APEC Open Regionalism and its Impact on the World Economy: A Computable General Equilibrium Analysis

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1. INTRODUCTION

THE Asia-Pacific Economic Cooperation (APEC) forum, a loose-knit, 21-member regional institution, could assume a more pivotal role in the integration of the Pacific Rim, a market for more than 60 per cent of US agriculture and food exports, and play a central role in promoting global liberalisation (Bergsten, 1997). In 1994, APEC announced its 'Bogor Declaration', a plan to achieve free trade in 2010 for developed members and in 2020 for other members. It also pledged that it would pursue such a regional free trade arrangement by promoting 'open regionalism,' calling for 'not only' 'the actual reduction of barriers among APEC economies but also between APEC economies and non-APEC economies.' Such an approach, it is argued, promotes economic benefits not only for APEC members, but also could serve as a 'building block' for pursuing the goal of global free trade.

Members' liberalisation plans (known as Individual Action Plans) under the Bogor Declaration were first tabled at the Manila Ministerial Meeting in November 1996 for implementation beginning in 1997. These country plans were updated at each successive Ministerial meeting since then. Peer pressure is used to assure comparability in commitments among the 21 economies as members pursue 'concerted unilateral liberalisation,' but in consultation with and under the scrutiny of other members. APEC members called for comprehensive treatment, including controversial sectors like agriculture, but

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flexibility in dealing with various trade sectors in meeting the goal; e.g. addressing more sensitive sectors, which differ by country, toward the end of the implementation period.

In the five years of implementing APEC's free trade programme, there has been little substantive progress toward the elimination of trade barriers across the region, in part because the Asian financial crisis diverted attention from broad regional issues to urgent domestic ones in 1997–99.

However, APEC's programme, with its principle of 'open regionalism,' does provide an institutional framework for Asia-Pacific trade negotiation. If a new WTO round were to fail, APEC's free trade programme could become an important alternative for the United States to advance the cause of global free trade. The prospect of a trade agreement across the Pacific may propel the rest of the world, especially Europe, more quickly to undertake liberalisation to assure the competitiveness of its exports and economic growth.

There is considerable controversy, even among APEC members, regarding the central principle of APEC's free trade programme, 'open regionalism' (Bergsten, 1997). Should 'open regionalism' be implemented unconditionally, without requiring reciprocity from the non-APEC world, or should its benefits to non-APEC members be conditional on reciprocal measures? Some APEC members argue that the benefits from APEC liberalisation should accrue only to members, or to non-members who agree to reciprocal liberalising measures. According to this view, by applying 'open regionalism' conditionally, APEC avoids possible exploitation by 'free riders,' like, for example, the EU. Furthermore, without this reciprocity, the political cost might limit the willingness of some APEC members to proceed with their liberalisation programme. In Bergsten's words:

Extension of APEC benefits to non-members on a wholly unconditional MFN basis would limit the incentives of those economies to reduce their own barriers, and might even induce them to hold back on further liberalisation of their own, in the expectation that they could receive enhanced access to the huge APEC market without reciprocating in any way (Bergsten, 1997).

Other APEC members argue that the liberalising nation gains the most from its own action; non-APEC economies who 'free ride' APEC's free trade measures, by not offering reciprocal policy reform, would benefit less than the liberalising economies. Remaining distortions would hamstring non-member countries' ability to compete and take advantage of the opportunities in APEC. Therefore, what other economies do or not do is less important than what APEC members do. In addition, it would obviate the need to work out preferential rules of origin and detailed plans to qualify as a 'free trade area' under Article 24 of the WTO and avoid charges of preferential discrimination from the non-APEC world (Bergsten, 1997).

Given the controversial nature of APEC's 'open regionalism' approach to free trade, this paper evaluates the impact of such an approach on world trade and economic growth, using a 22-region, 18-sector recursive dynamic computable general equilibrium model. It empirically assesses how 'open regionalism'

applied on an unconditional basis (unconditional MFN) compares with two alternatives – a preferential free trade area and global free trade – in terms of its impact on economic growth, national welfare, trade creation and diversion with major partners in and outside of APEC. Who will gain? Who will lose? And what is the distribution of gains and losses across the world economy?

There are a number of CGE-based analyses on APEC trade liberalisation, most of which focus on the welfare and distributional effects on APEC and non-APEC economies. As pointed out by Scollay and Gilbert (2000) in their recent survey on CGE assessments of APEC trade liberalisation, a central issue of the APEC debate is the mode of liberalisation: which approach will deliver the greatest economic benefit to APEC members and what is their impact on non-APEC economies. A model-based comparison of the impact of the three liberalisation approaches will be the major focus of this paper. It builds on the work by Coyle and Wang (1998), covering more regions and sectors based on most recent data available and incorporating services trade liberalisation into its simulation design.

The rest of the paper is organised as follows: the next section outlines the basic structure of the model used. Section 3 provides an economic analysis of production factor endowments and comparative advantages across the APEC economies, while also introducing the data used in the model. Section 4 describes major assumptions about calibrating the baseline and in designing simulation scenarios. Major simulation results are presented and discussed in Section 5. Section 6 concludes the paper with major policy implications and model limitations.

2. STRUCTURE OF THE MODEL

The model used in this paper is an extension of the CGE models used in China's WTO accession study by Wang (1997 and 1999) with import embodied technology transfer and trade policy induced TFP growth. It is part of a family of models used widely to analyse the impact of global trade liberalisation and structural adjustment programmes. It focuses on the real side of the world economy and incorporates considerable detail on sectoral output and real trade flows, both bilateral and global. However, this structural detail is obtained at the cost of not explicitly modelling financial markets, interest rates, and inflation. While not designed to generate short-term macroeconomic forecasts, the model could be linked to a macroeconomic model including asset flows and generating macro scenarios. Given a macro scenario, however, this model could then be used to determine the resulting real trade flows and sectoral structural adjustments for each region in a recursive dynamic framework. Under assumptions on a likely path of future world economic growth, it generates the pattern of production and trade resulting from world economic adjustment to the shocks specified in the alternative macro scenarios.

In this study, 22 fully endogenised regions and 18 production sectors in each region are specified to represent the world economy. The 22 regions include 19 major APEC members: (1) the United States, (2) Canada, (3) Japan, (4) Australia, (5) New Zealand, (6) Korea, (7) Taiwan, (8) Hong Kong, (9) China, (10) Singapore, (11) Malaysia, (12) Thailand, (13) the Philippines, (14) Indonesia, (15) Vietnam, (16) Mexico, (17) Chile, (18) Peru, (19) Russia,¹ and three non-APEC regions: (20) Western Europe, (21) Other MFA restricted developing countries (India, Bangladesh, Nepal, Pakistan, and Sri Lanka, Central America and Caribbean, Brazil, Colombia, Uruguay, Turkey, Botswana, Poland, Hungary, rest of south African custom union, and rest of Middle East), and (22) Rest of the World.

The 18 sectors include three food and agricultural sectors: (1) land-intensive crops (rice, wheat, other grains, oilseeds, and cotton), (2) other primary agricultural products, (3) processed agricultural products, three natural resource-based sectors: (4) forest and fishery, (5) mining, and (6) energy, ten manufacturing sectors: (7) textiles, (8) wearing apparel, (9) leather, shoes and sporting goods, (10) other light manufactures, (11) wood and paper products, (12) manufactured intermediates, (13) motor vehicles and parts, (14) other transport equipment, (15) electronic equipment, (16) other machinery, and two service sectors: (17) utility, housing and construction, (18) transportation and traded services, a portion of which is allocated to international shipping. (The correspondence between sectors in the model, GTAP and ISIC are listed in the Appendix.)

There are six primary factors of production: agricultural land, natural resources, capital, agricultural labour, unskilled-labour, and skilled-labour. Skilled- and unskilled-labour have basic education in common, with skilled-labour having more advanced training. Agricultural labour has little or no education and works only in the farm sector. Natural resources are sector specific, while other primary factors are assumed to be mobile across sectors, but immobile across regions. Land and agricultural labour are only employed in agricultural sectors. The intra-period equilibrium structure and inter-period linkages are similar with what is described in Wang (1999).²

Three types of gains from trade liberalisation are captured by the model:

- (1) The gains from more efficient utilisation of resources, which lead to a one-time permanent increase in GDP and social welfare.
- (2) More rapid physical capital accumulation from a 'medium-run growth bonus' which compounds the efficiency gain from trade liberalisation and leads to higher saving and investment.
- (3) The model incorporates a capital and intermediate goods imports embodied technology transfer among regions, which links sector-specific TFP growth with each region's imports of capital and technology intensive products. The

¹ The data for Russia is based on the Former Soviet Union in the version 5 GTAP database.

² A detailed algebraic specification of the model is available from the authors on request.

technology transfer is assumed to flow in one direction – from more developed regions to less developed regions. Empirical evidences suggest that there is strong positive feedback between trade expansion and productivity growth. Trade liberalisation increases the prevalence of technology transfer as trade barriers are reduced. Firms in the liberalised regions will import more capital- and technology-intensive goods as both investment and intermediate inputs from abroad at cheaper prices. Those goods are usually embodied with advanced technology from other countries, thus stimulating productivity growth for all production factors.

