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ABSTRACT

In this paper, we examine the bilateral implications of regional and global trade arrangements in the East Asian context. Using a dynamic global CGE model, we examine a variety of trade scenarios, in terms of bilateral relations between China and two of its most populace regional partners, Vietnam and Japan. Given the differences between the latter two economies, it might be reasonable to expect divergence in the bilateral outcomes. Our findings indicate that differences in initial conditions can indeed have a significant impact on bilateral adjustments, and that these can be adverse for some partners in the absence of policies that promote trade complementarity. By the latter we mean bilateral import and export patterns where the aggregate grows faster for each country than their total trade, but which help sustain bilateral balance of payments equilibrium.

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1. Introduction

The accession of China to the WTO is a watershed event for the global economy generally and for the East Asian region in particular. China has already established new standards for sustained growth and dynamic resource allocation by a large economy, and further Chinese domestic and external liberalization will redefine trade relations in ways that are only beginning to be understood. Initial reactions among most regional partners, who perceive China as a strong export competitor and magnet for FDI, have been somewhat defensive preoccupied as they are with how the regional trade system may develop in the coming years. These sentiments can undermine both regional and global multilateralism and could retard the progress of trade-induced growth in the region. Nowhere is awareness of China's rapid emergence more acute than in Vietnam and Japan, two of its most populace East Asian neighbors. Vietnam is a prime candidate for the same rapid Asian growth experience and, in important respects, might be seen as an apparent competitor to China. Japan is an established industrial power with very extensive export markets where China is a real and potential competitor.

In this paper, we try to enrich the simplistic view of head-to-head export competitiveness, reaching beyond traditional Ricardian ideas of large-scale sectoral specialization and looking instead at more complex mosaics of regional trade. In recent decades, the phenomenon of supply chain decomposition has drastically increased the scope and depth of intra-industry trade, both regionally and globally. For this reason, benefits from trade expansion are now more uniformly distributed, and trade patterns are more and more likely to exhibit complementarity than substitution between countries.

To elucidate these patterns, we use a new global dynamic general equilibrium model to forecast changing trade patterns over the next two decades. Examining a variety of trade scenarios, our results indicate for both Vietnam-China and Japan-China, that bilateral trade expands faster for both countries than their total trade, but bilateral imbalances between these pairs often do too. For this reason, it is important to examine

compositional effects closely. Here we see a more variegated picture of mutual trade benefits, ones that offer attractive but subtle opportunities to trade policy makers.

The next section of the paper summarizes the conceptual framework within which we want to evaluate bilateral trade. This is followed in section 3 with a general description of the modelling facility and baseline data. In section four, we outline a series of trade scenarios and present the main results and analysis of the paper. A fifth and final section of the exposition is devoted to concluding remarks and indications of how this work might be extended.

2. International Trade and Bilateral Complementarity

The incessant drumbeat of globalization often drowns out more detailed and immediate considerations, including bilateral trade relations with neighboring countries. Because of shared history, geographically proximate countries are more likely to adopt open multilateralism with careful attention to established economic and political relationships. In the East Asian context, this perspective is relevant to both developing and developed countries.

Consider the case of developing countries. The most intense interest in globalization is usually focused on North-South trade relations, yet most developing countries are embedded in regional communities of countries more like themselves than like OECD members. This is particularly the case in Latin America and Africa, neither of which contains a single OECD country, but is also true of much of Asia. While East Asia, includes several countries and economic regions that are highly industrialized, the majority of the region's population live in developing countries bordering on other developing countries. For this reason, the South-South dimension of globalization is of particular interest.[2]

[2] It is noted that by North-South and South-South we refer here to respectively trade between developed and developing countries, and to trade between developing countries. In the case of Vietnam and China the structure of trade is similar to North-South trade in the sense that Vietnam exports primary goods and imports manufactured items. Some 75 percent of Vietnam's exports to China in 2000 were materials and

Proximity to China is the most dramatic example of this phenomenon, and the most populous East Asian nation bordering China is Vietnam. Both countries are considered to have very significant economic potential, but China has a first-mover advantage in many aspects of economic reform and modernization. Higher levels of market directed resource allocation, industrialization, and inbound foreign investment, among other things are evidence hereof. Although Vietnam set records for national poverty alleviation in the last decade, it is still at the early stages of economic modernization. For these reasons, trade relations between Vietnam and China represent an especially interesting case, where differences in initial conditions could lead to sustained imbalances and patterns of resource allocation that reinforce inequality between the two countries. For example, could China's early lead in manufacturing lead to chronic import dependence by Vietnam, denying it the opportunity to develop its own industrial capacity? Likewise, could Vietnam's comparative advantage in relatively low value added primary products lead to chronic export bias in these sectors? In either or both cases, initial conditions could lead to sustained inequality between the two countries.

From a more traditional North-South perspective, the bilateral relationship between China and Japan provides an interesting example. Japan is a first-tier industrialized country with a very well established presence in many important export markets. China's emergence is of particular interest to Japan because of its proximity, size, and the remarkable diversity of its expanding economic activities. Rather than playing the traditional Southern role of primary and low value added exporter, China is rapidly moving up the value added ladder and challenging regional exporters for market share in a wide spectrum of higher technology manufactures. Although this provides attractive investment opportunities for outsiders, some in Japan fear China will displace domestic production capacity and employment by a combination of import competition and crowding out in third party export markets. While this concern ignores new export opportunities arising from Chinese absorption, it is widely felt and undermines domestic support for globalization.

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processed food, and this share has been increasing steadily. In contrast, vehicles and equipment from China made up more than 41 percent of Vietnamese imports from China in 2000.

In this paper, we begin examination of the bilateral implications of globalism in a limited way. The traditional perspective of Ricardian comparative advantage envisaged nations specializing in relatively generic activities, which would today be classified in single or at most double-digit customs codes. In this world, the international division of labor could be seen in broad taxonomies of production and employment (resource-intensive, agriculture, skill-intensive, energy-intensive, etc.). By contrast, one of the most dramatic emerging realities of globalization is the proliferation of intra-industry trade.[3] The primary drivers of this phenomenon are trans-national corporations (TNCs). These firms, individually and especially through contract mechanisms, are decomposing supply chains, regionally and globally, for a variety of reasons unmentioned by Ricardo, including market access, "geographic" or local incentives (rent and other margin seeking), legal conditions, and a variety of cost arbitrage strategies (supply chain bargaining, risk management, etc.).

The result of this global trend toward supply chain decomposition is that intra-industry trade is now observable at the most detailed levels of disaggregation (6, 8, and even 10 digit customs lines), and the traditional notion of Ricardian comparative advantage must be reconsidered. Yes, the determinants of comparative advantage are probably what they always were, but to identify them empirically, at the national level, with individual production activities is less revealing than it once was. Yes, it is still important to promote production and employment in higher wage activities, but thanks to technology the path to wage appreciation is open to many sectors that were once thought to be low wage traps. The important thing for most countries is to promote supply expansion in an environment with mobile capital and viable efficiency criteria. In this context, economic expansion and rising living standards can move in parallel.

Thus we want to examine the issue of bilateralism, in the context of globalization, in a more limited way. In particular, we consider bilateral trade to be complementary if it makes a superior contribution to trade growth for the two partners and does not aggravate trade imbalances. This might seem like minimal conditions for consensual bilateral trade, but they are important ones to monitor when initial conditions vary greatly between

[3] This is as already alluded to not so characteristic in the case of Vietnam-China trade as in Japan-China trade.

trading partners. More specifically, consider two countries, denoted i and j, and define the following notation, where trade is measured in common international prices:

E_{ij}^k = Bilateral exports from i to j, in period k.

$B_{ij}^k = E_{ij}^k + E_{ji}^k$ = Total bilateral trade between i and j in period k

$T_i^k = \sum_j B_{ij}^k$ = Total trade of country i in period k (exports plus imports)

By extension:

$\beta_{ij} = \frac{B_{ij}^2 - B_{ij}^1}{B_{ij}^1}$ = percentage change between periods 1 and 2 in ij bilateral trade (note that $\beta_{ij} = \beta_{ji}$)

$\tau_i = \frac{T_i^2 - T_i^1}{T_i^1}$ = percentage change in total trade between periods 1 and 2 for country i

$\gamma_i^k = \frac{E_{ij}^k - E_{ji}^k}{GDP_i^k}$ = the bilateral trade gap as a percent of country i GDP in year k

Now we establish the following two criteria for Bilateral Trade Complementarity (BTC), from the perspective of country i, looking at the prospect of trade with country j,

1. $BTG_{ij} = \frac{\beta_{ij}}{\tau_i} \geq 1$

2. $BTI_i = \frac{\gamma_i^2}{|\gamma_i^1|} \leq 1$

The first condition above (the index of Bilateral Trade Growth) states that the percent change in bilateral trade should be at least equal to the percent change in total trade for country i. The second condition (index of Bilateral Trade Imbalance) states that the

bilateral trade imbalance as seen by country i with respect to j, will not grow as a percent of GDP. If both conditions are satisfied for one country, we say bilateral trade is weakly complementary, i.e. the incentive to trade exists on one side, but perhaps not on the other. When both conditions are satisfied in both countries, bilateral trade is strongly complementary.

3. Methodology and Data

3.1. Model Specification

The complexities of today's global economy make it very unlikely that policy makers relying on intuition or rules-of-thumb will achieve anything approaching optimality in either the international or domestic arenas. Market interactions are so pervasive in determining economic outcomes that more sophisticated empirical research tools are needed to improve visibility for both public and private sector decision makers. The preferred tool for detailed empirical analysis of economic policy is now the Calibrated General Equilibrium (CGE) model. It is well suited to trade analysis because it can detail structural adjustments within national economies and elucidate their interactions in international markets. The model is more extensively discussed in an annex below and the underlying methodology is fully documented elsewhere, but a few general comments will facilitate discussion and interpretation of the scenario results that follow.[4]

Technically, a CGE model is a system of simultaneous equations that simulate price-directed interactions between firms and households in commodity and factor markets. The role of government, capital markets, and other trading partners are also specified, with varying degrees of detail and passivity, to close the model and account for economywide resource allocation, production, and income determination.

The role of markets is to mediate exchange, usually with a flexible system of prices, the most important endogenous variables in a typical CGE model. As in a real

[4] The model used here is typical of modern global models and is based on the LINKAGE model developed at the World Bank (van der Mensbrugghe, 2001).

market economy, commodity and factor price changes induce changes in the level and composition of supply and demand, production and income, and the remaining endogenous variables in the system. In CGE models, an equation system is solved for prices that correspond to equilibrium in markets and satisfy the accounting identities governing economic behavior. If such a system is precisely specified, equilibrium always exists and such a consistent model can be calibrated to a base period data set. The resulting calibrated general equilibrium model is then used to simulate the economywide (and regional) effects of alternative policies or external events.

