	Crop agriculture	Petroleum coal products	Petroleum and coal products
Vegetables fruit nuts	Crop agriculture	Chemical rubber plastic prods	Chemical rubber & plastic products
Oil seeds	Crop agriculture	Mineral products nec	Basic metal & mineral products
Sugar cane sugar beet	Crop agriculture	Ferrous metals	Basic metal and mineral products
Plant-based fibers	Crop agriculture	Metals nec	Basic metal and mineral products
Crops nec	Crop agriculture	Metal products	Other manufacturing
Cattle sheep goats horses	Animal agriculture	Motor vehicles and parts	Motor vehicles and parts
Animal products nec	Animal agriculture	Transport equipment nec	Other transport equipment
Raw milk	Animal agriculture	Electronic equipment	Electronic equipment
Wool silk-worm cocoons	Animal agriculture	Machinery and equipment nec	Machinery and equipment
Forestry	Crop agriculture	Manufactures nec	Other manufacturing
Fishing	Animal agriculture	Electricity	Utilities
Coal	Coal	Gas manufacture distribution	Utilities
Oil	Oil and gas	Water	Utilities
Gas	Oil and gas	Construction	Construction
Minerals nec	Other minerals	Trade	Trade and transport
Meat: cattle sheep goats horse	Meat products	Transport nec	Trade and transport
Meat products nec	Meat products	Sea transport	Trade and transport
Vegetable oils and fats	Other foods	Air transport	Trade and transport
Dairy products	Meat products	Communication	Trade and transport
Processed rice	Other foods	Financial services nec	Business services
Sugar	Other foods	Insurance	Business services

Food products nec	Other foods	Business services nec	Business services
Beverages and tobacco products	Other foods	Recreation & other services	Other services
Textiles	Textiles	PubAdmin Defence Health Educat	Other services
Wearing apparel	Wearing apparel	Dwellings	Other services
Leather products	Wearing apparel		

Table A2 Factor Account Mappings

GTAP Accounts	Model Accounts
Land	Land
Unskilled labour	Unskilled labour
Skilled labour	Skilled Labour
Capital	Capital
Natural Resources	Natural resources

Table A3 Region Account Mappings

GTAP Accounts	Model Accounts	GTAP Accounts	Model Accounts
Australia	Advanced East Asia	Canada	NAFTA
New Zealand	Advanced East Asia	United States	NAFTA
Japan	Advanced East Asia	Mexico	NAFTA
Korea	Advanced East Asia	Argentina	MERCOSUR plus
Taiwan	Advanced East Asia	Brazil	MERCOSUR plus
Singapore	Advanced East Asia	Chile	MERCOSUR plus
China	China	Colombia	MERCOSUR plus
Hong Kong	China	Uruguay	Rest of the Americas
Rest of East Asia	Middle East Asia	Rest of South America	Rest of the Americas
Malaysia	Middle East Asia	Central America	Rest of the Americas
Rest of Oceania	Middle East Asia	Rest of FTAA	Rest of the Americas
Thailand	Middle East Asia	Rest of the Caribbean	Rest of the Americas
Indonesia	Other East Asia	Rest of North America	Rest of the Americas
Philippines	Other East Asia	Peru	Rest of the Americas
Vietnam	Other East Asia	Venezuela	Rest of the Americas
Rest of Southeast Asia	Other East Asia	Rest of Andean Pact	Rest of the Americas
India	India	Rest of Europe	Rest of the World
Bangladesh	Rest of South Asia	Albania	Rest of the World
Sri Lanka	Rest of South Asia	Bulgaria	Rest of the World
Rest of South Asia	Rest of South Asia	Croatia	Rest of the World
Austria	European Union	Romania	Rest of the World
Belgium	European Union	Russian Federation	Rest of the World
Denmark	European Union	Rest of Former Soviet Union	Rest of the World
Finland	European Union	Turkey	Middle East and North Africa
France	European Union	Rest of Middle East	Middle East and North Africa
Germany	European Union	Morocco	Middle East and North Africa
United Kingdom	European Union	Tunisia	Middle East and North Africa
Greece	European Union	Rest of North Africa	Middle East and North Africa
Ireland	European Union	Botswana	Southern Africa Customs Union
Italy	European Union	South Africa	Southern Africa Customs Union
Luxembourg	European Union	Rest of South African CU	Southern Africa Customs Union
Netherlands	European Union	Malawi	Rest of sub-Saharan Africa
Portugal	European Union	Mozambique	Rest of sub-Saharan Africa