Accumulation patterns for capital stock in the model depend upon depreciation and gross real investment rates, the latter set exogenously based on forecasts from the Oxford world macroeconomic model (Oxford Economic Forecasting, 1999). However, household savings, government surplus (deficit), and foreign capital inflows (foreign savings) are assumed to be perfect substitutes and collectively constitute the source of gross investment in each region. It means that changes in the trade balance, which directly affect foreign savings, are assumed to have only a partial effect on aggregate real investment in the region. Instead, they lead to an equilibrium adjustment in the domestic savings rate, which partially offsets the change in foreign savings.

Government surplus (deficit) is the difference between government tax revenues and its expenditures, the latter fixed as a percentage of each region's real GDP based on forecasts from the Oxford model. Foreign capital inflows or outflows are determined by the accumulation of the balance of trade, which is also fixed as a percentage of GDP in each region based on the Oxford model's projections except for the United States.

There are an economy-wide and a set of sector-specific TFP growth variables for each region in the model. The economy-wide TFP variable is solved endogenously in the baseline calibration to match a pre-specified path of real GDP growth in each region based on forecasts from the Oxford model. Then the economy-wide TFP variable is fixed when alternative scenarios are simulated, in such a case, the growth rate of real GDP and the sector-specific TFP variables that link productivity growth and imports are solved endogenously.

Similar to Hertel et al. (1995), the MFA quota rents are assumed to be captured by exporting countries as export taxes, and these export tax rates are adjusted endogenously to equate with the quotas. Such a treatment assumes that all quotas are binding constraints at equilibrium. Consistent with this modelling practice, we divide developing countries, subject to MFA quota restrictions, into quota binding and non-binding regions based on historical trade statistics.³ Quantity constraints only apply to those regions with binding quotas.

³ There are 16 developing regions in the model, 11 of which are subject to binding MFA quotas. They are Korea, Taiwan, Hong Kong, Singapore, China, Malaysia, Thailand, Philippines,

3. FACTOR ENDOWMENT AND TRADE PATTERNS AMONG APEC ECONOMIES

The CGE model described above was constructed around a 22-region, 18-sector world Social Accounting Matrix (SAM) estimated for 1997 based on version 5 of the Global Trade Analysis Project (GTAP) database (Dimaranan and McDougall, 2001). Details of this type of multi-regional SAM and its construction from the GTAP database are described in Wang (1994).

This section outlines the base year factor endowments, structure of net trade, and comparative position of major economic regions included in the model, and briefly describes the patterns of protection across APEC and non-APEC economies. The purpose of this SAM-based data analysis is to provide an overview of each APEC region's comparative advantage, and trade linkages among the regional economies so as to facilitate understanding of simulation results reported later in this paper.

a. Structure of Factor Endowment

Table 1 presents the data on factor endowments, intensity, cost, and the relative size of the economic regions included in the model. It shows that economies in the APEC are very diverse in terms of economic size, income level, and factor endowment. The seven high-income APEC economies (USA, Canada, Japan, Australia, New Zealand, Hong Kong and Singapore) account for less than nine per cent of the global labour force, but more than 45 per cent of the world capital stock. In contrast, more than one third of the global labour force with less than five per cent of the world's production capital resides in the five low-income developing APEC economies (China, Indonesia, Thailand, Philippines, Vietnam). The high-income regions are also relatively abundant in skilled-labour, their skilled-labour share in the world is one or two times more than their world share of total labour force, while the same share is much smaller relative to their total labour endowment in China and other low-income countries. Japan, Korea, Taiwan, Hong Kong, Singapore, Vietnam, China, Indonesia, the Philippines and Malaysia are poorly endowed with arable land relative to labour. Conditions are just the opposite in the United States, Canada, Australia, New Zealand and Russia, where land is relatively abundant and cheap. Thailand, Mexico, Chile, Peru, non-APEC textile exporting developing countries and Western Europe are between the two extremes with intermediate amounts of arable land per worker.

Uneven distribution of factor endowments induces wide differences in factor intensities and costs among regions. Because China, Indonesia, the Philippines, Vietnam, and other textile exporting developing countries are poorly endowed

Indonesia, Peru, other MFA restricted countries, while Vietnam, Mexico, Chile, Russia and the rest of the world are modelled as MFA quota non-binding countries.

with capital relative to labour, they have the lowest capital intensity (capital stock per worker), the largest shares of unskilled labour in their total labour force, and the highest rental-wage ratios. The reverse is true for the high-income economies. Mexico, Korea, and Taiwan, as newly industrialised economies fall somewhere between the advanced industrial countries and those developing countries. This is indicated by the fact that they have a lower capital intensity and a higher rental-wage ratio. Their skilled-labour share is larger than low-income developing countries, but only about one half that of the high-income developed economies (Table 1). These factor endowment differences are important in understanding net trade flows across regions based on conventional trade theory.

b. Net Trade Patterns

Trade theory suggests that world trade patterns are determined by the relative costs in delivering commodities by trading nations.⁴ Although many factors, such as distance, technical efficiency, prices of intermediate inputs, etc., may influence such costs, the relative scarcity of factor endowments is the most basic determinant. A country tends to export commodities that require relatively intensive use of the country's relatively abundant factors of production, and tends to import commodities that use its scarce production factors intensively. In other words, the direction of net trade flows is a function of the relative factor-intensity of production, and the relative factor scarcities among countries. The scarcer the production factors, the higher their cost in production.

Table 2 presents data on the direction of sectoral net trade flows in the base year for the regions included in the model. They show that, the United States, Canada, Australia, and New Zealand as land-abundant economies, are net exporters in almost all food and agricultural products, especially those land-intensive products such as grains, cotton and oilseeds. Russia is the only exception, importing large quantities of meat and processed food, although it is also a net exporter of land-intensive products. Japan, Korea, Taiwan, Hong Kong, and Singapore as land-scarce economies, are net importers of almost all food and agricultural products. Thailand, Mexico, Chile, Peru, non-APEC textile exporting developing countries, and Western Europe with intermediate land endowments, are each net exporters and net importers of different agricultural products. Western Europe is a net exporter of processed food products, but a net importer of land-intensive and other primary

⁴ Trade theories generally identify two types of international trade. Among developed industrial countries with similar endowments and technology, intra-industry trade is more common. Whereas between high- and low-income economies with different factor endowments and stages of technology development, trade is still on an inter-industry basis. The wide range in factor endowments and stages of economic development of the modelled economies suggest that perhaps the traditional Heckscher-Ohlin arguments (based on different factor endowment) may explain the trade pattern among them to a large extent as demonstrated by the base year trade data.

TABLE 1
Factor Endowment, Intensity, and Relative Size of Model Regions, 1997

	<i>United States</i>	<i>Canada</i>	<i>Japan</i>	<i>Aus- tralia</i>	<i>New Zealand</i>	<i>Korea</i>	<i>Taiwan</i>	<i>Hong Kong</i>	<i>China</i>	<i>Indo- nesia</i>	<i>Thai- land</i>	<i>Singa- pore</i>	<i>Malay- sia</i>	<i>Philip- pines</i>	<i>Viet- nam</i>	<i>Mexico</i>	<i>Chile</i>	<i>Peru</i>	<i>Russia</i>	<i>West Europe</i>	<i>Other MFA</i>	<i>Rest of the World</i>
GDP & trade flows	<i>Billions US Dollars</i>																					
GDP	7945	631	4255	393	65	445	300	140	855	209	158	80	106	78	22	389	76	65	587	8374	2397	1412
Exports	853	231	491	71	17	149	136	53	239	57	71	126	95	41	9	115	19	8	103	1007	394	287
Imports	1024	217	419	73	17	159	111	94	215	57	69	136	88	54	12	102	21	9	102	962	459	354
Relative size in the world	<i>Per cent</i>																					
GDP	27.4	2.2	14.7	1.4	0.2	1.5	1.0	0.5	3.0	0.7	0.5	0.3	0.4	0.3	0.1	1.3	0.3	0.2	2.0	28.9	8.3	4.9
Exports	18.7	5.1	10.7	1.5	0.4	3.3	3.0	1.2	5.2	1.3	1.6	2.8	2.1	0.9	0.2	2.5	0.4	0.2	2.3	22.0	8.6	6.3
Imports	21.5	4.6	8.8	1.5	0.4	3.3	2.3	2.0	4.5	1.2	1.5	2.9	1.8	1.1	0.3	2.1	0.5	0.2	2.2	20.2	9.7	7.4
Trade dependence	<i>Per cent</i>																					
Exports/output	10.7	36.6	11.5	18.0	26.2	33.5	45.5	38.2	28.0	27.3	44.8	157.7	89.7	52.3	41.8	29.6	24.7	12.1	17.5	12.0	16.4	20.4
Imports/ absorption	12.9	34.4	9.9	18.6	25.5	35.6	37.2	67.3	25.2	27.3	43.8	170.0	82.7	68.5	56.7	26.2	27.9	14.5	17.4	11.5	19.1	25.1
Share of factor endowment	<i>Per cent</i>																					
Land	12.8	3.3	0.3	3.8	0.1	0.1	0.1	0.0	9.0	1.3	1.2	0.0	0.1	0.4	0.4	1.8	0.1	0.3	15.5	5.6	25.0	18.7
Agricultural labour	0.3	0.0	0.3	0.0	0.0	0.2	0.1	0.0	39.2	3.7	1.6	0.0	0.1	1.0	2.1	0.7	0.1	0.2	1.8	0.7	30.2	17.8
Unskilled labour	7.7	0.9	4.5	0.5	0.1	1.5	0.6	0.2	14.3	3.5	1.1	0.1	0.5	1.4	0.9	2.1	0.4	0.7	7.0	10.5	28.0	13.8
Skilled labour	13.5	1.7	3.5	0.8	0.2	0.8	0.4	0.2	17.5	1.1	0.7	0.1	0.4	0.7	0.3	1.4	0.2	0.2	12.4	15.0	15.0	14.0
Total labour	4.9	0.6	2.4	0.3	0.1	0.8	0.3	0.1	26.1	3.3	1.3	0.1	0.3	1.1	1.4	1.3	0.2	0.4	5.2	6.5	27.6	15.7
Capital	22.1	1.9	18.5	1.3	0.2	1.6	0.7	0.6	2.6	0.6	0.6	0.3	0.3	0.3	0.1	1.4	0.2	0.2	2.5	30.4	8.9	4.9

agricultural products. While Mexico, Chile, Peru and non-APEC textile exporting developing countries, with a relative abundant labour endowment, are net exporters of other agricultural goods, which are often labour-intensive, but net importers of land-intensive agricultural products. Malaysia, Indonesia, the Philippines and China, as land-scarce and labour-abundant economies, also follow this pattern. The only exception is Vietnam, a land-scarce country with net exports of rice and other agricultural products, because of its distorting trade policy.