The distinguishing feature of a general equilibrium model, applied or theoretical, is its closed-form specification of all activities in the economic system under study. This can be contrasted with more traditional partial equilibrium analysis, where linkages to other domestic markets and agents are deliberately excluded from consideration. A large and growing body of evidence suggests that indirect effects (e.g., upstream and downstream production linkages) arising from policy changes are not only substantial, but may in some cases even outweigh direct effects. Only a model that consistently specifies economywide interactions can fully assess the implications of economic policies or business strategies. In a multi-country model like the one used in this study, indirect effects include the trade linkages between countries and regions which themselves can have policy implications.

The model we use for this work has been constructed according to generally accepted specification standards, implemented in the GAMS programming language, and calibrated to the GTAP global database.[5] The result is a nine-country/region, thirty-sector global CGE model, calibrated over a twenty-four year time path from 1997 to 2020.[6] Apart from its traditional neoclassical roots, an important feature of this model is product differentiation, where we specify that imports is differentiated by country of origin and exports are differentiated by country of destination (e.g., de Melo and Tarr, 1992). This feature allows the model to capture the pervasive phenomenon of intra-industry trade,

[5] See e.g. Meeraus et al. (1992) for GAMS and Hertel et al. (1997) for GTAP.

[6] The present specification is one of the most advanced examples of this empirical method, already applied to over 50 individual countries or combinations thereof (see e.g. Francois and Roland-Holst, 1997; Lee and Roland-Holst, 1995, 1997, 1998ab; Lee et al., 1999).

where a country is both an importer and exporter of similar commodities, and avoids tendencies toward extreme specialization.

3.2. Baseline Data and Scenario

As has already been mentioned, the model is calibrated to a reference global database obtained from GTAP Version 5. While these data are generally available to the research community, we reproduce some of this information in the present section for the convenience of the reader. For example, to give a general indication about trade patterns in the base data, Tables 3.1 and 3.2 summarize base year trade flows for selected regions included in the model.

Table 3.1: Base Year Export Flows
(*percentages, 1997*)

	Developing East Asia					High Income East Asia				
	Share	**EAP**	**HYA**	**CUS**	**ROW**	**Share**	**EAP**	**HYA**	**CUS**	**ROW**
Wheat	0.3	33.4	22.1	12.1	32.4	0.0	0.0	59.8	3.4	36.8
Other grains	0.1	78.8	5.3	0.7	15.2	0.3	40.0	12.7	0.0	47.3
Oil seeds	0.0	16.7	43.4	0.0	39.9	0.0	11.4	66.8	4.0	17.8
Sugar	0.2	50.5	23.2	7.4	19.0	0.1	30.5	23.9	37.6	8.0
Other crops	1.0	14.5	36.6	15.7	33.2	0.4	29.4	31.9	6.8	31.8
Livestock	0.3	6.4	55.0	9.8	28.7	0.4	27.2	18.0	5.7	49.2
Energy	4.3	27.7	57.8	4.1	10.4	2.0	38.8	38.5	2.6	20.1
Processed foods	3.9	13.6	43.5	14.8	28.1	2.1	19.5	37.9	14.5	28.1
Textile	6.6	20.7	32.8	10.8	35.7	2.9	53.6	11.7	13.7	21.0
Wearing apparel	6.1	2.9	33.7	28.7	34.8	1.3	15.9	7.9	48.6	27.6
Leather goods	4.7	6.8	14.2	44.6	34.3	0.4	35.3	16.6	15.2	33.0
Basic manufacturing	17.2	22.9	32.9	17.2	27.0	16.2	40.9	22.4	17.8	18.8
Motor vehicles	2.1	8.6	14.2	19.4	57.8	8.8	11.6	9.8	45.9	32.7
Other transp equipment	1.7	9.0	11.5	10.3	69.2	2.5	10.3	13.9	15.7	60.1
Electronic equipment	22.7	10.6	32.4	32.4	24.6	24.3	23.9	19.8	32.7	23.6
Other manufacturing	15.6	10.8	27.0	29.3	32.8	21.7	31.3	18.9	23.0	26.7
Construction	0.1	1.3	24.3	2.7	71.8	0.8	8.2	2.7	4.1	85.0
Services	12.9	8.8	11.3	18.6	61.3	15.7	7.6	9.6	21.7	61.1
Total	**100.0**	**13.6**	**29.0**	**23.4**	**34.0**	**100.0**	**25.3**	**17.7**	**25.2**	**31.8**

Notes:

1. The first column (in the left hand side box) represents the sectoral share in aggregate exports from EAP to the four destinations indicated. The first column (in the right hand side box) represents the sectoral share in aggregate exports from HYA to the four destinations indicated.
2. The regional acronyms are Developing East Asia (EAP), High-income East Asia (HYA), Canada and the United States (CUS), and Europe and the rest of the world (ROW).

Source : GTAP Version 5.0.

Table 3.2: Base Year Import Flows

(*percentages, 1997*)

	Developing East Asia					High Income East Asia				
	Share	**EAP**	**HYA**	**CUS**	**ROW**	**Share**	**EAP**	**HYA**	**CUS**	**ROW**
Wheat	0.1	96.5	0.0	0.8	2.7	0.1	62.5	16.0	16.9	4.6
Other grains	0.7	17.8	23.2	49.4	9.6	0.6	1.0	6.4	88.3	4.3
Oil seeds	0.3	2.4	0.9	76.7	20.0	0.4	3.9	3.4	77.8	14.9
Sugar	0.2	60.0	17.6	0.0	22.4	0.1	48.6	24.4	0.0	27.0
Other crops	1.0	15.6	15.6	32.3	36.5	1.1	26.6	11.4	29.9	32.0
Livestock	0.4	4.9	37.5	35.7	21.8	0.4	36.0	21.1	23.7	19.2
Energy	7.2	17.7	15.8	2.7	63.8	8.8	22.8	9.7	4.3	63.2
Processed foods	3.1	18.6	19.5	18.4	43.5	5.4	25.8	16.5	24.5	33.2
Textile	4.5	32.7	50.5	3.7	13.1	2.9	60.9	12.9	5.6	20.6
Wearing apparel	0.6	29.2	44.5	3.7	22.6	2.4	70.7	4.6	3.8	20.9
Leather goods	0.8	40.8	23.2	9.7	26.3	1.0	53.1	6.8	5.6	34.4
Basic manufacturing	23.7	17.8	40.6	13.8	27.8	18.9	24.3	21.2	21.1	33.4
Motor vehicles	2.5	7.7	59.2	8.7	24.4	3.4	7.3	28.3	20.4	44.0
Other transp equipment	2.7	6.0	13.9	44.5	35.7	2.2	7.1	17.4	57.0	18.4
Electronic equipment	16.0	16.0	52.5	20.5	11.0	16.6	36.1	32.0	19.6	12.3
Other manufacturing	20.8	8.7	47.5	14.9	28.9	17.4	19.7	26.0	24.0	30.3
Construction	0.4	0.3	23.3	9.6	66.8	0.9	2.2	2.6	13.5	81.6
Services	14.9	8.2	11.5	21.6	58.7	17.5	6.8	9.5	25.2	58.5
Total	**100.0**	**14.5**	**36.6**	**16.4**	**32.5**	**100.0**	**23.5**	**19.4**	**21.2**	**35.8**

Notes:

1. The first column (in the left hand side box) represents the sectoral share in aggregate imports to EAP from the four destinations indicated. The first column (in the right hand side box) represents the sectoral share in aggregate imports to HYA from the four destinations indicated.
2. The regional acronyms are Developing East Asia (EAP), High-income East Asia (HYA), Canada and the United States (CUS), and Europe and the rest of the world (ROW).

Source : GTAP Version 5.0.

Second only to baseline trade flows in their importance for the policy outcomes we consider in this paper are prior patterns of import protection. The next three tables present this information, representing a variety of perspectives on trade price distortions. For selected regions, Tables 3.3 and 3.4 give import protection levels by origin and destination, respectively. This helps reveal asymmetries in market openness for aggregate

commodity groups. Table 3.5, on the other hand, gives a matrix of trade weighted import barriers by country and region, indicating (fairly significant) asymmetries in overall domestic market access under current (1997) patterns of trade.[7] Table 3.6 summarizes the country and regional abbreviations used in tables throughout the paper.

Table 3.3: Applied tariffs by region of origin
(*percent*)

	Developing East Asia					High Income East Asia				
	EAP	**HYA**	**CUS**	**ROW**	**Total**	**EAP**	**HYA**	**CUS**	**ROW**	**Total**
Wheat	50.8	..	0.0	0.0	49.2	109.5	256.8	409.0	293.2	192.7
Other grains	191.0	28.3	95.4	76.6	96.1	30.8	210.1	66.2	28.8	72.7
Oil seeds	76.4	78.9	86.5	87.0	86.3	69.7	76.4	56.3	64.0	58.7
Sugar	9.4	14.1	..	15.9	11.6	81.6	56.9	..	89.1	77.8
Other crops	43.6	18.1	23.3	17.6	23.7	20.0	16.5	22.4	17.7	19.6
Livestock	5.4	10.6	8.7	11.8	9.9	2.0	11.3	20.9	15.2	11.0
Energy	5.0	9.2	4.0	3.6	4.8	0.4	1.0	1.2	-0.5	0.0
Processed foods	30.3	26.8	32.7	32.5	31.0	28.2	39.1	34.6	33.5	33.3
Textile	21.5	23.5	13.9	13.9	21.3	5.5	3.3	6.2	6.3	5.5
Wearing apparel	16.8	29.6	12.0	12.0	21.1	9.9	7.1	10.3	10.8	10.0
Leather goods	10.3	9.6	8.2	6.6	9.0	12.1	5.3	10.7	10.7	11.1
Basic manufacturing	10.4	10.8	8.6	7.9	9.6	2.1	2.0	1.7	1.6	1.8
Motor vehicles	50.5	34.4	15.0	27.4	32.2	6.5	7.6	3.7	4.1	5.2
Other transp equipment	9.6	16.3	1.4	3.4	4.7	1.1	0.7	0.3	0.2	0.4
Electronic equipment	6.9	7.0	5.4	6.8	6.6	0.4	0.7	0.5	0.8	0.6
Other manufacturing	9.5	9.6	8.8	7.7	8.9	1.6	2.0	1.4	1.4	1.6
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	13.3	11.4	10.3	7.0	10.1	4.7	4.4	6.7	3.1	4.5
Agriculture & food	51.1	23.2	49.7	31.8	38.9	28.5	43.3	43.8	32.0	36.7
Energy	5.0	9.2	4.0	3.6	4.8	0.4	1.0	1.2	-0.5	0.0
Textile & apparel	19.2	23.2	12.1	12.0	19.6	8.3	4.3	8.2	8.9	8.1
Other manufacturing	10.0	10.6	7.1	8.2	9.3	1.4	1.9	1.3	1.6	1.5
Other goods & services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes:

1. The first column (in the left hand side box) represents tariffs on imports to EAP from the four origins indicated. The first column (in the right hand side box) represents the tariffs on imports to HYA from the four origins indicated.
2. The regional acronyms are Developing East Asia (EAP), High-income East Asia (HYA), Canada and the United States (CUS), and Europe and the rest of the world (ROW).