Spain	European Union	Tanzania	Rest of sub-Saharan Africa
Sweden	European Union	Zambia	Rest of sub-Saharan Africa
Switzerland	European Union	Zimbabwe	Rest of sub-Saharan Africa
Rest of EFTA	European Union	Rest of SADC	Rest of sub-Saharan Africa
Cyprus	European Union	Madagascar	Rest of sub-Saharan Africa
Czech Republic	European Union	Uganda	Rest of sub-Saharan Africa
Hungary	European Union	Rest of Sub-Saharan Africa	Rest of sub-Saharan Africa
Malta	European Union		
Poland	European Union		
Slovakia	European Union		
Slovenia	European Union		
Estonia	European Union		
Latvia	European Union		
Lithuania	European Union		

Table A.4 Export Shares by Least Developed Countries

	From Rest of South Asia to :			From SACU to:			From Rest of SSA to:		
	China	E&SE Asia	India	China	E&SE Asia	India	China	E&SE Asia	India
Crops	0.02	0.11	0.07	0.03	0.13	0.00	0.06	0.10	0.04
Livestock	0.03	0.39	0.06	0.06	0.06	0.00	0.12	0.06	0.04
Coal	0.05	0.09	0.11	0.00	0.06	0.03	0.03	0.08	0.01
Oil and gas	0.01	0.60	0.15	0.00	0.01	0.01	0.06	0.08	0.00
Other minerals	0.29	0.25	0.07	0.20	0.22	0.02	0.11	0.11	0.04
Meat products	0.01	0.01	0.75	0.01	0.04	0.00	0.01	0.04	0.00
Other foods	0.02	0.13	0.02	0.02	0.13	0.00	0.02	0.07	0.00
Textiles	0.07	0.09	0.01	0.01	0.07	0.01	0.01	0.03	0.01
Wearing apparel	0.01	0.03	0.00	0.02	0.06	0.00	0.01	0.02	0.01
Wood and paper	0.00	0.07	0.11	0.02	0.19	0.01	0.01	0.01	0.01
Petroleum and coal	0.01	0.20	0.01	0.01	0.06	0.01	0.01	0.09	0.01
Chemical etc	0.06	0.10	0.17	0.03	0.09	0.04	0.00	0.04	0.10
Basic metal etc	0.01	0.10	0.26	0.03	0.23	0.10	0.02	0.08	0.01
Motor vehicles	0.01	0.14	0.00	0.02	0.24	0.00	0.01	0.02	0.00
Transport equipment	0.06	0.02	0.01	0.02	0.02	0.00	0.00	0.14	0.04
Electronic equipment	0.08	0.45	0.01	0.02	0.06	0.01	0.02	0.07	0.00
Machinery and equipment	0.02	0.29	0.02	0.03	0.04	0.01	0.04	0.05	0.01
Other manufacturing	0.00	0.10	0.01	0.03	0.01	0.00	0.00	0.02	0.02
Utilities	0.03	0.03	0.05	0.01	0.02	0.01	0.00	0.01	0.00
Construction	0.07	0.23	0.00	0.04	0.27	0.00	0.06	0.21	0.01
Business services	0.04	0.18	0.01	0.05	0.16	0.01	0.03	0.18	0.01
Other services	0.03	0.07	0.00	0.03	0.12	0.00	0.03	0.09	0.01

Source: model database form GTAP 6.

Table A5 Import Shares by Least Developed Countries

	Rest of South Asia's imports from :			SACU's imports from:			Rest of SSA's imports from:		
	China	E&SE Asia	India	China	E&SE Asia	India	China	E&SE Asia	India
Crops	0.04	0.22	0.15	0.03	0.11	0.03	0.03	0.09	0.02
Livestock	0.11	0.32	0.12	0.05	0.11	0.00	0.04	0.08	0.01
Coal	0.02	0.48	0.37	0.00	0.92	0.00	0.05	0.13	0.03

Oil and gas	0.00	0.03	0.00	0.00	0.04	0.00	0.01	0.02	0.00
Other minerals	0.05	0.33	0.25	0.02	0.07	0.02	0.01	0.02	0.04
Meat products	0.00	0.68	0.04	0.02	0.23	0.00	0.00	0.15	0.02
Other foods	0.00	0.38	0.15	0.01	0.15	0.05	0.04	0.19	0.03
Textiles	0.25	0.50	0.10	0.15	0.33	0.04	0.28	0.21	0.16
Wearing apparel	0.17	0.33	0.08	0.36	0.08	0.08	0.31	0.26	0.05
Wood and paper	0.05	0.43	0.10	0.02	0.08	0.00	0.02	0.09	0.03
Petroleum and coal	0.01	0.19	0.02	0.01	0.01	0.01	0.04	0.02	0.01
Chemical etc	0.10	0.36	0.09	0.03	0.12	0.01	0.05	0.12	0.06
Basic metal etc	0.05	0.41	0.12	0.04	0.22	0.01	0.03	0.11	0.06
Motor vehicles	0.07	0.57	0.10	0.00	0.22	0.00	0.02	0.19	0.02
Transport equipment	0.10	0.34	0.11	0.01	0.04	0.00	0.04	0.38	0.02
Electronic equipment	0.14	0.49	0.02	0.08	0.21	0.00	0.05	0.15	0.01
Machinery and equipment	0.12	0.32	0.07	0.03	0.17	0.01	0.07	0.11	0.02
Other manufacturing	0.14	0.31	0.07	0.09	0.13	0.03	0.13	0.07	0.06
Utilities	0.02	0.04	0.01	0.00	0.00	0.00	0.01	0.01	0.00
Construction	0.04	0.20	0.01	0.03	0.19	0.00	0.04	0.20	0.00
Business services	0.04	0.15	0.01	0.03	0.12	0.01	0.04	0.14	0.02
Other services	0.02	0.10	0.01	0.02	0.09	0.00	0.02	0.08	0.01