The net trade data in Table 2 also demonstrate that labour-intensive manufactured goods (textile, apparel, leather and shoes, and other light manufactures), electronics, and natural resource-based products are the major net imports for the United States, Japan and West Europe, while capital and skill-intensive manufactures (manufactured intermediates, motor vehicles, machinery and other transport equipment) are their major net exports (except for the US because of its deficit with Japan). Australia and New Zealand have a surplus in most natural resource-based sectors but a deficit in almost all manufactured goods. The trade patterns of labour-abundant economies such as China, Indonesia, Thailand, the Philippines, Vietnam, and non-APEC textile exporting developing countries exhibit some similarities. They are net exporters of labour-intensive manufactured goods and net importers of capital-intensive manufactured goods.

However, there is a clear distinction between developing countries in East and Southeast Asia and in the rest of the world. East and Southeast Asian developing countries except Vietnam are also net exporters in electronic products, while developing countries in other parts of the world are often net importers. This is caused by the vertical integration of the electronic industry in Asia and production relocation from Japan, Korea, Singapore and Taiwan to developing countries in Asia. At an intermediate level of capital intensity, Korea, Taiwan and Mexico, are net suppliers and net demanders of different skill/capital-intensive manufactured goods, while remaining net exporters of labour-intensive manufactured goods. However, upstream products such as textiles represent a major share of their net exports of such products, with more labour-intensive exports such as apparel playing less and less of a role as production shifts to China and other developing countries.

Hong Kong and Singapore serve as entry ports for China and Southeast Asia, respectively, have a huge surplus in their traded services sector (\$20 and \$12 billion respectively), but are net importers for almost all other products except electronics.

c. Comparative Position of APEC Economies According to Their Factor Endowment

The factor endowment and net trade data in the base year reviewed above provide detailed information on trade patterns across Asia-Pacific and the world. The impression given by the data is generally consistent with intuition about

these economies based on conventional international trade theory. There are at least three types of economies that can be identified within APEC. At one extreme, labour-abundant developing countries such as China and Indonesia are seen as major competitors in labour-intensive manufactured exports and important importers of capital/technology-intensive products for their modernisation programmes. At the other extreme, Japan and the United States are seen as major suppliers of capital/technology-intensive goods and as the final markets for labour-intensive consumer products. Newly industrialised economies such as Korea and Taiwan are seen as in between the two extremes. They are important suppliers of manufactured goods to China and other developing countries, and become both demanders and suppliers of technology/capital-intensive products from Japan, and the United States, while still remaining important suppliers of labour-intensive goods for industrial countries.

d. Import Protection Faced by Exporting Regions

Most general equilibrium analyses of regional integration focuses on the removal of *ad valorem* equivalent price distortions against imports from existing trade barriers. As shown in the literature, the pattern and level of protection are important determinants of impacts of trade liberalisation. The larger the initial distortion, the greater the response to an assumed policy change. For this analysis, the estimated impact of alternative APEC trade liberalisation scenarios also depends on the structure of existing trade barriers captured by the estimated global SAM. The initial import protection rate levied on each country's exports as a percentage of c.i.f. value is presented in Table 3. Note that these rates include the tariff equivalent of non-tariff barriers for agricultural and food products in most regions, and anti-dumping duties for the United States and the EU.

Because there are no protection data on services trade in the GTAP database, tariff equivalents of protection data are adopted from Francois (1999). Since Francois only estimated the barriers in construction and business services, the former was taken as the protection level for utility, housing and construction sector of our model, while the latter was taken as the protection level for transportation and traded services sector of the model. Those estimates of tariff equivalent of trading costs in services are very preliminary; however, they do provide a consistent starting point to include services in trade liberalisation simulation exercises.⁵

⁵ The basic methodology used by Francois (1999) was to estimate two gravity models of trade – one for business services and one for construction services – using bilateral services export data from the United States. Those gravity models predict the levels of service trade in the absence of barriers, using Hong Kong and Singapore as 'free trade' benchmarks, and thus allow tariff equivalents for the unobserved trade barriers in other countries to be estimated. The estimates we used are slightly modified by Hertel, Walmsley and Itakura (2001).

TABLE 2
Net Trade Patterns in APEC Regions, 1997 Billions of US Dollars

	<i>United States</i>	<i>Canada</i>	<i>Japan</i>	<i>Aus- tralia</i>	<i>New Zealand</i>	<i>Korea</i>	<i>Taiwan</i>	<i>Hong Kong</i>	<i>China</i>	<i>Indo- nesia</i>	<i>Thai- land</i>	<i>Singa- pore</i>	<i>Malay- sia</i>	<i>Philip- pines</i>	<i>Viet- nam</i>	<i>Mexico</i>	<i>Chile</i>	<i>Peru</i>	<i>Russia</i>	<i>West Europe</i>	<i>Other MFA</i>	<i>Rest of the World</i>
Land-intensive agriculture	20.1	5.1	-7.0	3.6	0.0	-2.6	-1.8	-0.2	-1.4	-2.1	-0.7	-0.1	-0.8	-0.7	0.0	-2.6	-0.2	-0.4	2.0	-5.6	-7.7	3.0
Other agriculture	-3.1	0.3	-5.9	3.2	1.1	-1.5	-0.8	-2.1	2.1	1.2	0.4	-0.8	0.0	0.1	0.8	2.3	1.1	0.4	-1.5	-18.9	13.6	8.0
Processed agriculture	3.2	1.3	-26.8	5.0	4.9	-2.1	-1.7	-4.7	0.4	1.9	5.3	-1.7	2.8	-0.7	0.6	-0.2	1.9	0.9	-11.4	19.3	-1.7	3.7
Food and agriculture total	20.3	6.7	-39.8	11.7	6.0	-6.2	-4.3	-7.1	1.1	1.1	5.0	-2.6	2.0	-1.3	1.4	-0.5	2.8	0.9	-11.0	-5.2	4.1	14.7
Forest & fishery	1.1	0.3	-5.1	0.3	0.6	-0.5	-0.2	-0.8	-0.1	0.3	0.2	0.0	0.8	0.0	0.1	0.1	0.3	0.0	1.5	-2.2	0.3	2.9
Energy	-60.3	13.5	-45.3	5.5	-0.4	-17.4	-6.7	-2.0	-3.7	8.0	-3.9	-4.5	3.0	-2.4	0.1	9.0	-1.6	-0.3	31.7	-55.8	99.8	33.6
Mining	-1.6	1.0	-4.9	4.0	-0.3	-3.1	-0.5	-1.6	0.7	1.1	0.2	-1.0	-0.5	-0.6	-0.2	0.5	2.1	0.8	0.1	3.3	0.8	-0.3
Wood & paper	-12.2	22.9	-13.2	-1.7	0.5	-1.3	0.4	-1.4	-1.5	6.5	0.3	-0.6	3.5	-0.2	0.1	-0.5	1.2	-0.2	-1.3	5.6	-6.3	-0.7
Resource-based total	-73.0	37.8	-68.5	8.1	0.5	-22.2	-7.1	-5.8	-4.6	15.9	-3.1	-6.0	6.8	-3.3	0.1	9.1	2.0	0.3	32.0	-49.1	94.6	35.5
Textile	-9.1	-2.1	-2.0	-0.5	0.1	10.1	9.6	-3.6	4.0	2.0	1.4	-1.2	0.4	-0.9	-1.0	0.6	-0.5	0.2	-1.5	-2.9	1.3	-4.5
Apparel	-29.4	-1.0	-10.7	-0.9	-0.1	1.3	1.3	3.0	24.8	3.4	2.6	-0.6	1.1	2.0	1.0	2.2	-0.3	0.2	-1.7	-23.3	20.4	4.6
Leather	-17.7	-1.2	-5.0	-0.4	0.1	1.4	1.6	-0.7	18.6	2.8	1.6	-0.4	-0.1	0.2	1.3	0.2	-0.3	0.0	-1.5	-3.6	2.1	1.0
Other light manuf.	-25.5	-1.4	-1.4	-0.6	-0.2	0.5	3.3	-2.3	20.2	0.5	1.7	-0.7	0.4	0.2	0.0	0.5	-0.3	0.1	0.6	3.2	0.7	0.6
Labour- intensive total	-81.7	-5.7	-19.1	-2.4	-0.1	13.3	15.8	-3.5	67.7	8.6	7.3	-3.0	1.9	1.5	1.4	3.6	-1.4	0.4	-4.2	-26.5	24.4	1.7