Source : GTAP Version 5.0.

[7] It is noted that changes have of course taken place since 1997, but account could not be taken hereof in this analysis.

Table 3.4: Applied Tariffs by Region of Destination

(*percent*)

	Developing East Asia					High Income East Asia				
	EAP	**HYA**	**CUS**	**ROW**	**Total**	**EAP**	**HYA**	**CUS**	**ROW**	**Total**
Wheat	50.8	109.5	3.5	40.9	54.8	..	256.8	0.0	34.8	169.5
Other grains	191.0	30.8	0.0	8.4	155.0	28.3	210.1	..	14.4	45.2
Oil seeds	76.4	69.7	..	6.5	45.8	78.9	76.4	0.0	0.0	61.6
Sugar	9.4	81.6	54.0	19.1	31.2	14.1	56.9	22.9	23.7	28.1
Other crops	43.6	20.0	16.0	15.6	21.5	18.1	16.5	6.5	18.9	17.0
Livestock	5.4	2.0	0.0	9.9	4.3	10.6	11.3	0.0	11.1	10.4
Energy	5.0	0.4	0.0	8.4	2.5	9.2	1.0	0.0	5.1	5.0
Processed foods	30.3	28.2	10.5	29.5	26.3	26.8	39.1	14.0	53.0	36.9
Textile	21.5	5.5	11.4	15.1	12.9	23.5	3.3	12.4	12.7	17.6
Wearing apparel	16.8	9.9	13.5	14.5	12.8	29.6	7.1	13.8	12.8	15.5
Leather goods	10.3	12.1	15.5	13.5	14.0	9.6	5.3	10.8	8.6	8.7
Basic manufacturing	10.4	2.1	3.6	9.5	6.2	10.8	2.0	3.6	8.8	7.2
Motor vehicles	50.5	6.5	2.3	15.9	14.9	34.4	7.6	2.9	13.4	10.5
Other transp equipment	9.6	1.1	3.8	5.5	5.2	16.3	0.7	1.8	10.8	8.6
Electronic equipment	6.9	0.4	1.2	6.3	2.8	7.0	0.7	1.1	5.2	3.4
Other manufacturing	9.5	1.6	2.6	7.5	4.7	9.6	2.0	2.7	6.3	5.7
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Services	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.4	0.2
Total	**13.3**	**4.7**	**4.6**	**8.4**	**7.1**	**11.4**	**4.4**	**2.6**	**6.6**	**6.4**
Agriculture & food	51.1	28.5	11.6	25.6	29.3	23.2	43.3	13.2	36.1	32.7
Energy	5.0	0.4	0.0	8.4	2.5	9.2	1.0	0.0	5.1	5.0
Textile & apparel	19.2	8.3	14.1	14.5	13.2	23.2	4.3	13.1	12.2	16.3
Other manufacturing	10.0	1.4	2.1	8.1	4.8	10.6	1.9	2.2	7.8	6.0
Other goods & services	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.4	0.2

Notes:

1. The first column (in the left hand side box) represents tariffs on EAP exports to the four destinations indicated. The first column (in the right hand side box) represents the tariffs HYA exports to the four destinations indicated.
2. The regional acronyms are Developing East Asia (EAP), High-income East Asia (HYA), Canada and the United States (CUS), and Europe and the rest of the world (ROW).

Source : GTAP Version 5.0.

Table 3.5: Bilateral, Trade Weighted Tariffs
(percent)

		Importer																								
Exporter		***chn***	***hkg***	***idn***	***jpn***	***kor***	***mys***	***phl***	***sgp***	***tha***	***twn***	***vnm***	***anz***	***can***	***eur***	***lac***	***sas***	***usa***	***row***	***Total***	***eap***	***eax***	***nie***	***ean***	***eat***	***lmx***	***hiy***	***lmy***
China	***chn***	..	.0	7.0	8.6	25.1	8.9	11.3	.3	15.9	5.0	26.2	11.2	8.7	5.7	13.8	27.4	5.7	14.4	8.3	9.6	9.6	4.5	8.7	9.1	8.5	7.0	9.0
Hong Kong	***hkg***	18.2	..	6.5	4.6	5.6	2.8	2.7	.0	7.8	5.4	46.5	.0	12.4	5.2	4.4	15.4	4.2	2.4	6.3	13.4	4.3	2.9	11.2	10.9	3.6	4.9	6.8
Indonesia	***idn***	10.1	.0	..	5.4	5.3	10.7	6.0	.0	15.1	4.4	7.5	3.3	5.5	6.3	10.4	22.2	7.3	11.9	7.0	6.1	5.6	4.9	5.9	5.8	9.5	6.0	7.5
Japan	***jpn***	15.2	.0	9.6	..	7.6	8.3	6.2	.0	16.8	5.2	17.1	5.4	3.7	3.6	12.0	27.0	2.3	8.6	6.1	9.8	6.6	6.2	8.6	8.5	4.2	5.5	6.6
Korea	***kor***	16.4	.0	19.0	6.0	..	3.0	6.3	.0	13.4	4.5	18.0	6.4	3.0	3.9	13.3	25.4	2.9	11.6	7.7	9.6	5.8	4.5	8.7	8.8	7.6	6.1	8.7
Malaysia	***mys***	16.3	.0	6.6	1.8	5.4	..	4.9	.2	10.9	3.9	18.5	2.8	1.7	3.5	8.2	27.5	1.7	11.8	4.3	5.0	2.7	2.0	3.4	3.4	6.2	2.9	5.6
Philippines	***phl***	9.4	.0	1.1	5.2	8.9	1.4	..	.0	8.3	2.9	.0	1.5	1.3	2.4	1.8	2.3	3.8	4.8	3.3	4.6	4.3	2.4	3.9	3.8	4.0	2.3	4.2
Singapore	***sgp***	11.1	.0	4.4	1.2	6.2	5.0	4.0	..	11.0	3.7	14.6	1.4	.0	2.2	6.2	20.6	1.1	6.7	4.2	4.5	3.3	6.9	4.9	4.9	4.4	3.7	4.5
Thailand	***tha***	19.3	.0	7.8	13.4	8.0	7.1	3.4	.2	..	4.1	24.2	4.3	4.4	5.7	7.5	22.9	4.9	9.4	7.2	10.9	9.6	.7	8.1	8.2	6.8	4.6	8.9
Taiwan	***twn***	16.4	.0	7.9	4.5	8.0	5.4	8.8	.2	15.4	..	17.2	3.5	4.2	3.9	10.6	20.6	3.2	7.7	7.1	10.5	4.6	5.6	9.8	9.8	4.1	5.4	7.8
Vietnam	***vnm***	5.8	.0	.0	11.1	10.1	22.4	20.8	.0	8.5	7.9	..	1.4	10.4	10.0	9.7	.0	8.9	12.1	9.2	10.7	11.3	4.6	9.2	8.6	9.8	8.0	10.5
Australia and New	***anz***	14.4	.0	5.8	20.2	5.7	6.8	7.5	1.8	12.3	6.3	8.0	.0	7.9	9.2	8.6	11.4	3.0	20.5	10.3	13.4	13.2	6.3	12.2	10.7	10.7	6.9	12.4
Canada	***can***	22.6	.0	1.5	19.4	4.4	1.3	3.0	.0	4.2	2.9	.0	1.6	.0	3.3	9.1	7.6	.4	12.7	2.6	13.8	12.5	2.2	12.2	11.7	1.0	4.1	2.3
Western Europe	***eur***	11.0	.0	4.5	3.7	5.9	4.4	3.5	.1	9.5	7.3	10.7	3.4	3.8	.5	9.3	18.8	2.2	11.1	3.1	5.0	3.8	4.8	4.9	4.8	7.8	1.2	7.1
Latin America and	***lac***	19.9	.0	3.0	10.4	16.6	2.8	4.3	.5	11.8	3.1	.0	1.6	2.6	7.6	12.9	16.5	2.7	15.6	7.1	11.6	10.0	4.2	10.3	10.0	4.3	9.5	5.5
South Asia	***sas***	9.5	.0	3.7	10.2	8.6	8.4	5.8	.0	10.7	1.8	.0	8.1	8.9	7.3	7.8	19.5	7.0	13.9	8.7	8.4	8.1	3.4	7.3	7.3	10.6	7.0	10.0
United States	***usa***	13.9	.0	4.8	9.3	14.2	3.1	4.7	.1	8.7	4.2	5.1	2.8	.8	2.7	6.2	15.5	.0	8.7	5.1	9.4	8.6	3.4	8.1	7.7	9.2	3.1	9.3
Rest of the World	***row***	5.3	.0	2.7	1.8	5.2	3.8	1.2	.1	3.7	2.6	8.6	1.9	2.1	4.4	4.7	24.5	2.1	8.2	5.1	3.0	2.7	1.7	2.8	2.8	7.3	4.1	5.9
	Total	13.9	.0	6.6	7.0	9.4	5.4	5.0	.1	11.3	5.0	15.8	3.6	1.9	1.9	8.9	20.9	2.4	10.3	4.8	7.9	6.3	4.3	7.1	6.9	6.4	3.0	6.9
Developing East A	***eap***	15.6	.0	10.6	6.7	11.3	7.2	6.7	.1	15.2	4.9	19.4	6.2	4.7	4.3	12.1	25.8	3.5	10.0	6.6	9.1	6.9	4.8	7.9	7.9	5.9	5.5	7.4
Developing East A	***eax***	15.6	.0	11.2	4.8	7.2	6.9	5.9	.1	15.2	4.9	17.0	4.8	3.6	3.8	11.6	25.3	2.8	8.7	6.1	9.0	5.7	4.8	7.7	7.6	5.1	5.1	6.9
Newly industrializ	***nie***	15.6	.0	6.0	6.6	7.2	5.4	5.4	.2	12.8	3.8	17.4	2.8	3.0	3.7	8.7	21.0	2.9	7.7	6.0	8.3	5.1	4.6	7.7	7.7	4.8	4.5	6.8
Developing East A	***ean***	15.6	.0	9.5	6.6	10.8	6.4	6.4	.1	14.7	4.7	18.7	5.4	4.3	4.1	11.6	24.6	3.4	9.6	6.5	8.9	6.4	4.8	7.8	7.9	5.7	5.3	7.2
East Asia	***eat***	15.5	.0	9.1	8.4	10.2	6.4	6.6	.2	14.6	4.9	18.5	4.5	4.6	4.5	11.4	23.3	3.4	10.3	6.7	9.3	7.1	4.8	8.1	8.1	5.9	5.4	7.5
Low- and middle-i	***lmx***	10.7	.0	4.0	6.4	10.1	3.6	3.6	.1	6.6	3.9	5.7	2.8	1.0	3.7	6.1	21.6	2.9	8.7	5.2	7.0	6.4	2.9	6.2	6.0	8.1	3.6	7.6
High-income	***hiy***	14.0	.0	4.8	7.6	6.9	5.0	4.6	.2	10.7	6.0	14.2	2.7	3.7	1.0	10.7	18.2	1.9	11.4	3.9	7.5	5.9	4.7	7.0	6.8	5.9	2.1	6.4
Low- and middle-i	***lmy***	13.9	.0	8.1	6.5	10.6	5.8	5.3	.1	11.7	4.5	17.1	4.4	1.4	3.9	7.4	23.2	3.4	9.0	5.8	8.1	6.6	4.1	7.1	7.0	7.0	4.2	7.5