Source: model database form GTAP 6.

Table A6 Average Tariff Rates – E&SE Asia and India

	China	Adv East Asia	Middle East Asia	Other East Asia	India
Crops	0.43	0.47	0.16	0.04	0.23
Livestock	0.04	0.04	0.05	0.03	0.14
Coal	0.01	0.00	0.01	0.05	0.43
Oil and gas	0.00	0.02	0.00	0.02	0.15
Other minerals	0.01	0.00	0.01	0.02	0.11
Meat products	0.08	0.40	0.06	0.09	0.57
Other foods	0.10	0.20	0.27	0.21	0.79
Textiles	0.15	0.07	0.12	0.13	0.26
Wearing apparel	0.04	0.11	0.11	0.14	0.28
Wood and paper	0.07	0.02	0.10	0.06	0.22
Petroleum and coal	0.06	0.02	0.01	0.06	0.17
Chemical etc	0.11	0.03	0.08	0.05	0.31
Basic metal etc	0.06	0.02	0.08	0.05	0.33
Motor vehicles	0.29	0.09	0.36	0.21	0.40
Transport equipment	0.04	0.00	0.06	0.16	0.19
Electronic equipment	0.07	0.00	0.02	0.01	0.15
Machinery and equipment	0.11	0.02	0.06	0.04	0.25
Other manufacturing	0.07	0.02	0.10	0.09	0.34

Source: model database form GTAP 6.

Table A7 Sectoral Export Shares of Production for Selected Regions

	Percent of production that is exported						
	China	Adv East Asia	Middle East Asia	Other East Asia	India	SACU	Rest of SSA
Crops	2.6	8.0	21.9	11.9	2.9	29.3	18.2
Livestock	1.8	6.9	6.4	2.7	0.4	7.0	2.3
Coal	23.6	66.4	2.1	66.1	1.3	30.8	1.4
Oil and gas	3.7	33.9	41.3	55.8	0.0	38.8	87.4
Other minerals	1.8	20.7	28.2	35.5	39.6	44.0	24.0
Meat products	7.3	13.8	31.7	4.3	6.8	7.4	3.1
Other foods	5.0	3.7	41.0	12.7	7.5	18.1	8.6
Textiles	16.1	42.3	33.1	29.5	20.7	18.4	19.6
Wearing apparel	55.1	12.8	52.1	69.9	68.1	45.9	28.9
Wood and paper	16.6	5.3	46.8	48.2	5.4	24.0	15.3
Petroleum and coal	5.1	8.8	14.5	8.2	6.0	17.4	11.5
Chemical etc	11.3	19.9	47.4	25.1	12.6	24.9	13.5
Basic metal etc	5.7	14.9	31.2	26.0	8.4	63.3	39.7
Motor vehicles	5.4	27.5	17.9	5.8	5.9	32.5	55.0
Transport equipment	16.6	46.0	47.8	34.2	6.0	35.8	65.8
Electronic equipment	54.9	43.8	91.4	79.9	13.0	48.8	38.0
Machinery and equipment	21.5	40.4	60.4	58.3	11.3	39.8	42.1
Other manufacturing	32.1	13.5	35.2	27.2	25.3	55.4	18.9
Utilities	0.7	0.1	1.3	0.2	0.0	2.4	8.5
Construction	0.3	0.6	2.4	0.7	0.0	0.1	0.6
Trade and transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Business services	13.0	3.4	32.0	7.4	14.9	4.0	9.4
Other services	1.5	0.7	5.4	2.1	1.0	1.5	3.9