Electronic	-42.2	-7.9	66.5	-6.4	-0.9	20.2	22.6	-14.3	4.6	0.3	6.8	15.1	16.8	2.9	-0.5	1.1	-1.3	-0.6	-5.0	-45.0	-23.4	-9.4
Intermediate	-1.4	0.5	24.4	1.6	-0.5	-4.4	3.1	-13.1	-14.8	-4.3	-5.3	-6.1	-3.8	-4.7	-2.7	-8.4	2.9	0.2	15.2	69.5	-34.7	-13.5
Motor vehicle	-52.2	4.2	64.0	-4.0	-1.2	8.4	-1.8	-3.8	-2.1	-2.3	-2.1	-1.5	-2.0	-1.2	-0.4	7.1	-1.7	-0.4	-4.5	33.5	-26.8	-9.1
Other	28.2	0.3	11.2	-0.5	-0.8	3.4	-0.1	-1.2	-1.1	-1.7	-1.2	-4.0	-2.8	-1.9	-0.3	-0.4	-0.5	-0.1	-0.4	-0.2	-20.3	-5.6
transportation																						
Machinery	12.7	-14.8	91.1	-10.2	-1.5	-9.0	0.9	-9.0	-7.5	-9.7	-6.1	-8.7	-8.1	-4.8	-1.9	3.5	-4.2	-1.7	-12.9	109.4	-79.5	-27.8
Capital-	-12.6	-9.7	190.7	-13.1	-4.1	-1.5	2.0	-27.1	-25.5	-18.0	-14.7	-20.3	-16.6	-12.6	-5.2	1.8	-3.5	-2.0	-2.7	212.1	-161.2	-56.1
intensive total																						
Trade services	51.7	-3.7	-36.2	2.3	-0.4	-5.7	0.0	19.9	-0.9	-5.7	3.4	11.7	-0.4	2.8	0.0	0.4	-0.1	-0.1	-4.0	-6.7	-13.5	-14.9
Housing &	1.1	1.1	-0.6	0.0	0.0	-0.1	0.0	-0.2	-0.9	0.0	-0.3	0.0		-0.6	0.0	-0.1	0.0	0.0	-0.9	0.9	1.4	-0.6
construction																						
Total	-136.5	18.6	93.0	0.2	1.0	-2.1	28.9	-38.2	41.5	2.3	4.4	-5.1	10.5	-10.7	-2.8	15.4	-1.5	-1.1	4.4	80.6	-73.6	-29.1

Source: Calculated from version 5 GTAP database.

TABLE 3
Trade Weighted Average Protection Rate Faced by Each Region's Exports, 1997 Per Cent of c.i.f. Value

	<i>All Sector Average</i>		<i>Agriculture</i>		<i>Land-intensive</i>		<i>Resource-intensive</i>		<i>Labour-intensive</i>		<i>Capital-intensive</i>		<i>Services</i>	
<i>APEC</i>	<i>APEC</i>	<i>Non-APEC</i>	<i>APEC</i>	<i>Non-APEC</i>	<i>APEC</i>	<i>Non-APEC</i>	<i>APEC</i>	<i>Non-APEC</i>	<i>APEC</i>	<i>Non-APEC</i>	<i>APEC</i>	<i>Non-APEC</i>	<i>APEC</i>	<i>Non-APEC</i>
United States	6.6	8.3	36.0	26.5	50.1	17.1	1.9	5.1	3.5	14.8	2.7	5.1	13.0	12.1
Canada	2.5	10.5	24.6	37.3	58.4	40.8	0.2	4.4	0.9	1.7	0.4	5.6	10.8	12.0
Japan	7.9	10.9	18.1	39.4	9.3	21.2	6.4	8.6	13.5	4.7	6.8	7.7	10.0	12.7
Australia	9.8	11.3	34.9	27.3	51.0	13.4	1.3	4.9	6.1	5.5	3.6	6.6	12.0	11.4
New Zealand	13.8	32.9	31.3	59.9	5.9	11.2	1.8	13.9	3.8	3.6	1.7	6.9	11.8	11.3
Korea	8.7	9.8	31.5	35.2	8.7	6.9	5.0	12.0	15.7	6.1	6.8	8.9	10.5	11.6
Taiwan	9.1	6.1	29.1	32.5	10.1	15.8	7.7	6.9	16.7	2.9	7.1	4.3	12.6	12.3
Hong Kong	7.5	4.6	28.1	42.7	15.0	51.6	8.5	7.9	16.6	5.7	9.0	3.8	10.0	16.6
China	8.4	11.2	38.6	26.2	158.2	16.0	2.6	10.4	8.8	5.6	3.6	6.7	10.7	11.5
Indonesia	6.8	10.4	25.0	19.1	13.2	13.0	3.2	7.0	11.3	9.7	4.0	8.6	13.0	11.6
Thailand	10.0	9.7	28.7	36.8	14.0	55.8	3.8	6.1	9.5	11.4	6.9	5.5	11.6	11.3
Singapore	5.7	6.3	24.8	34.2	8.9	16.9	5.3	14.4	11.5	12.7	5.2	5.0	10.6	11.3
Malaysia	7.5	8.7	15.2	30.6	31.6	16.8	3.0	12.1	7.4	4.7	8.2	4.4	10.8	11.3
Philippines	6.8	5.4	24.2	34.5	6.0	1.9	2.6	5.3	11.7	4.5	4.8	1.3	9.5	11.6
Vietnam	11.1	11.9	24.2	15.7	10.8	41.1	1.0	2.7	12.0	18.8	5.9	4.8	12.5	12.4
Mexico	1.4	9.2	11.6	22.2	7.2	35.9	0.2	4.3	0.4	1.0	0.4	9.6	12.1	11.5
Chile	7.3	9.1	19.8	23.8	3.6	32.8	1.5	4.0	13.8	26.7	2.9	5.3	11.4	11.4
Peru	7.5	14.4	15.7	43.0	4.6	9.7	1.3	4.5	11.3	8.2	2.4	5.2	11.7	11.8
Russia	9.4	5.4	29.7	20.7	5.1	6.5	2.4	1.3	8.4	37.8	3.6	4.0	18.7	13.1
West Europe	7.4	13.6	21.9	41.6	10.6	23.4	4.7	11.3	7.7	11.9	4.8	11.6	11.9	12.3
Other MFA	7.7	9.9	21.1	20.5	38.3	12.3	1.5	1.5	9.0	15.0	4.3	6.1	11.6	11.9
Rest of the World	8.5	11.5	21.4	22.9	29.2	16.1	1.9	4.0	10.5	27.9	5.7	7.6	12.3	13.1

Source: Calculated from version 5 GTAP database. Services sector protection data taken from Francois (1999).

The import protection rates levied on each country's export show that there are substantial variations in barriers to trade among commodity groups and across exporters. Generally speaking, the exporting country faces much higher barriers in agricultural and food products than other goods, especially for land-intensive products. High food system protection reflects high tariffs and many non-tariff barriers, such as import licensing and quotas. The protection level for services trade is also high, while protection levels in manufacturing sectors and natural resource-based sectors are generally low, especially for capital-intensive products. Those barriers faced by exporters are indicative of the potential gains in regional markets from trade liberalisation and, thus, one of the economic incentives each economy may have to engage in negotiating a free trade agreement.

The economic and trade structures of APEC discussed above have important implications for understanding the impact of APEC trade liberalisation on changes in world trade. However, this information cannot be considered in isolation, since changes in trade policies and protection levels in any of the regions and sectors will have impacts on other regions and sectors. It is on this point that the application of a CGE model, which includes all participating regions, can help us better understand and estimate the possible impacts of alternative scenarios of APEC trade liberalisation.

4. BASELINE CALIBRATION AND SIMULATIONS DESIGN

To estimate the impact of APEC trade liberalisation on the world economy, four scenarios are simulated. In the baseline scenario, the world economic growth path from 1997 to 2025 is generated, assuming full implementation of the Uruguay Round and NAFTA, and that China and Taiwan will become WTO members and participate in the Uruguay Round liberalisation process sometime in the year 2002.

Three alternative scenarios are compared with the baseline scenario: (1) an exclusive APEC free trade area (FTRA), featuring APEC trade liberalisation among its members; (2) unconditional MFN (OPEN), under which APEC members conduct trade liberalisation on an MFN basis, granting free trade to all their trade partners, including non-APEC countries without asking for reciprocal treatment; and (3) global trade liberalisation under which non-APEC economies undertake policy reform in the same way as APEC (FULL). According to the 'Bogor Declaration', trade liberalisation means reducing import protection and export subsidies in the developed and newly industrialised economies of APEC (the United States, Canada, Japan, Australia, New Zealand, Korea, Singapore, and Taiwan) to zero by 2010, and removing all import barriers in all other APEC economies (Mexico, Chile, Peru, China, Malaysia, Thailand, Philippines,

Indonesia, Vietnam and Russia) by 2020. Protection levels decline at a constant annual rate. All exogenous forces driving economic growth are the same as in the baseline scenario. The only differences among the three scenarios and the baseline are changes in each country's trade policy.