Notes: China and Hong Kong are disaggregated in the 1997 GTAP 5 dataset.

All regional and "Total" averages are trade-weighted ad valorem equivalent rates.

It is essential to note, even in passing, that we are not modeling significant agricultural protection in the present exercise, including non-tariff barriers. This means our results will generally understate the effects of trade liberalization at the aggregate level and do not fully capture sectoral adjustments, particularly in primary activities. This will be the subject of further research.[8]

Table 3.6: Country and Regional Definitions

Abbreviation	Name
chn	China
jpn	Japan
kor	Korea
twn	Taiwan
vnm	Vietnam
axv	ASEAN ex Vietnam
eur	Western Europe
usa	United States
row	Rest of the World
eap	Developing East Asia
eax	Developing East Asia x/ China
nie	Newly industrialized economies
ean	Developing East Asia & NIEs
eat	East Asia total
lmx	Low- and middle-income x/ East Asia
hiy	High-income
lmy	Low- and middle-income
wlt	World total

[8] See, e.g. OECD (1990), Goldin, Knudsen, and van der Mensbrugghe (1993), and van der Mensbrugghe and Guerrero (1998) for indications about treatment of agricultural liberalization in this framework.

Now we look at the baseline scenario projections in more detail. Recall that these represent a so-called "business as usual" policy regime, meaning in particular that protection levels are maintained for all countries/regions at their initial levels. In the Baseline case, we calibrate the dynamic model to consensus forecasts for real GDP obtained from independent sources (e.g. IMF, DRI, and Cambridge Econometrics). The model is then run forward to meet these targets, making average capital productivity growth for each country/region endogenous. This calibration yields productivity growth that would be needed to attain the macro trajectories, and these are then held fixed in the model under other policy scenarios. Other exogenous macro forecasts could have been used, but this is the standard way to calibrate these models.[9]

The general macroeconomic properties of the baseline scenario are summarized for aggregate countries/regions in Table 3.7. Here we see the real GDP growth rates obtained from outside sources, as well as the implied (annualized) growth rates of some other important macro aggregates. These differences are quite revealing, both of the underlying domestic and international adjustment mechanisms (see Annex 2 below). For example, it is generally true that faster growing economies experience faster growing absorption, as would be expected. Trade growth is more complex, however. Faster growing economies generally experience real exchange rate depreciation for two reasons:

1) Their export capacity is growing faster than the absorptive capacity of the Rest of the World (ROW, on average).

2) Their imports are growing faster than export capacity of the ROW.

Apart from these observations, it is rather difficult to generalize because so much depends on the sectoral and geographic composition of trade.

[9] The baseline calibration is described in greater detail in an annex.

Table 3.7: Selected Baseline Macroeconomic Indicators
(percentage annualized growth rates, 1997-2020)

	Real GDP	Absorption	Exports	Imports	Exp PI	Imp PI	Real ER
China	7.1	6.9	6.3	5.9	-.2	-.2	.0
Japan	2.2	2.1	2.4	3.1	.2	-.1	.4
NIE	4.3	4.4	4.0	4.2	-.1	-.1	.0
ASEAN	4.7	4.6	4.5	4.3	-.3	-.1	-.1
USA	2.6	2.6	3.1	2.9	.1	-.1	.2
EU	2.5	2.6	2.4	2.6	.1	.0	.1
ROW	3.7	3.6	3.7	3.4	-.2	-.1	-.1

4. Scenarios, Results, and Interpretation

After calibrating the model to a dynamic baseline, we considered some of the many scenarios for regional and global trade liberalization in an East Asian context.[10] Of particular relevance in the present context are China's WTO initiative, direct bilateral arrangements between the two subject countries, China and Vietnam, and the much discussed initiative of China and ASEAN joining in a regional free trade arrangement. To place these scenarios in context, we added full globalization and an East Asian Free Trade Area as reference cases. The result was a set of seven policy scenarios, consisting of one calibrated baseline, three bilateral scenarios, and three multilateral arrangements explained in more detail in Table 4.1 below.

[10] Compare with Roland-Holst (2002a, b) and Azis, Liu, Roland-Holst (2002) where trade scenarios of this kind are evaluated in a more multilateral context.

Table 4.1: Trade Policy Scenarios

1)	**Baseline** – Business as usual, with status quo protection levels and consensus macroeconomic growth rates (see Table 3.7 above).
2)	**CWTO** – China implements its WTO commitments and abolishes all trade protection by 2005. All scenarios hereafter assume CWTO.
3)	**BiVC** – Abolition of bilateral trade barriers between Vietnam and China, beginning in 2005.
4)	**BiJC** – Abolition of bilateral trade barriers between Japan and China, beginning in 2005.
5)	**AFTAPC** – ASEAN Free Trade Area plus China – As the name implies, ASEAN and China abolish all mutual trade barriers. China also implements its WTO commitments.
6)	**EAFTA** – East Asian Free Trade Area – Tariff and trade subsidy abolition by all East Asian economies by 2005, including China's WTO implementation.
7)	**GTL** – Global Trade Liberalization – A reference case of universal tariff abolition.

In a simulation framework of this size, there are very large quantities of results, which might be relevant to economic outcomes, even when confining attention to two countries alone. To keep the discussion manageable, however, we begin with the simple complementarity indicators developed in section 2 above. Table 4.2 below presents these indices and a few related economic indicators for the counterfactual scenarios. All these indicators are calculated for changes with respect to the Baseline dynamic scenario.

These results immediately reveal the main conclusion of this paper, that it is easy to expand bilateral trade, but difficult to foresee its consequences for the balance of payments. In particular, we can see that bilateral trade among these partners grows faster than overall trade for each of the three countries in most of the trade scenarios (bilateral and multilateral). In most cases, however, bilateral imbalances grow faster than GDP and

the direction of these balances is consistently adverse to some partners and favourable to others.

Table 4.2: Bilateral Trade Indices
(changes defined with respect to Baseline scenario in 2020)

	Vietnam				China			
Scenario	**BTG**	**BTI**	**GDP**	**T**	**BTG**	**BTI**	**GDP**	**T**
Baseline	.00	-1.00	.00	.00	0.00	1.00	.00	.00
CWTO	4.17	-6.43	4.64	5.84	1.06	6.43	1.48	25.68
BiVC	5.12	-26.74	6.94	43.50	9.23	26.74	1.54	26.04
BiJC	4.89	-5.46	4.27	4.79	0.84	5.46	1.71	27.24
AFTAPC	3.47	-22.14	9.10	51.05	7.14	22.14	1.63	26.81
EAFTA	2.25	-18.81	14.50	63.68	5.35	18.81	1.76	28.06
GTL	1.76	-18.23	18.67	78.10	4.28	18.23	2.35	32.36

	Japan				China			
Scenario	**BTG**	**BTI**	**GDP**	**T**	**BTG**	**BTI**	**GDP**	**T**
Baseline	.00	1.00	.00	.00	0.00	-1.00	.00	.00
CWTO	9.89	25.75	-.04	2.14	1.40	-30.57	1.48	25.68
BiVC	9.65	28.91	-.04	2.15	1.35	-34.31	1.54	26.04
BiJC	6.83	-67.05	-.23	9.60	3.07	79.70	1.71	27.24
AFTAPC	11.12	36.17	-.04	1.81	1.30	-42.80	1.63	26.81
EAFTA	3.38	-16.77	-.02	13.27	2.04	20.20	1.76	28.06
GTL	2.13	29.19	.29	15.52	1.24	-35.41	2.35	32.36

Note: GDP and T(rade) are expressed as percentages.

Thus, in the present cases, established trade relationships are likely to grow more than average, even under universal trade liberalization. When the agreements are bilateral, this kind of trade obviously is the main impetus for external demand and supply growth. But even under multilateral arrangements (including the partner), bilateral trade can expand by multiples of average trade. This bilateral bias decreases as the scope of the trade arrangement increases, but even under GTL bilateral trade rises almost twice as fast as the average. Thus the first condition for trade complementarity is easily satisfied in most cases.

The second condition presents a real challenge, however. These results indicate that most bilateral trade growth occurs along established lines of comparative advantage,

and prior imbalances are more likely to be intensified. In a sense, this confirms the fears of those who see trade liberalization as a trap for countries that specialize in low wage exports, although such thinking ignores the long term benefits of endogenous growth effects. In the present case, this reasoning apparently applies with equal force to Vietnam and China, but in different contexts. Vietnam runs bilateral deficits with China under all scenarios, and these imbalances appear to grow faster than both total and bilateral trade.[11] In its trade with Japan, China adopts a similar defensive position, with nearly universal bilateral deficits that also exhibit more volatility than either bilateral or total trade. Japan appears to be at the top of the trade "food chain" with robust bilateral surpluses vis-à-vis China, while the latter maintains like surpluses with Vietnam. In this sense, Japan might be said to be holding the head of the dragon, while Vietnam is holding the tail.