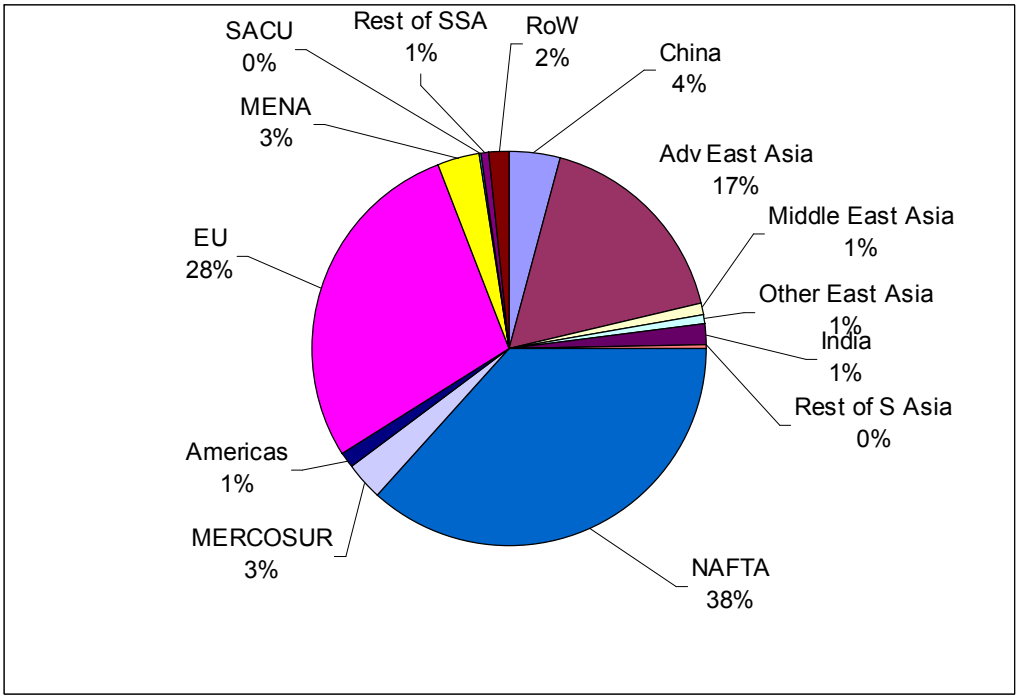
Source: model database form GTAP 6.

Table A8 **Unskilled Labour Supply** (% change)

	E&SE Asia RTA	E&SE Asia & India RTA	India 10% growth	China 10% growth	Developing E&SE Asia 10% growth
China	2.4	2.4	0.0	5.1	5.1
Other East Asia	1.7	1.9	0.0	0.0	5.6
India	-0.2	1.3	4.3	-0.1	4.1
Rest of S Asia	-0.3	-0.4	0.0	-0.1	-0.2
SACU	-0.1	-0.2	0.0	0.1	0.1
Rest of SSA	-0.1	-0.1	0.1	0.2	0.5

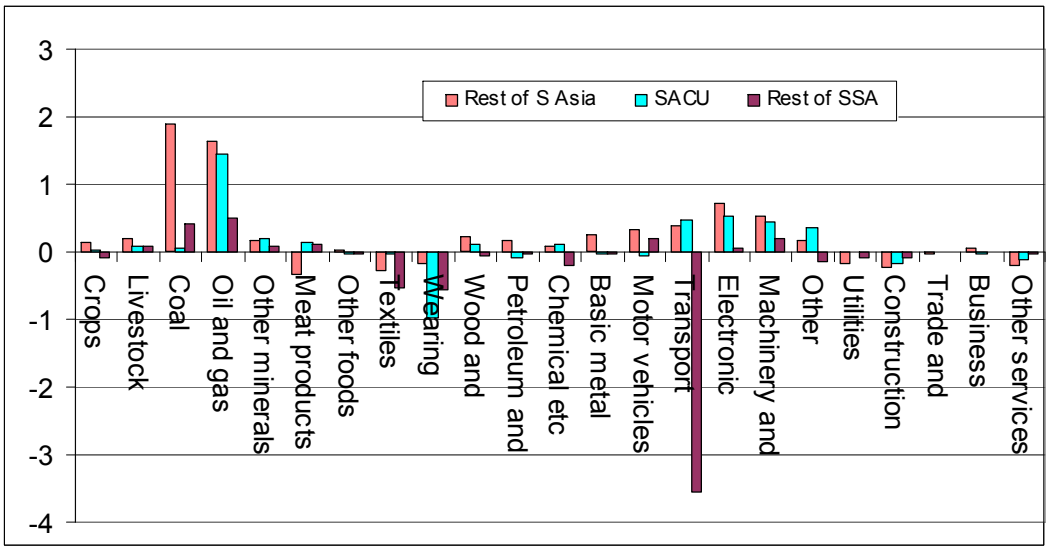
Source: model simulation results for each scenario.

Figure A1 **Global GDP (expenditure measure)**



Source: model database form GTAP 6.

Figure A2 **Shares of Value Added by Activity in Least Developed Region** (% change)



Source: results from E&SE Asia and India RTA.