Major assumptions and results from the baseline calibration are presented in Table 4. It provides a general picture of economic trends in the APEC region and the world in the next 20 years. Under the assumptions specified in Table 4, this calibrated 'benchmark' will serve as a basis of comparison for counterfactual simulation analyses presented later in the paper. All the endogenously solved macroeconomic variables seem to fall into a reasonable range. TFP, as a residual and an adjustment mechanism in the model to match the pre-specified real GDP growth rate and the gross investment rate, seems consistent with estimated patterns of TFP growth in each of the modelled economies.

For all the simulation scenarios, the CGE model generates results regarding the effects on social welfare, terms of trade, the volume of trade, output, consumption, the real wages paid to each factor, and changes in prices and resource allocation. The differences in results generated by the three alternative simulation scenarios with the baseline scenario provide estimates of the impact of different APEC trade liberalisation policy on the world economy. However, those estimates should be regarded as outcomes from conditional projections rather than as forecasts. In reality, actual trade and output patterns are affected by many more factors than just trade liberalisation, such as domestic macroeconomic and income policy changes.

5. SIMULATION RESULTS: APEC'S OPEN REGIONALISM IN PERSPECTIVE

Given APEC's controversial objective of free trade through 'open regionalism', we evaluate its implications for APEC and the world economy with three alternative trade liberalisation scenarios. Table 5 summarises the differences between the baseline scenario and the three alternative scenarios in major aggregate economic variables. It shows that world economic growth rate increases regardless of liberalisation approach. They vary somewhat in magnitude, with worldwide gains smallest for the APEC free trade area option, in the middle for unconditional MFN, and largest for global free trade. However, the distribution across regions of those gains in economic growth is quite different under different scenarios. For instance, almost all member regions (except Mexico) gain and all non-member regions lose in the APEC exclusive free trade scenario, while all countries gain in the unconditional MFN and global free trade scenarios except Mexico. Developed and newly industrialised countries gain relatively more during 2001–10 when their tariff is being reduced to zero, while developing countries gain more in 2011–20, when their import protections are being eliminated to zero.

TABLE 4
Major Assumption for Baseline Calibration in APEC Model

	United States	Canada	Japan	Aus- tralia	New Zealand	Korea	Taiwan	Hong Kong	China	Indo- nesia	Thai- land	Singa- pore	Malay- sia	Philip- pines	Viet- nam	Mexico	Chile	Peru	Russia	West Europe	Other MFA	Rest of the World	World Average
<i>Average Annual Growth Rate, %, 2000–2020</i>																							
Real GDP	3.1	2.5	2.1	3.4	3.2	4.6	4.2	4.1	6.8	5.1	4.9	4.4	5.3	3.7	5.9	4.3	4.7	4.2	3.1	2.5	3.8	3.2	3.2
Labour force	0.8	0.6	−0.2	1.0	0.8	1.1	0.8	0.2	0.8	2.0	0.8	0.3	2.7	2.4	1.9	2.4	2.1	2.6	0.6	−0.1	2.3	2.5	1.6
Skilled labour	2.1	2.0	1.7	2.4	2.3	4.3	4.2	3.1	3.6	8.4	5.6	3.2	8.8	4.9	5.1	5.4	5.1	6.9	0.6	2.1	5.4	6.2	3.9
TFP	0.9	0.5	1.0	0.6	1.0	1.5	0.8	0.9	3.1	1.7	2.8	0.8	2.1	1.4	2.2	0.5	0.2	0.4	1.4	1.1	0.6	0.2	1.1
Capital stock	4.5	3.6	2.4	4.2	3.1	5.2	6.0	5.0	8.3	4.7	2.7	4.6	5.9	3.2	6.5	4.6	6.4	4.3	2.7	3.0	3.6	3.0	3.8
Gross investment	3.7	3.1	2.1	3.9	3.2	5.3	4.3	5.5	7.0	5.5	4.8	5.0	5.7	3.5	5.9	5.5	5.3	4.2	4.7	2.8	4.8	3.2	3.7
Government spending	2.6	2.4	2.1	3.0	3.2	3.0	3.8	3.6	7.4	4.8	3.5	3.4	4.3	3.3	5.9	3.2	3.7	4.2	2.7	1.9	3.3	3.2	2.6
Exports	3.6	1.9	1.6	2.3	2.0	4.3	4.2	3.1	7.4	5.5	5.5	3.3	6.1	4.0	6.3	4.3	4.6	4.1	2.2	2.3	4.0	3.4	3.3
Imports	3.1	3.0	2.7	3.8	3.5	4.6	4.1	3.7	6.2	5.1	4.5	3.7	5.2	3.7	6.0	4.4	4.6	3.7	3.5	2.5	4.0	3.5	3.3
HH consumption	2.9	2.4	2.2	3.4	3.2	5.0	4.4	4.2	6.8	5.1	4.9	4.3	5.1	4.0	6.0	4.2	4.8	4.2	2.8	2.5	3.7	3.2	3.1
Total absorption	3.0	2.5	2.1	3.4	3.1	4.9	4.3	4.5	6.8	5.0	4.7	4.5	5.2	3.8	5.8	4.3	4.8	4.2	3.1	2.4	3.8	3.2	3.1
<i>Average Annual Agricultural Labour Force Migration, 1000 Persons, 2000–2020</i>																							
Rural labour migration	13	6	30	1	2	81	22	0	11247	1929	710	0	73	413	852	244	9	41	673	79	16470	10237	43130
<i>Labour Composition, %, 2000</i>																							
Agricultural labour	2.2	2.7	4.6	4.5	9.2	11.3	8.8	0.6	67.6	52.6	57.0	0.2	20.6	39.1	68.9	21.9	17.2	25.0	15.5	4.6	50.0	50.5	45.4
Unskilled labour	64.9	62.2	78.2	65.5	59.1	77.2	76.4	79.4	24.4	42.9	36.6	71.9	64.1	52.8	28.6	65.9	69.6	68.4	57.7	66.8	43.4	38.4	42.7
Skilled labour	32.9	35.2	17.2	30.0	31.7	11.5	14.9	20.0	8.1	4.5	6.4	27.9	15.4	8.0	2.5	12.3	13.2	6.6	26.8	28.6	6.6	11.1	12.0
<i>Labour Composition, %, 2020</i>																							
Agricultural labour	2.2	2.4	4.2	4.3	8.4	8.5	6.8	0.8	54.6	37.7	40.3	0.3	15.2	29.8	52.3	17.5	16.2	22.7	11.6	4.2	34.8	34.4	34.2
Unskilled labour	55.0	51.9	70.5	56.1	49.6	70.1	63.9	63.4	31.4	46.9	43.5	50.8	36.2	57.3	43.1	60.8	60.5	62.4	61.7	52.2	53.0	43.1	46.9
Skilled labour	42.9	45.8	25.3	39.6	42.0	21.5	29.3	35.8	14.0	15.4	16.2	49.0	48.6	12.9	4.7	21.8	23.3	15.0	26.8	43.6	12.2	22.4	18.9
<i>Balance of Trade as % of Nominal GDP</i>																							
2000	−4.5	4.3	2.4	−2.6	1.3	14.1	4.4	6.4	2.4	3.8	16.1	14.6	11.1	−4.1	−14.0	−2.6	−4.7	−2.3	6.4	1.8	−1.7	−3.0	
2010	−3.3	3.6	1.4	−3.3	1.4	9.0	3.5	0.1	0.3	3.6	18.9	13.1	13.5	−5.9	−15.4	−4.2	−7.2	−2.3	5.0	2.6	−3.2	−3.2	
2020	−3.0	4.0	1.0	−3.5	1.5	9.1	3.3	−0.7	0.1	4.1	19.8	13.5	15.1	−7.1	−18.2	−4.7	−8.2	−2.5	5.4	2.7	−3.6	−3.7	

Note:

Data in boldface are set exogenously. Most of them are forecasting from *Oxford World Macroeconomic Model*.

Those gains to economic growth from trade liberalisation are mainly generated from three sources that reinforce each other: (1) more efficient allocation of production factors; (2) more rapid physical capital accumulation from trade liberalisation, which induces higher income for economic agents and lowers price for capital goods, and leads to higher savings and investment, so that there will be more physical capital stock available in the economy; and (3) more rapid growth of total factor productivity (TFP) due to the acceleration of technology transfer via expansion of capital and intermediate goods imports from advanced industrial countries. The additional capital accumulation and TFP growth in each region due to different APEC trade liberalisation scenarios are also reported in Table 5. They demonstrate a similar pattern as the additional accumulated real GDP growth.

As classical trade theory indicates, removing trade distortions leads to further realisation of each region's comparative advantage, more efficient allocation of production factors, and expansion of trade. This type of efficiency gain is driven by each region's comparative advantage, resulting in structural adjustments in each regional economy and a shifting of world net trade patterns. In addition, trade liberalisation encourages technology transfer as trade barriers are reduced. When countries expand their exports to the world market after trade liberalisation, firms in each region will import more capital- and technology-intensive goods as both investment and intermediate inputs from abroad at cheaper prices to meet higher demands for their products. Those imported intermediate and capital goods are usually embodied with advanced technology from other countries, thus stimulating productivity growth.