An interesting fact is that, in all three countries, bilateral imbalances are more volatile as a percent of GDP than as a percent of total trade. This is not surprising, since these are trade liberalization experiments and, as the GDP and T(rade) columns indicate, trade is growing much faster than GDP. Japan actually experiences some very small contactionary effects under tariff removal, a result of adverse terms-of-trade adjustments. Finally, it is worth noting that all three countries can obtain most of the gains from global trade liberalization in a comprehensive East Asian FTA.[12]

To better understand the underlying adjustment process in these scenarios, Tables 4.3 and 4.4 summarise sectoral changes in bilateral trade balances, whereas Table 4.5 provides sector definitions. With respect to China, we see that Vietnam's net import dependence is very pervasive, and this country's overall trade balance must be sustained by exports to other destinations. In the case of Japan, however, trade balances are much more diverse, and in two senses distinctly favourable to Japan. We already know that the aggregate bilateral balance is positive for Japan, but closer inspection also indicates that

[11] It is interesting to note that official trade statistics have over recent years been demonstrating a widening trade gap between China and Vietnam.
[12] This point is made more forcefully and in greater detail in Azis, Liu, and Roland-Holst (2002).

Japan's sectoral balances favour higher wage manufacturing activities in all scenarios. This means that the value added trade balance is even more favourable to Japan.[13]

Table 4.3: Sectoral Adjustments - Bilateral Trade
Vietnamese Balances with respect to China
(changes from Baseline in 2020)

	Year 2000 USD Millions					Percentages				
Sector	CNWTO	BIVC	AFTAPC	EAFTA	GTL	CNWTO	BIVC	AFTAPC	EAFTA	GTL
rice	0	-1	-4	-4	-4	7	16	49	51	51
otgn	-14	-14	-14	-14	-14	-757	-874	-967	-1123	-1037
vgfr	12	-65	-75	-99	-87	-95	73	76	81	79
olsd	-21	-23	-23	-23	-22	-3472	1591	1232	1229	2969
cnbt	0	0	0	0	0	-19	-40	-58	-85	-84
pfib	0	0	0	0	0	0	0	0	0	0
ocer	18	7	2	-7	-9	25	11	4	-16	-19
lvsk	-24	-40	-50	-61	-58	-22	-43	-60	-83	-76
frst	30	18	8	-6	-7	18	11	5	-5	-5
fish	-12	-24	-30	-40	-43	-12	-27	-36	-56	-62
enrg	0	0	0	0	0	0	0	0	0	0
omin	-1	-1	-1	-1	-1	-11	-6	-7	-12	-14
meat	-55	-71	-81	-97	-92	-52	-79	-103	-154	-134
vgol	190	146	268	197	238	78	73	83	78	81
milk	0	0	0	0	0	0	0	0	0	0
prrc	-23	-24	-24	-25	-25	-380	-410	-444	-531	-556
sugr	62	52	42	28	22	57	53	47	38	32
opfd	-51	-216	-203	-306	-300	-11	-72	-65	-145	-138
bvtb	-73	-947	-886	-921	-871	36	88	87	88	87
txap	-607	-8039	-7555	-5344	-6276	31	85	85	79	82
wdpr	-23	-637	-483	-393	-337	24	90	87	84	82
chem	-458	-7851	-5707	-5321	-4425	17	78	72	71	67
metl	-281	-668	-483	-95	22	22	40	32	8	-2
vehc	-44	-677	-108	18	26	37	90	58	-31	-50
elec	-44	-537	-315	-220	-178	261	105	110	114	118
omfg	-479	-2004	-1411	-1124	-854	34	68	60	54	47
util	0	0	0	0	0	-20	-50	-55	-89	-130
cnst	-1	0	0	0	-1	-31	-1	1	-17	-20
trcm	-6	-13	-16	-29	-33	-11	-27	-35	-93	-119
prsv	-18	-39	-53	-73	-78	-16	-41	-66	-118	-138

[13] See Roland-Holst (2002b) for a more detailed analysis of this kind of factor content in East Asian trade patterns.

Table 4.4: Sectoral Adjustments - Bilateral Trade
Japanese Balances with respect to China
(changes from Baseline in 2020)

	Year 2000 USD Millions					Percentages				
Sector	CNWTO	BIJC	AFTAPC	EAFTA	GTL	CNWTO	BIJC	AFTAPC	EAFTA	GTL
rice	0	0	0	0	0	0	0	0	0	0
otgn	-4	-32	-4	-20	40	6	32	5	22	-131
vgfr	-47	-685	-36	-662	-532	7	54	6	53	47
olsd	-9	-292	-8	-258	-103	5	65	4	62	39
cnbt	0	0	0	0	0	0	0	0	0	0
pfib	-1	0	0	0	1	-64	9	-40	8	44
ocer	-34	-138	-28	-117	-48	8	25	6	22	11
lvsk	-102	-98	-87	-18	293	21	20	18	4	-285
frst	-22	-33	-17	-31	-12	11	16	9	15	7
fish	-81	-140	-59	-56	61	9	15	7	6	-8
enrg	-121	-85	-96	-67	13	16	12	13	10	-2
omin	1	-3	1	-5	-3	-1	2	-1	3	2
meat	-709	-17574	-602	-11487	-4483	25	89	22	85	68
vgol	-83	-111	-78	-75	1087	57	64	55	54	106
milk	-1	-10755	0	-3278	-3	-27	100	-10	100	-427
prrc	-11	-17948	-9	-5361	-1926	19	100	16	99	98
sugr	-2	-1644	-1	-100	-21	16	99	10	89	64
opfd	-2569	-35097	-2259	-15595	-6084	31	86	28	73	52
bvtb	71	-400	88	-358	35	-56	67	-82	65	-22
txap	1904	-9272	4134	-5892	1010	-8	26	-19	18	-4
wdpr	-1101	-1387	-773	-1073	-172	21	25	16	20	4
chem	913	1721	1880	1336	3848	43	58	61	52	76
metl	2228	3598	2973	2775	3710	31	42	37	36	43
vehc	9696	11415	10219	10382	10310	58	62	60	60	60
elec	8088	11722	9059	8805	8630	28	36	30	30	29
omfg	2537	7036	4753	4327	7228	16	35	27	25	35
util	0	0	0	0	0	0	-1	0	0	0
cnst	-147	-65	-123	-98	-70	-27	-11	-22	-17	-11
trcm	-1036	-500	-816	-656	-252	26	15	22	18	8
prsv	-441	-175	-344	-270	-119	218	-276	325	851	-99

Table 4.5: Sector Definitions

rice	Rice
otgn	Other Grains
vgfr	Vegetables and Fruits
olsd	Oil Seeds
cnbt	Cane and Beet Sugar (raw)
pfib	Plant Fibers
ocer	Other Cereal and Cellulose Materials
lvsk	Livestock
frst	Forestry
fish	Fishery
enrg	Coal, Oil and Natural Gas
omin	Other Minerals
meat	Meat Products
vgol	Vegetable Oils
milk	Dairy Products
prrc	Processed Rice Products
sugr	Refined Sugar
opfd	Other Processed Food
bvtb	Beverages and Tobacco
txap	Textiles and Apparel
wdpr	Wood Products and Paper
chem	Chemicals
metl	Metal Products
vehc	Vehicles
elec	Electronics
omfg	Other Manufacturing
util	Utilities
cnst	Construction
trcm	Transport and Communication
prsv	Private Services

5. Conclusions and Extensions

The agenda of open multilateralism, as enunciated by the WTO and a myriad of regional trade arrangements, gives little direct attention to the issue of bilateral trade. Despite this, however, most countries must undertake multilateral trade initiatives within a mosaic of established bilateral ties, especially with neighboring countries with which they may share deep historical and political relationships. For this reason, a little more attention to the bilateral implications of trade liberalization generally, and globalism in particular, might be justified.

In this paper, we raised these issues in the East Asian context, using a dynamic CGE model to elucidate the bilateral effects of trade liberalization on China and two of its most populous neighbors, Vietnam and Japan. The latter two countries represent very different stages of economic modernization and diversification, and one might expect the course of trade-induced adjustment to vary between them. Indeed, our results indicate that differences in initial conditions do matter, and an apparent hierarchy emerges along lines that might be predicted by traditional notions of comparative advantage.

We proposed reasonable criteria for bilateral complementarity in trade, identifying conditions where trade would grow at superior rates, yet contribute to balance of payments stability. In the present case, we noted that trade between these partners did grow faster than average trade in most scenarios, whether the liberalization undertaken was unilateral, bilateral, or multilateral. While this could be desirable, we also found that, other things equal, bilateral trade imbalances were likely to be amplified in this process, and this had adverse implications for the poorer country in both cases. For Vietnam in relation to China, as well as for China in Japan, traditional patterns of comparative advantage were apparently intensified, increasing dependence on relatively low wage output and employment and dependence on higher value added imports.

These results clearly mandate the future extensions of this work – to examine the components of the adjustment process more closely and identify policies that can capture the benefits of liberalization while offsetting its adverse effects. In other words, how can

the attention shift from a focus on comparative advantage in a static sense to how comparative advantage can be changed in a dynamic and forward looking manner. Examples of this might be technology transfer through FDI and joint venture promotion, increased infrastructure investment to reduce distribution margins, and investments in human capital. In any case, the results obtained here reinforce cautionary notions about trade liberalization. Like most economic policies with extensive and generally irreversible indirect effects, it is best undertaken as part of a more comprehensive scheme to advance national development.

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7. Annex A - Model Summary

This paper uses a version of the LINKAGE Model, a global, multi-region, multi-sector, dynamic applied general equilibrium model.[14] The base data set—GTAP[15] Version 5.0—is defined across 66 country/region groupings, and 57 economic sectors. For this paper, the model has been defined for an aggregation of 9 country/regions and 30 sectors including agricultural sectors of importance to the developing countries—grains, textiles, and apparel. The remainder of this section outlines briefly the main characteristics of supply, demand, and the policy instruments of the model.

7.1. Production

All sectors are assumed to operate under constant returns to scale and perfect competition. Production in each sector is modeled by a series of nested CES production functions, which are intended to represent the different substitution and complementarity relations across the various inputs in each sector. There are material inputs, which generate the input/output table, as well as factor inputs representing value added.