Another interesting observation from each region's additional trade growth under the three alternative APEC trade liberalisation scenarios listed in Table 5 is that non-APEC countries seem unable to 'free ride' on trade expansion from APEC's unconditional MFN liberalisation. Under such a scenario, export growth in the non-APEC economies is much slower than in the APEC economies, and in some non-APEC countries such as Western Europe and rest of the world, export growth actually declines from baseline during the 20-year simulation period. However, if non-APEC economies were to liberalise their markets also, then their export growth rate would increase dramatically, surpassing the growth of many of those APEC economies (compare additional export growth in Table 5 for the two scenarios 'Open' and 'Full'). The remaining import protection in the non-APEC region results in higher prices for firm's intermediate and capital goods inputs, taxes their own production and exports, and slows technology transfer and productivity growth as well as capital accumulation (see numbers in the shadowed area in Table 5), thus reducing its competitiveness in world markets. This would furnish an incentive for non-APEC economies to adopt active measures in liberalising their own markets. Therefore, APEC open regionalism, defined as unconditional MFN here, would likely be a stepping-stone towards global free trade.

TABLE 5
Growth Impact of Alternative Trade Liberalization Scenarios on APEC and World Economy
(Additional accumulated growth during 2001–2020, percentage different from baseline)

<i>Region</i>	<i>Real GDP</i>			<i>Real Exports</i>			<i>Real Imports</i>			<i>Factor Productivity</i>			<i>Capital Stock</i>		
	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>
United States	0.54	0.38	1.18	3.8	7.3	8.6	7.5	9.3	12.2	0.02	0.03	0.30	0.38	0.34	0.86
Canada	1.57	1.44	2.18	−1.6	0.1	−0.7	4.4	6.7	8.0	−0.06	−0.02	−0.01	0.48	0.38	0.78
Japan	1.51	1.38	2.21	14.3	17.8	19.1	20.4	23.9	27.5	0.54	0.55	0.98	0.70	0.71	1.13
Australia	3.22	3.09	4.97	7.1	11.2	11.5	19.0	20.6	25.1	0.45	0.60	1.08	1.77	1.75	2.83
New Zealand	5.89	5.45	13.14	7.0	10.1	14.6	23.1	25.2	45.5	0.87	1.03	2.48	2.86	2.64	6.51
Korea	6.05	5.91	7.89	23.0	28.2	30.2	31.7	36.7	41.5	1.47	1.90	2.24	3.46	3.54	4.76
Taiwan	3.68	3.42	4.10	18.3	23.5	24.4	26.3	30.0	31.7	0.49	0.75	0.87	2.25	2.19	2.81
Hong Kong	8.52	5.18	6.20	6.6	6.0	7.6	16.4	14.6	16.3	0.99	0.34	0.74	3.95	2.12	2.96
China	3.44	5.96	8.24	99.3	120.6	125.4	60.9	73.4	79.7	2.19	3.43	3.94	4.03	5.56	7.66
Indonesia	0.58	0.59	1.71	21.9	28.4	30.2	21.5	27.1	30.2	0.26	0.42	0.58	0.62	0.60	1.25
Thailand	2.32	1.93	3.25	27.0	32.3	32.8	36.6	41.9	44.7	0.33	0.50	0.57	1.00	0.90	1.32
Singapore	11.65	8.58	13.93	4.8	5.6	7.6	9.7	11.1	14.3	−0.01	−0.11	0.28	5.04	3.11	5.28
Malaysia	−0.44	−1.19	0.75	23.4	30.4	32.5	20.5	26.0	29.2	0.86	1.44	1.72	0.53	0.13	1.37
Philippines	0.00	−1.06	−0.52	23.0	30.1	29.1	18.9	23.0	23.7	0.09	0.26	0.30	0.46	0.00	0.12
Vietnam	4.54	5.26	9.88	122.6	138.0	142.6	71.3	77.4	84.6	−0.53	−0.50	0.05	4.68	5.04	8.76
Mexico	−1.02	−1.50	−1.07	10.9	18.7	20.0	7.1	12.0	14.3	−0.23	−0.18	−0.18	−0.25	−0.48	−0.19
Chile	0.64	−1.17	1.00	17.2	27.7	28.9	12.7	16.4	21.8	0.18	0.11	0.23	0.69	−0.60	0.96
Peru	1.89	1.20	5.47	32.0	50.9	54.9	21.2	28.5	43.3	0.79	0.89	1.43	1.19	0.86	3.33
Russia	1.10	1.23	3.00	14.6	22.6	25.5	23.4	32.6	39.6	0.19	0.78	1.35	0.63	0.63	1.55
West Europe	−0.43	0.36	0.50	−1.8	−1.5	5.7	−0.7	1.2	9.1	−0.12	−0.15	0.05	−0.18	0.19	0.25
Other MFA restricted	−0.96	0.34	1.60	−3.9	0.1	38.9	−2.3	3.6	29.9	−0.16	−0.05	0.57	−0.37	0.25	1.28
Rest of the World	−0.41	0.42	1.98	−2.8	−0.1	29.2	−1.6	2.9	24.8	−0.06	−0.02	0.50	−0.15	0.22	1.08
World Average	0.58	0.93	1.76	7.9	11.1	19.2	7.9	11.1	19.2	0.29	0.43	0.76	0.02	0.63	1.16

Households in APEC economies and their major trade partners would benefit from further realisation of each region's comparative advantage in a freer trade environment and faster economic growth. As shown in Table 6, yearly average social welfare measured by equivalent variation (EV)⁶ rises in all APEC member regions except Mexico but declines in non-APEC countries under APEC free trade area scenario. APEC unconditional MFN also yields welfare gains for non-APEC countries as well as for all APEC members except Mexico. According to the simulation results, real purchasing power in the APEC region as a whole rises in the range of \$58 to \$105 billion a year for the three options during 2001–10 (as 0.3 to 0.5 per cent of real consumption in baseline), and from \$217 to \$394 billion during 2011–20 (as 0.7 to 1.2 per cent of real consumption in baseline). The jump between 2010 and 2020 is explained by the elimination of the higher protection levels in the developing economies of APEC and the liberalisation-induced higher rates of economic growth from 2010–20 in most developing countries.

Trade creation dominates trade diversion.⁷ As expected, trade diversion occurs in the case of the APEC free trade area, \$37 billion annually during the first ten years and \$97 billion annually during the second ten years, but trade creation overwhelmingly dominates, as demonstrated in Table 7 (\$128 billion and \$482 billion, respectively).

In the case of the APEC free trade area, total trade increases significantly for all APEC members, but declines for non-APEC economies. Economies within APEC trade more among themselves. Within APEC, trade increases 4.3 per cent from the baseline scenario during the first ten years and 11.4 per cent in the second ten years. But trade between APEC and non-APEC economies declines by about 1.4 and 3.2 per cent, respectively.⁸ Trade diversion is no longer an issue

⁶ Equivalent variation is the Hicksian measure of the change in consumer surplus. It is a money metric measuring how much better or worse off is the representative household in the equilibrium after a policy change than it was in the initial equilibrium using the base prices as reference. It represents the income change that would be equivalent to the household utility change resulting from the policy change. Mathematically,

$$EV = C[p^0, U(p^1, y^1)] - C[p^0, U(p^0, y^0)]$$

where $C(\cdot)$ is the expenditure function, and $U(\cdot)$ is the indirect utility function. The first term in EV is the minimum income necessary to reach the utility level after the policy change, $U(p^1, y^1)$, given price p^0 . The second term in EV is the minimum income level necessary to reach the initial utility level, $U(p^0, y^0)$, given price p^0 . If EV is positive, the household is better off as a result of the policy change. Measured in base prices, an income greater than the household's initial income is needed to reach the new utility level $U(p^1, y^1)$.

⁷ Trade creation is the replacement of expensive domestic production by cheaper imports from free-trade-area (FTA) members, resulting from a reduction in trade impediments among FTA members. Trade diversion is the replacement of cheaper initial imports from non-FTA members by more expensive imports from FTA members.

⁸ Numbers are derived from Table 7, divided by baseline numbers. Because of space limitation, only aggregate trade creation and diversion results are discussed here; sector details are available on request from the authors for those who are interested.

TABLE 6
Social Welfare (measured by real purchasing power) Impact of Alternative APEC Trade Liberalisation Scenarios

	<i>Changes from Baseline in Billions US Dollars</i>						<i>Changes from Baseline as Percentage of Baseline Real Consumption</i>					
	<i>2001–2010 Annual Average</i>			<i>2011–2020 Annual Average</i>			<i>2001–2010 Annual Average</i>			<i>2011–2020 Annual Average</i>		
	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>	<i>FTRA</i>	<i>OPEN</i>	<i>FULL</i>
United States	13.2	14.0	25.6	54.3	50.7	104.5	0.12	0.13	0.23	0.36	0.34	0.69
Canada	1.1	0.9	2.2	8.1	7.9	12.6	0.14	0.12	0.28	0.78	0.76	1.22
Japan	12.9	15.4	25.3	41.5	41.2	70.7	0.28	0.33	0.54	0.70	0.70	1.19
Australia	3.5	3.5	5.3	14.1	13.8	21.0	0.62	0.63	0.94	1.77	1.73	2.61
New Zealand	1.0	1.0	2.4	3.7	3.6	8.2	1.26	1.21	2.84	3.23	3.09	6.89
Korea	3.8	4.0	5.6	15.8	16.0	22.8	0.64	0.67	0.93	1.63	1.64	2.33
Taiwan	2.4	2.5	3.2	10.5	10.3	12.4	0.55	0.57	0.74	1.56	1.53	1.83
Hong Kong	1.6	0.9	1.5	9.2	5.4	6.8	0.79	0.45	0.72	2.85	1.70	2.12
China	11.1	13.3	19.5	33.1	55.7	83.6	0.68	0.82	1.20	1.07	1.78	2.66
Indonesia	0.8	0.8	1.4	2.9	3.1	5.4	0.31	0.31	0.54	0.71	0.76	1.30
Thailand	1.3	1.2	1.6	5.3	5.2	6.7	0.77	0.75	0.97	1.95	1.93	2.46
Singapore	1.0	0.6	0.9	5.4	3.7	6.1	1.10	0.63	1.01	3.83	2.67	4.32
Malaysia	0.4	0.4	0.8	1.1	0.9	2.8	0.32	0.28	0.60	0.51	0.40	1.25
Philippines	0.5	0.3	0.4	1.4	0.6	1.3	0.48	0.31	0.37	0.83	0.39	0.78
Vietnam	0.4	0.5	0.9	1.8	1.9	3.3	1.07	1.10	2.09	2.46	2.59	4.45
Mexico	−0.1	−0.4	0.3	−3.2	−4.2	−1.8	−0.02	−0.07	0.05	−0.35	−0.46	−0.20
Chile	0.2	0.0	0.4	1.0	−0.1	1.6	0.20	0.01	0.31	0.52	−0.04	0.84
Peru	0.4	0.3	1.1	1.5	1.2	4.2	0.44	0.36	1.21	1.11	0.88	3.04
Russia	2.6	2.7	6.4	9.8	12.4	23.0	0.35	0.36	0.85	0.99	1.24	2.29
APEC	58.3	62.0	104.8	217.3	229.2	394.9	0.26	0.28	0.47	0.69	0.73	1.25
West Europe	−5.6	8.5	18.2	−20.9	31.4	58.6	−0.05	0.08	0.18	−0.16	0.24	0.44
Other MFA restricted	−4.3	5.7	27.0	−17.4	20.6	70.0	−0.12	0.15	0.72	−0.32	0.38	1.27
Rest of the World	−0.9	1.9	8.0	−3.4	6.9	25.9	−0.07	0.14	0.58	−0.18	0.36	1.35
World	47.4	78.0	158.1	175.6	288.0	549.3	0.13	0.21	0.42	0.34	0.55	1.05

TABLE 7
Impact of Alternative APEC Trade Liberalisation Scenarios: Average Annual Trade Creation and Trade Diversion
(Billions of 2000 US dollars)

	<i>Exports</i>				<i>Imports</i>			
	<i>2001–2010</i>		<i>2011–2020</i>		<i>2001–2010</i>		<i>2011–2020</i>	
	<i>To APEC</i>	<i>To ROW</i>	<i>To APEC</i>	<i>To ROW</i>	<i>From APEC</i>	<i>From ROW</i>	<i>From APEC</i>	<i>From ROW</i>
APEC Free Trade Area								
United States	20.2	–5.6	57.0	–24.5	25.1	–4.3	82.1	–7.8
Canada	1.8	–1.0	3.8	–4.4	2.6	–0.6	8.9	–0.9
Japan	25.2	–1.8	70.1	–9.9	29.2	–5.8	73.7	–6.6
Australia	3.7	–0.9	8.3	–3.1	5.5	–1.6	15.2	–2.8
New Zealand	1.1	–0.5	2.6	–1.4	1.2	–0.1	3.2	0.0
Korea	11.3	–1.3	46.4	–7.0	10.9	–1.4	40.3	–2.8
Taiwan	6.8	–0.5	24.2	–3.1	8.0	–1.5	27.7	–3.2
Hong Kong	2.2	–0.9	8.1	–3.7	1.6	0.3	6.8	2.0
China	23.0	–0.9	133.1	24.2	20.7	–2.1	115.3	–17.6
Indonesia	1.7	–0.6	8.7	–1.3	1.2	0.0	8.0	–1.3
Thailand	2.8	–0.8	14.3	–1.2	2.6	–0.5	16.6	–3.7
Singapore	2.6	–1.0	10.3	–3.6	1.6	0.7	9.2	2.4
Malaysia	2.2	–0.4	14.6	–0.2	2.0	–0.3	14.7	–2.7
Philippines	1.7	–0.3	7.6	–0.3	1.5	–0.1	8.1	–1.3
Vietnam	0.6	0.3	4.1	2.9	0.9	–0.1	6.6	–0.8
Mexico	0.9	0.0	6.6	0.4	0.8	–0.2	6.8	–2.1
Chile	0.4	–0.1	1.8	0.1	0.6	–0.3	4.0	–2.1
Peru	0.4	–0.1	1.5	0.1	0.4	–0.1	2.1	–0.6
Russia	4.8	–1.6	17.9	–3.0	4.6	–0.5	25.7	–6.9
APEC	113.3	–17.9	441.0	–38.9	121.0	–18.5	475.0	–58.7
West Europe	–11.5	5.3	–36.6	6.9	–10.7	5.1	–17.3	3.0
Other MFA restrict.	–4.9	1.5	–15.2	0.1	–6.0	1.8	–16.3	3.3
Rest of the World	–1.4	0.5	–4.3	0.3	–1.9	0.8	–4.7	1.3
World Total	95.4	–10.5	384.9	–31.6	102.3	–10.9	436.7	–51.2
APEC Open Regionalism								
United States	15.7	9.0	38.1	19.2	27.1	–0.1	95.9	–3.3
Canada	2.4	0.4	4.8	–0.9	2.4	1.2	9.6	3.1
Japan	27.3	4.9	71.4	5.5	23.1	6.6	64.0	14.9
Australia	4.0	0.3	8.3	–0.3	3.7	1.0	11.7	1.7
New Zealand	1.0	–0.2	2.4	–0.6	0.8	0.4	2.4	1.1
Korea	10.6	2.3	43.6	5.5	10.6	1.1	38.5	5.7
Taiwan	7.7	0.9	26.4	1.1	6.6	1.5	23.9	4.7
Hong Kong	1.2	0.4	4.8	–0.3	1.9	–0.1	8.0	–0.2
China	22.2	4.5	137.5	53.7	20.4	1.5	109.1	8.2
Indonesia	1.2	0.3	7.6	2.2	1.4	0.0	7.8	0.6
Thailand	2.0	0.3	12.5	3.4	2.6	–0.2	14.9	–0.1
Singapore	1.9	0.6	8.0	0.6	3.0	0.1	13.2	0.7
Malaysia	1.9	0.7	13.9	5.1	2.5	–0.2	15.2	0.1
Philippines	1.5	0.4	7.4	2.3	1.6	0.0	7.7	0.4
Vietnam	0.3	0.6	3.5	4.4	1.0	–0.2	6.8	–0.4
Mexico	0.8	0.7	9.1	2.8	1.0	–0.2	3.5	4.3
Chile	0.2	0.3	1.6	1.5	0.6	–0.3	3.0	–0.5
Peru	0.4	0.1	1.7	0.9	0.3	0.1	1.3	0.6
Russia	4.2	1.0	17.2	6.5	3.5	2.1	17.3	9.1
APEC	106.6	27.4	419.5	112.6	114.1	14.3	453.6	50.5

TABLE 7
(Continued)

	<i>Exports</i>				<i>Imports</i>			
	<i>2001–2010</i>		<i>2011–2020</i>		<i>2001–2010</i>		<i>2011–2020</i>	
	<i>To APEC</i>	<i>To ROW</i>	<i>To APEC</i>	<i>To ROW</i>	<i>From APEC</i>	<i>From ROW</i>	<i>From APEC</i>	<i>From ROW</i>
West Europe	8.3	–13.4	23.8	–48.4	18.8	–15.0	80.2	–57.2
Other MFA restrict.	4.4	–4.2	19.2	–18.9	7.1	–3.6	29.6	–14.2
Rest of the World	2.0	–1.8	8.0	–7.8	2.7	–1.3	11.0	–5.4
World total	121.2	7.9	470.5	37.6	142.7	–5.6	574.3	–26.3
Global Free Trade								
United States	14.8	16.3	32.8	37.4	17.4	15.7	71.2	44.5
Canada	0.8	1.8	0.0	2.5	1.0	3.2	6.2	8.3
Japan	20.9	13.6	58.3	24.1	21.6	12.4	59.5	30.6
Australia	3.8	0.6	7.4	0.8	2.9	2.6	9.7	6.5
New Zealand	–0.3	1.4	–0.6	3.1	1.2	1.1	3.6	2.8
Korea	9.5	4.2	40.1	12.2	9.7	3.3	35.5	13.9
Taiwan	7.2	1.7	25.5	3.0	5.6	3.1	21.5	8.9
Hong Kong	1.4	0.8	6.3	–0.5	1.4	1.0	6.1	3.0
China	17.5	11.5	121.8	78.2	20.2	5.4	107.1	21.6
Indonesia	0.9	0.8	6.5	4.0	1.1	0.7	6.5	3.1
Thailand	1.4	1.1	11.0	5.2	2.3	0.5	13.7	2.2
Singapore	2.5	0.7	8.6	2.8	1.9	1.9	11.2	6.4
Malaysia	2.0	1.0	14.3	6.4	2.0	0.9	13.7	3.8
Philippines	1.6	0.3	7.6	1.9	1.1	0.5	6.5	1.8
Vietnam	0.1	1.0	2.7	5.6	1.2	0.0	7.1	0.2
Mexico	0.4	1.2	8.1	4.5	0.2	1.1	0.4	9.1
Chile	0.2	0.3	1.5	1.7	0.4	0.1	2.1	1.1
Peru	0.0	0.6	0.7	2.2	0.5	0.4	1.7	1.4
Russia	3.1	3.4	14.7	12.5	2.9	5.2	15.2	18.0
APEC	87.8	62.1	367.4	207.6	94.4	59.0	398.5	187.0
West Europe	52.3	29.1	118.8	32.4	48.9	29.6	130.6	65.2
Other MFA restrict.	3.7	13.8	50.9	81.7	12.7	12.5	71.1	54.6
Rest of the World	2.0	3.2	13.1	25.7	3.3	4.7	19.1	23.6
World Total	145.7	108.2	550.3	347.3	159.3	105.9	619.2	330.3