Three different production archetypes are defined in the model—crops, livestock, and all other goods and services. The CES nests of the three archetypes are graphically depicted in Figures A-1 through A-3. Within each production archetype, sectors will be differentiated by different input combinations (share parameters) and different substitution elasticities. The former are largely determined by base year data, and the latter are given values by the modeler.

The key feature of the crop production structure is the substitution between intensive cropping versus extensive cropping, i.e. between fertilizer and land (see

[14] The LINKAGE model is directly inspired by RUNS Model (see Burniaux and van der Mensbrugghe, 1994), and the OECD GREEN Model (see van der Mensbrugghe, 1994). Full model specification is available in van der Mensbrugghe (2001).

[15] GTAP refers to the Global Trade Analysis Project based at Purdue University. For more information see Hertel (1997).

Figure A-1).[16] Livestock production captures the important role played by feed versus land, i.e. ranch- versus range-fed production (see Figure A-2).[17] Production in the other sectors more closely matches the traditional role of capital/labor substitution, with energy introduced as an additional factor of production (see Figure A-3).

In each period, the supply of **primary** factors—capital, labor, and land—is usually predetermined. However, the supply of land is assumed to be sensitive to the contemporaneous price of land. Land is assumed to be partially mobile across agricultural sectors. Given the comparative static nature of the simulations which assumes a longer term horizon, both labor and capital are assumed to be perfectly mobile across sectors (though not internationally).[18]

Model current specification has an innovation in the treatment of labor resources.[19] The GTAP data set identifies two types of labor skills—skilled and unskilled. Under the standard specification, both types of labor are combined together in a CES bundle to form aggregate sectoral labor demand, i.e. the two types of labor skills are directly substitutable. In the new specification, a new factor of production has been inserted which we call *human* capital. It is combined with capital to form a physical *cum* human capital bundle, with an assumption that they are complements. On input, the user can specify what percentage of the skilled labor factor to allocate to the human capital factor.

Once the optimal combination of inputs is determined, sectoral output prices are calculated assuming competitive supply (zero-profit) conditions in all markets.

[16] In the original GTAP data set, the fertilizer sector is identified with the crp sector, i.e. chemicals, rubber, and plastics.

[17] Feed is represented by three agricultural commodities in the base data set: wheat, other grains, and oil seeds.

[18] This can be contrasted with, e.g. Fullerton (1983).

[19] This feature is not invoked in results reported here. Because of increased interest in labor markets and human capital in the Latin American context (see e.g. World Bank (2001)), we have developed this modeling capacity and are using it experimentally. For indications about modeling in this context, see Collado et al. (1995), Maechler and Roland-Holst (1997), and van der Mensbrugghe (1998).

7.2. Consumption and closure rules

All income generated by economic activity is assumed to be distributed to a single representative household. The single consumer allocates optimally his/her disposable income among the consumer goods and saving. The consumption/saving decision is completely static: saving is treated as a "good" and its amount is determined simultaneously with the demands for the other goods, the price of saving being set arbitrarily equal to the average price of consumer goods.[20]

Government collects income taxes, indirect taxes on intermediate and final consumption, taxes on production, tariffs, and export taxes/subsidies. Aggregate government expenditures are linked to changes in real GDP. The real government deficit is exogenous. Closure therefore implies that some fiscal instrument is endogenous in order to achieve a given government deficit. The standard fiscal closure rule is that the marginal income tax rate adjusts to maintain a given government fiscal stance. For example, a reduction or elimination of tariff rates is compensated by an increase in household direct taxation, *ceteris paribus*.

Each region runs a current-account surplus (deficit) that is fixed (in terms of the model numéraire). The counterpart of these imbalances is a net outflow (inflow) of capital, subtracted from (added to) the domestic flow of saving. In each period, the model equates gross investment to net saving (equal to the sum of saving by households, the net budget position of the government and foreign capital inflows). This particular closure rule implies investment is driven by saving. The fixed trade balance implies an endogenous real exchange rate. For example, removal of tariffs, which induces increased demand for imports, is compensated by increasing exports which is achieved through a real depreciation.

[20] The demand system used in LINKAGE is a version of the Extended Linear Expenditure System (ELES) which was first developed by Lluch (1973). The formulation of the ELES used in LINKAGE is based on atemporal maximization—see Howe (1975). In this formulation, the marginal propensity to save out of supernumerary income is constant and independent of the rate of reproduction of capital.

7.3. Foreign Trade

The world trade block is based on a set of regional bilateral flows. The basic assumption in LINKAGE is that imports originating in different regions are imperfect substitutes (see Figure A-4). Therefore in each region, total import demand for each good is allocated across trading partners according to the relationship between their export prices. This specification of imports—commonly referred to as the Armington[21] specification—implies that each region faces a downward-sloping demand curve for its exports. The Armington specification is implemented using two CES nests. At the top nest, domestic agents choose the optimal combination of the domestic good and an aggregate import good consistent with the agent's preference function. At the second nest, agents optimally allocate demand for the aggregate import good across the range of trading partners.[22]

The bilateral supply of exports is specified in parallel fashion using a nesting of constant-elasticity-of-transformation (CET) functions. At the top level, domestic suppliers optimally allocate aggregate supply across the domestic market and the aggregate export market. At the second level, aggregate export supply is optimally allocated across each trading region as a function of relative prices.[23]

Trade variables are fully bilateral and include both export and import taxes/subsidies. Trade and transport margins are also included, so world prices reflect the difference between FOB and CIF pricing.

7.4. Prices

The LINKAGE model is fully homogeneous in prices, i.e. only relative prices are identified in the equilibrium solution. The price of a single good, or of a basket of goods,

[21] See Armington, 1969 and compare, e.g. de Melo and Robinson (1989) and Rutherford and Tarr (2002).

[22] The GTAP data set allows each agent of the economy to be an Armington agent, i.e. each column of demand in the input/output matrix is disaggregated by domestic and import demand. (The allocation of imports across regions can only be done at the national level). For the sake of space and computing time, the standard model specification adds up Armington demand across domestic agents and the Armington decomposition between domestic and aggregate import demand is done at the national level, not at the individual agent level.

[23] A theoretical analysis of this trade specification can be found in de Melo and Robinson (1989).

is arbitrarily chosen as the anchor to the price system. The price (index) of OECD manufacturing exports has been chosen as the numéraire, and is set to 1.

7.5. Elasticities

Production elasticities are relatively standard and are available from the authors. Aggregate labor and capital supplies are fixed, and within each economy they are perfectly mobile across sectors.

7.6. Equivalent Variation Aggregate National Income

Aggregate income gains and/or losses summarize the extent to which trade distortions are hindering growth prospects and the ability of economies to use the gains to help those whose income could potentially decline.

Real income is summarized by Hicksian equivalent variation (EV). This represents the income consumers would be willing to forego to achieve post-reform well-being (u^p) compared to baseline well-being (u^b) at baseline prices (p^b):

$$EV = E\left(p^b, u^p\right) - E\left(p^b, u^b\right)$$

where E represents the expenditure function to achieve utility level u given a vector of prices p (the b superscript represents baseline levels, and p the post-reform levels). The model uses the extended linear expenditure system (ELES), which incorporates savings in the consumer's utility function. See Lluch (1973) and Howe (1975). The ELES expenditure function is easy to evaluate at each point in time. (Unlike the OECD treatment of *EV*, we use baseline prices in each year rather than base year prices. See Burniaux et al. (1993)). The discounted real income uses the following formula:

$$CEV = \sum_{t=2001}^{2020} \beta^{(t-2000)} EV_t^a \Big/ \sum_{t=2001}^{2020} \beta^{(t-2000)} Y_t^d$$

where *CEV* is the cumulative measure of real income (as a percent of baseline income), β is the discount factor (equal to $1/(1+r)$ where r is the subjective discount rate), Y^d is real disposable income, and EV^a is adjusted equivalent variation. The adjustment to

EV extracts the component measuring the contribution of household saving, since this represents future consumption. Without the adjustment, the *EV* measure would be double counting. The saving component is included in the *EV* evaluation for the terminal year. Similar to the OECD, a subjective discount rate of 1.5 percent is assumed in the cumulative expressions.

7.7. Specification of Endogenous Productivity Growth

Productivity in manufacturing and services is the sum of three components:

1) a uniform factor used as an instrument to target GDP growth in the baseline simulation

2) a sector-specific fixed shifter which allows for relative differentials across sectors (for example, manufacturing productivity two percentage points higher than productivity in the services sectors)

3) a component linked to sectoral openness as measured by the export-to-output ratio

The latter takes the following functional form:

$$(1) \qquad \gamma_i^e = \chi_i^0 \left(\frac{E_i}{X_i} \right)^{\eta}$$

where γ^e is the growth in sectoral productivity due to the change in openness, χ^0 is a calibrated parameter, E and X represent respectively sectoral export and output, and η is the elasticity. The parameter χ^0 has been calibrated so that (on average) openness determines roughly 40 percent of productivity growth in the baseline simulation, and the elasticity has been set to 1.

In agriculture, productivity is fixed in the baseline, set to 2.5 percent per annum in most developing countries. However, a share of the fixed productivity is attributed to openness, using equation (3).

In the baseline, GDP growth is given. Agricultural productivity is similarly given, and equation (1) is simply used to calibrate the shift parameter, χ^0, so that a share of agricultural productivity is determined by sectoral openness. Average productivity in the manufacturing and services sectors is endogenous and is calibrated in the baseline to achieve the given GDP growth target. The economy-wide (excluding agriculture) productivity parameter is endogenous. Equation (1) is used to calibrate the same χ^0 parameter, under the assumption that some share of sectoral productivity is determined by openness, for example 40 percent.

In policy simulations, the economy-wide productivity factor, along with other exogenous productivity factors (sector-specific shifters) are held fixed, but the openness-related part of productivity is endogenous and responds to changes in the sectoral export-to-output ratio. In the manufacturing and services sectors, the elasticity is set at 1. In the agricultural sectors it is set to 0.5.

Say sectoral productivity is 2.5 percent, and that 40 percent of it can be explained by openness, i.e. 1.0 percent, with the residual 1.5 percent explained by other factors. Assume sectoral openness increases by 10 percent. If the elasticity is 1, this implies that the openness-related productivity component will increase to 1.1 percent and total sectoral productivity will increase to 2.6 percent (implying that the total sectoral productivity increases by 4 percent with respect to the 10 percent increase in sectoral openness).