under the unconditional MFN scenario for APEC members, but it is still a crucial problem for non-APEC economies. As showed in Table 7 (shadowed areas), trade between non-APEC countries shifts to trade between APEC and non-APEC economies, because import protection is eliminated in the APEC region while higher barriers remain in non-APEC countries. Such trade diversion effects are an important factor in slowing export and economic growth in the non-APEC economies. Non-APEC countries need to liberalise their own markets to prevent trade diversion induced by APEC unconditional MFN trade liberalisation (open regionalism) by either undertaking trade reform measures in the same way as APEC members or forming their own trading blocs. Which of these strategies is better will be an interesting topic worthy of further investigation but beyond the scope of this paper.

6. CONCLUSIONS

It may be too early to assess APEC's bold free-trade plan because of its distant target dates and uncertain implementation. However, if the plan were implemented as originally conceived, it could give APEC a much more visible role in encouraging future regional integration in the Pacific Rim and promoting global free trade.

As shown by our simulation results, all three options raise global welfare above baseline levels. The multilateral option is the best from both a global and an APEC perspective. The unconditional MFN approach is second best in terms of economic welfare; however, it may be the best choice for the United States to promote global free trade when both economics and politics are considered. Economically, it provides almost the same level of benefit for most APEC members as the APEC free trade option (Table 6), and no negative impact on non-APEC economies. Politically, open regionalism has the advantage of being non-discriminatory with regard to non-APEC members. It is a more acceptable, less threatening option from the perspective of the non-APEC world. It also has the advantage of being an agreement among only 21 parties, not 144, as would be the case for multilateral liberalisation under the auspices of the WTO. The failure of the WTO conference in Seattle underscores the difficulty that may exist in trying to negotiate an agreement with so many parties.

A key assumption we made in the unconditional MFN scenario was that the non-APEC world does not undertake any trade reforms. In reality, as APEC pursues a course of open regionalism, the rest of the world would likely not stand still and 'free ride,' given the widespread interest of many countries to participate more fully in global markets. According to the simulation results, non-APEC economies would be unable to take full advantage of free access to the broad APEC market and would suffer negative trade diversion effects if they did not adopt measures to liberalise their own markets. By leaving the distortions untouched in their own markets would act as a tax, limiting production efficiency and reducing exports. Therefore, non-APEC economies would have an incentive to pursue trade liberalisation to remain competitive with the APEC economies. Therefore, APEC economies may gain more under open regionalism than our simulation results indicate, depending on the policy response from the non-APEC world. This analysis suggests that APEC open regionalism could very well be a vehicle for promoting not only regional but also global trade liberalisation. The United States therefore would have the option of achieving its policy goal of global free trade through APEC 'open regionalism' if the next round of WTO negotiations were to fail.

This analysis provides useful insights in evaluating different approaches in APEC trade liberalisation and demonstrates that a CGE model can be a valuable tool in trade policy analysis. However, there are several obvious limitations that

need to be mentioned. First, service sector liberalisation is modelled in a way similar to other sectors: removing *ad valorem* tariff equivalent price distortions against imports. It does not consider different modes of trade in services that distinguish them from commodity trade (Findlay and Warren, 2000). Second, the model is a highly stylised simplification of the world economy that is far from perfect (Wang, 1997). Finally there are uncertainties about the size of parameters, such as elasticities of substitution and initial rates of protection, especially the tariff equivalents of protection in services, which rely on estimates in only two services sectors. Therefore, the results reported in this paper need to be interpreted with caution: they can be viewed as indicative but not as precise forecasts.

APPENDIX

Sector in the APEC Model and Their GTAP-ISIC Concordance

<i>Sectors in the Model</i>	<i>GTAP^a 5 Sector Number and Description</i>	<i>ISIC^b Rev. 3 Code</i>
1. Land-intensive crops	1 Paddy rice, 2 Wheat, 3 Cereal grains nec., 5 Oil seeds, 7 Plant-based fibres	01111, 01301, 01401, 01112, 01302, 01402, 01113, 01303, 01403, 15311, 01112, 01114, 01305, 01405, 01116, 01307, 01407
2. Other agricultural products	4 Vegetables fruit nuts, 6 Sugar cane sugar beet, 8 Crops nec., 9 Bovine cattle, sheep and goats, houses, 10 Animal products, nec., 11 Raw milk, 12 Wool, silk-worm cocoons	01121, 01204, 01404, 01117, 01115, 01306, 01406, 01122, 1132, 01308, 01408, 01211, 01212, 01213, 0122, 01309, 013010, 013011, 013012, 01409, 014010, 014011, 014012
3. Processed agricultural products	19 Bovine cattle, sheep and goats, houses meat products, 20 Meat products, nec., 22 Dairy products, 21 Vegetable oils and fats, 24 Sugar, 25 Food products nec., 26 Beverages & tobacco	1511-14, 1520, 15312, 1532, 1533, 1541-44, 1549, 1551-54, 1600
4. Forestry and fishery	13 Forestry, 14 Fishing	0150, 0200, 0500
5. Energy products	15 Coal, 16 Oil, 17 Gas, 32 Petroleum, coal products	1010, 1020, 1110, 2310, 2320
6. Mining products	18 Minerals nec., 34 Mineral products, nec.	1030, 1200, 1310, 1320, 1410, 1421, 1422, 1429,
7. Textile	27 Textiles	1711-12, 1721-23, 1729-30, 2610, 2691-96, 2699
8. Apparel	28 Wearing apparel	1810, 1820, 2430
9. Leather & shoes	29 Leather products, footwear & travel goods	1911-12, 1920

APPENDIX

(Continued)

<i>Sectors in the Model</i>	<i>GTAP^a 5 Sector Number and Description</i>	<i>ISIC^b Rev. 3 Code</i>
10. Other light manufactures	42 Manufactures nec.	3610, 3691-94, 3699, 9214, 9302, 7494
11. Wood & paper products	30 Wood products, 31 Paper products, publishing	2010, 2021-23, 2029, 2101-02, 2109, 2211-13, 2219, 2221-22
12. Manufacture intermediates	33 Chemicals, rubber and plastic products, 35 Ferrous metals, 36 Metals nec., 37 Metal products	2330, 2411-13, 2421-24, 2429, 2511, 2519-20, 2710, 2720, 2731-32, 2811-13, 2891-93, 2899, 7421
13. Motor vehicle and parts	38 Motor vehicles and parts	3410, 3420, 3430
14. Other transport equipment	39 Transport equipment nec.	3511, 3512, 3520, 3530, 3591, 3592, 3599
15. Electronic equipment	40 Electronic equipment	3000, 3210, 3220, 3230
16. Machinery	41 Machinery and equipment nec.	2213, 2230, 2911-15, 2919, 2921-27, 2929-30, 3110, 3120, 3130, 3140, 3150, 3190, 3311-13, 3320, 3330
17. Utility, housing, and construction	43 Electricity, 44 Gas manufacture, distribution, 45 Water, 46 Construction, 50 Dwellings	4010, 4020, 4030, 4510, 4520, 4530, 4540, 4550
18. Traded services	47 Trade, transport, 48 Financial, business, recreational services, 49 Public administration and defence, education, health services	3710, 3720, 4100, 4510, 5010, 5020, 5030, 5040, 5050, 5110, 5121-22, 5131, 5139, 5141-43, 5149-50, 5190, 5220, 5231-34, 5239-40, 5251-52, 5259-60, 5510, 5520, 6010, 6021-23, 6030, 6110, 6120, 6210, 6220, 6301-04, 6309, 6411-12, 6420, 6511, 6519, 6591-92, 6599, 6601-03, 6711-12, 6719-20, 7010, 7020, 7111-13, 7121-23, 7129, 7130, 7210, 7220, 7230, 7240, 7250, 7290, 7310, 7320, 7411-14, 7421-22, 7430, 7491-95, 7499, 7511-14, 7521-23, 7530, 8010, 8021-22, 8030, 8090, 8511-12, 8519-20, 8531-32, 9000, 9111-12, 9120, 9191-92, 9199, 9211-14, 9219-20, 9231-33, 9241, 9249, 9301-03, 9309, 9500, 9900

Notes:

^a Global Trade Analysis Project, version 5 (Dimaranan and McDougall, 2001).^b International Standard Industry Classification.

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