Figure A.1: Production Function for Crops

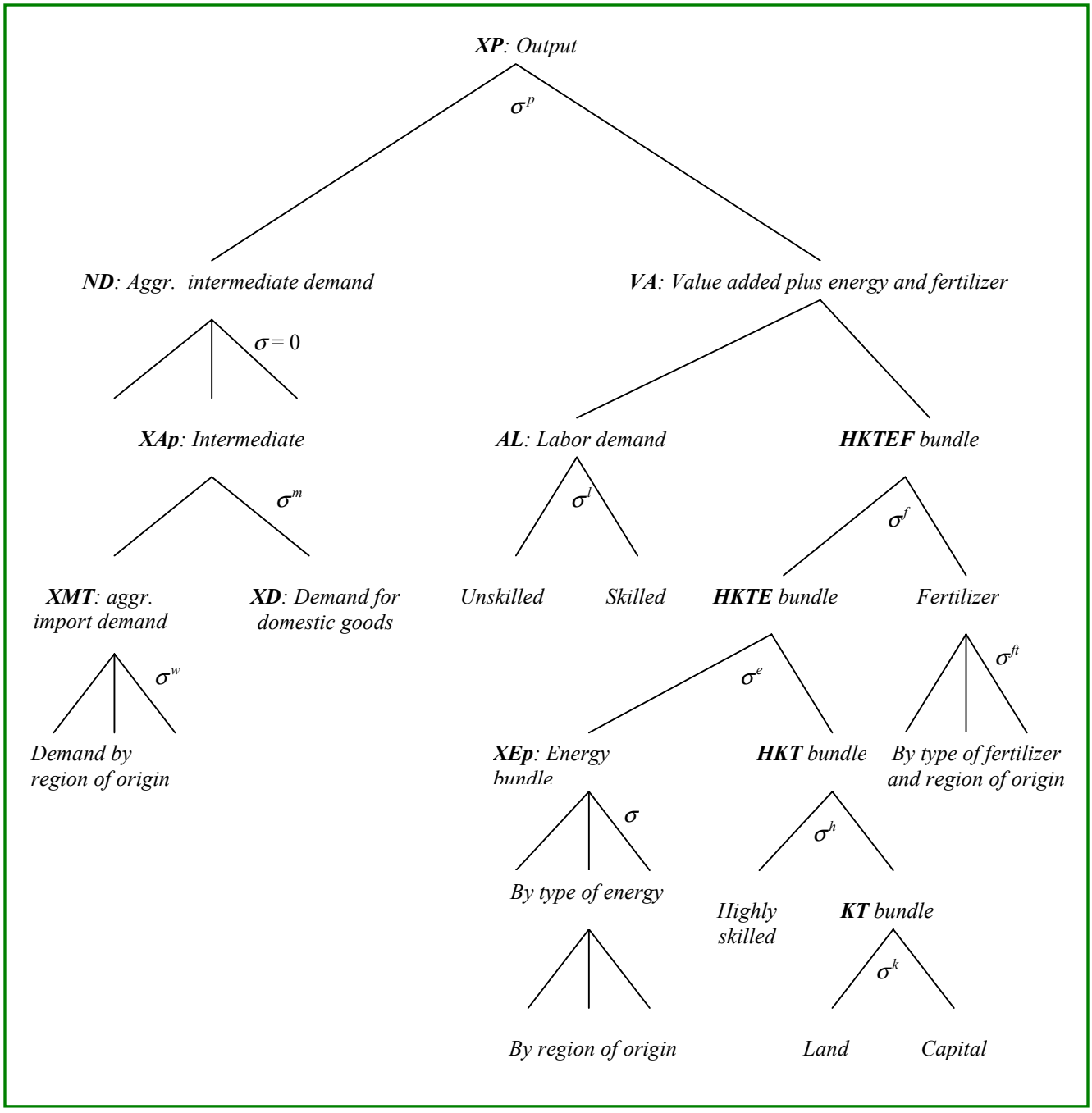


Figure A.2: Production Function for Livestock

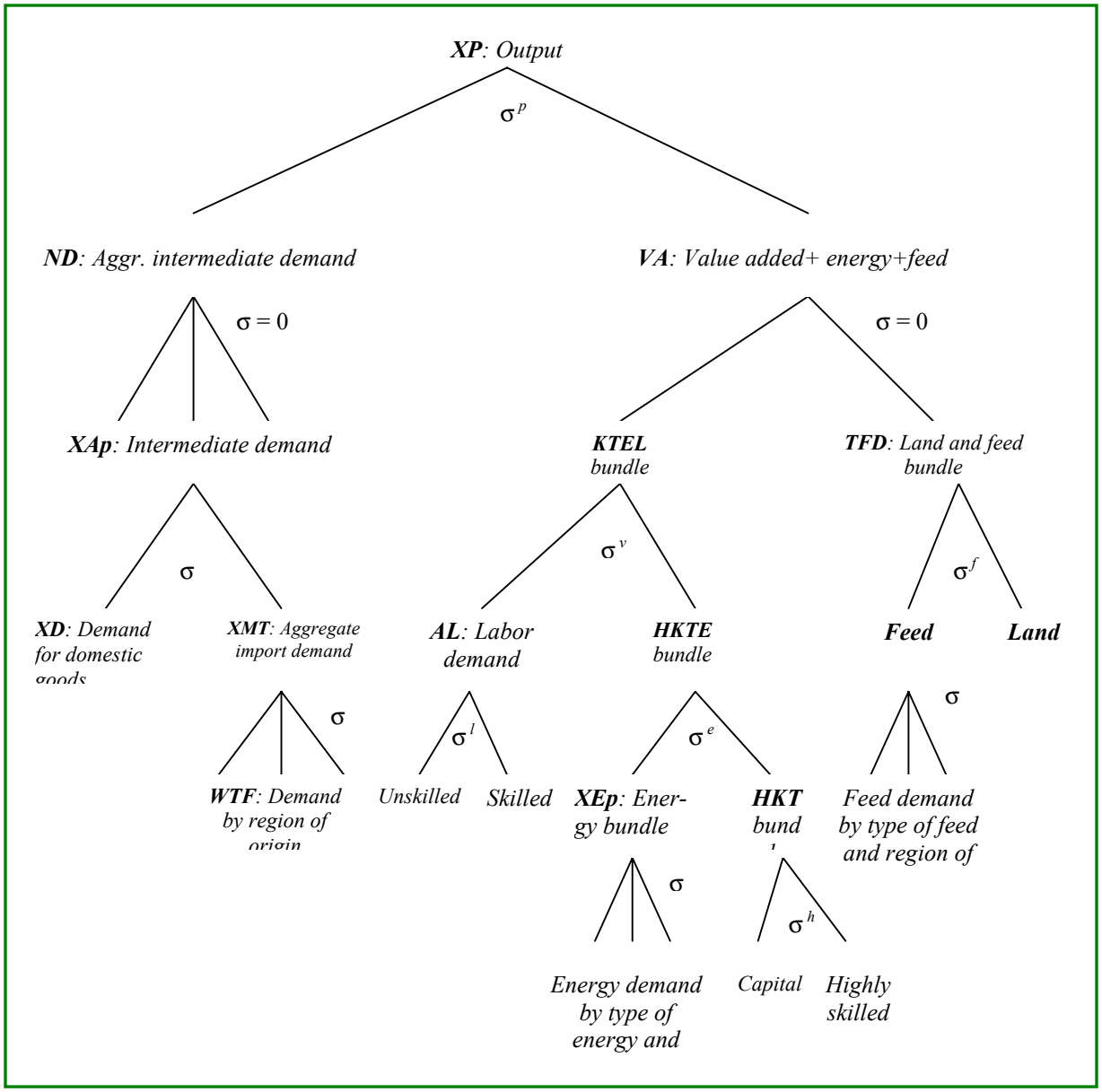


Figure A.3: Production Function for Non-agriculture

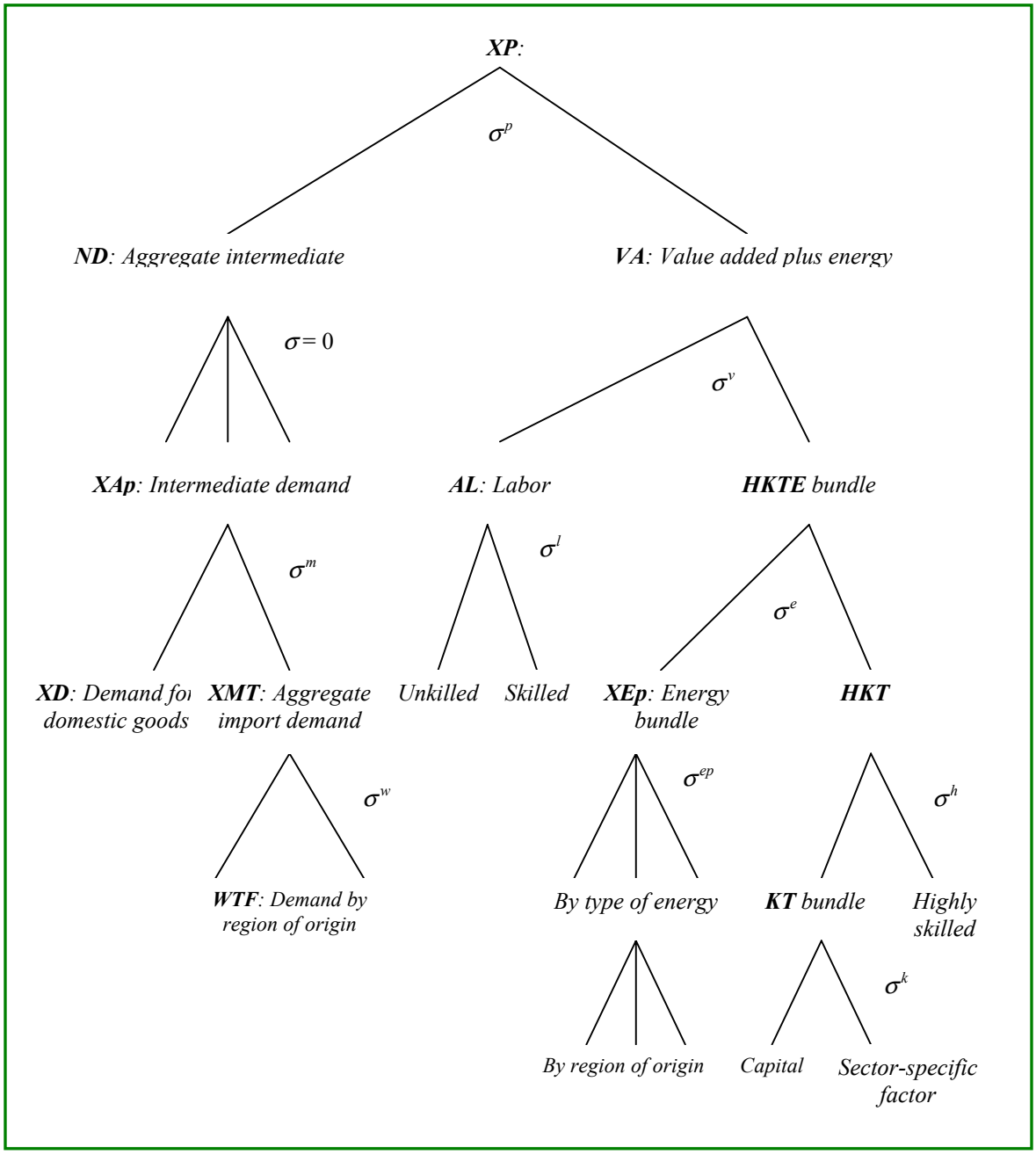
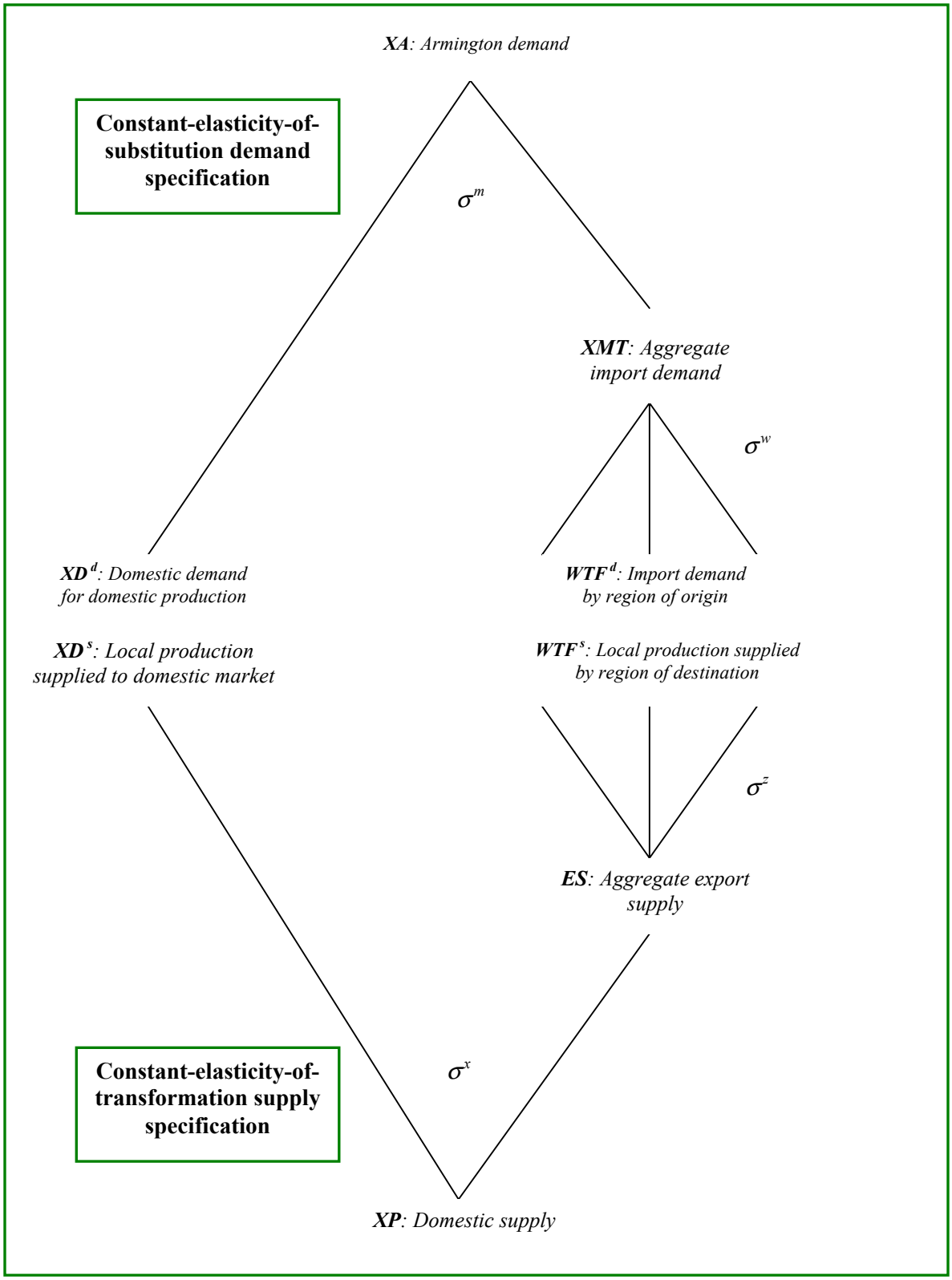


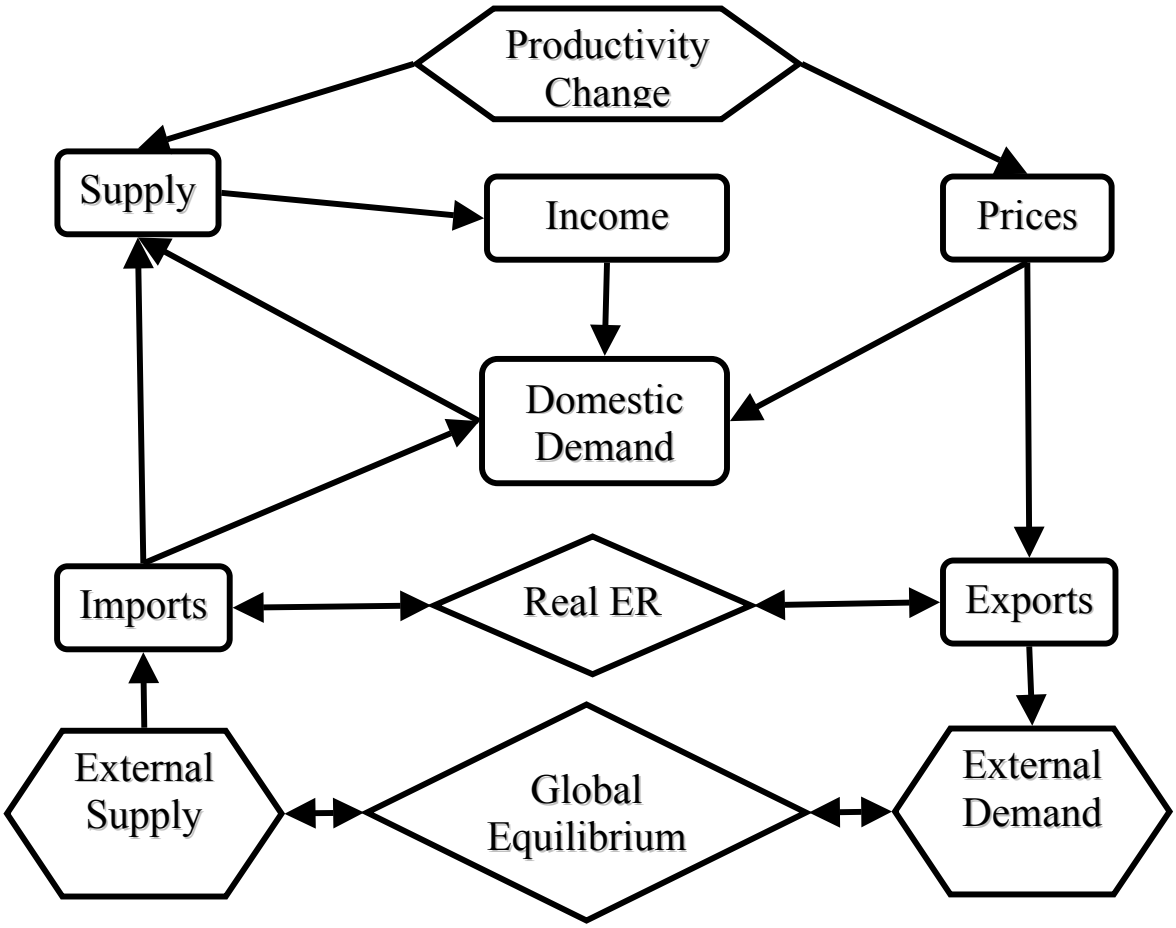
Figure A.4: Trade Aggregation



8. Annex B – Model Calibration

The model is calibrated to country and regional real GDP growth rates, obtained as consensus estimates from independent sources (DRI, IMF, Cambridge Econometrics). Using exogenous rates of implied TFP growth, the model computes supply, demand, and trade patterns compatible with domestic and global equilibrium conditions. Equilibrium is achieved by adjustments in the relative prices of domestic resources and commodities, while international equilibrium is achieved by adjusting trade patterns and real exchange rates to satisfy fixed real balance of payments constraints. The general process is schematically represented in the figure below.

Figure B.1: General Equilibrium Calibration Mechanism



9. Annex C - Notes on the Adjustment Process

The calibration procedure highlights the two salient adjustment mechanisms in the model (as well as the real economies), domestic and international prices. General equilibrium price adjustments are generally well understood by professional economists but, in the multilateral context, the role of exchange rates can be a source of confusion. Generally, in a neoclassical model like this one, there are no nominal or financial variables and the function of the exchange rate is only to equalize real purchasing power between different economies.

Because models like this do not capture the aggregate price level or other nominal quantities, there is no nominal exchange rate in the sense of traditional macroeconomics or finance. Since there is no money metric in the model, all prices are relative prices, and the exchange rate (the composite relative price of foreign goods) is no exception. If there were financial assets in the model, one could define a nominal exchange rate as the relative price of two international financial assets (money, bonds, etc.). Without them, the exchange rate is defined in terms of real international purchasing power, i.e. the relative price of tradeable to nontradeable goods. In a multi-sector setting, the real exchange rate is defined as the ratio of an index of the value of all tradeables (on world markets) to an index of the value of all nontradeables.

Since any tax (or other price elevating distortion) on an import is an implicit tax on all tradeable goods, trade liberalization causes tradeable goods prices to fall and the real exchange rate depreciates. Real exchange rate depreciation also makes exports more competitive, one of the principal motives for unilateral liberalization. The general implication of this is that trade will expand rapidly for a country removing significant import protection, and more rapidly for countries removing more protection. The pattern of trade expansion, and the domestic demand and supply shifts that accompany it, depend upon initial conditions and adjustments among trading partners.

It should also be noted that, even in a second-best world, removing price distortions also confers efficiency gains, increasing output potential and real incomes.