Interacting Preferential Trade Agreements: Illustrations from Asia-Pacific

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Abstract

Multilateral trade negotiations have faced many hurdles and frustrations in recent years, giving increased impetus for some countries to negotiate regional and bilateral trade agreements. In this international climate, many countries are actively pursuing a range of bilateral trade agreements. However, gains from any bilateral trade agreement will be influenced not only by what is negotiated between the countries directly involved, but also by other preferential trade agreements that countries may negotiate with other countries.

In this paper, we focus on some of the agreements that China is currently negotiating. Agreements are currently under negotiation with countries that include New Zealand and Australia and a framework agreement between China and ASEAN was signed in 2002. Thus we explore how such preferential trade agreements might impact on one another. We use the dynamic GTAP model to assess the anticipated impact of possible liberalization scenarios, including analysis of how agreements with other countries may impact these gains. For example, while the China-New Zealand agreement is unlikely to have a large economic impact on China, significant gains may accrue to New Zealand, particularly if there is liberalization of the sensitive agricultural sector. However, if China also enters into preferential agreements with other countries, this is likely to adversely impact on the gains accruing to New Zealand. If the spokes emanating from the China hub can be joined in a regional free trade area, rather than bilateral hub-and-spoke agreements, the overall gains can be much greater. Our analyses can be improved in a number of ways, including through appropriate modelling of rules of origin, savings in trade facilitation costs and productivity gains.

Introduction

The proliferation of bilateral and regional preferential or free trade agreements (PTAs)[1] since the 1980s is a phenomenon described as the 'new regionalism' (Ethier 1998; Majluf 2004). The World Trade Organisation (WTO) estimated around 300 in force by the end of 2005, and according to WTO Director-General Lamy[2] the world faces the prospect of 400 preferential trade agreements by 2010. Many Pacific Rim countries have been particularly active in the new regionalism (Lloyd 2002) to which China can now be added, having emerged from its earlier preoccupation with WTO accession and looking to achieve further gains through regional arrangements. With continuing difficulties at the multilateral level, Asia-Pacific bilateralism and regional integration may well become an even more important avenue for continuing trade negotiations in this region. Menon (2006) indicates the number of bilateral and preferential agreements in the Asia-Pacific region (involving at least one Asia-Pacific country) increased from 57 in 2002 to 176 by October 2006. About 30% of those 176 agreements are already implemented or being so, 28 had been signed but implementation was yet to commence, another 30% were under negotiation while the remainder were at the proposal or study stage. Each has its distinctive product coverage, time lines and varying rules of origin.

China is involved in 15 agreements – those already under implementation are with ASEAN, Hong Kong, Macao and Thailand, and other partner countries at the study, consultation or negotiation stage include India, Pakistan, New Zealand, Australia, Japan, Korea and Chile. ASEAN is negotiating with Australia and New Zealand, India, Japan, Korea and the EU. The web of agreements becomes more tangled when we consider those involving individual ASEAN member countries. For example Singapore has 8 agreements under implementation (e.g. with Australia, New Zealand, US, Japan , Korea and India) and another 11 under study or negotiation, often with regional partners; Thailand had 4 agreements under implementation (China, Laos, Australia and New Zealand) and another 9 under study or negotiation. South Asian economies, some of whom are among the least open in the wider Asian region despite recent liberalisation, are also active in regional trade negotiations. India for example has agreements under implementation with Sri Lanka, Nepal and Singapore, is a member of the South Asian Preferential Trade Agreement (SAPTA) and has 20 other agreements under study or negotiation including with many Asia-Pacific countries such as ASEAN, individual ASEAN members (Indonesia, Thailand and Malaysia), Australia, China and Japan. In addition to NAFTA, the USA has several other agreements under implementation and another

[1] We use this term to cover all bilateral or regional preferential or free trade arrangements.
[2] http://www.wto.org/english/news_e/sppl_e/sppl53_e.htm

10 under various stages of negotiation, including both Asia-Pacific countries and those in the Middle East.

What are some of the reasons that explain the emergence of the new regionalism? Sagar's (1997) list of reasons for the establishment of PTAs includes (a) recognition of the political needs of member nations; (b) geographic proximity of the partners; (c) dissatisfaction with the GATT/WTO process for trade liberalisation; (d) the opportunity to address issues not addressed by WTO or not effectively addressed such as barriers to services trade, foreign investment flows, various non-tariff barriers and labour and environment standards and (e) a response to regional trade agreements formed or forming elsewhere, including a reflection of the fear of exclusion from major markets. This 'domino' effect (Baldwin 1996) is clearly evident in Asia-Pacific, with Japan, South Korea, Singapore and New Zealand showing initial interest in PTAs in the 1990s. By 2000 the US, Australia, Thailand and China had joined the trend and the momentum has continued since. In addition to these broad factors, Menon (2006) lists an additional three specific factors. Apart from the well known economic reasons (market or sectoral expansion and access), strategic factors include some developed countries engaging with others to pursue their objectives regarding labour and environmental standards, or anti-terrorism objectives. Event-driven factors include individual countries' desires to form closer links with an existing regional agreement (such as India and others currently pursuing agreements with individual members of ASEAN), to link with an existing WTO member so as to facilitate eventual accession, and to strengthen political integration such as the agreements between China and its Special Administrative Regions of Hong Kong and Macao.

Some concerns associated with PTAs

Various concerns can be mentioned in association with PTAs including the well-known possibilities of trade diversion rather than creation, that concentration on regional arrangements will divert scarce negotiating resources away from multilateral negotiations, and the administrative costs and confusion that could result from a plethora of over-lapping trade agreements (Hilaire and Yang 2003). To these concerns can be added the likelihood of PTAs excluding sensitive sectors and the possible one-sided nature of the agreements.

A comprehensive analysis of potential trade creation and diversion effects within Asia-Pacific PTAs is that of Gilbert et al (2001). They find evidence of both, but importantly demonstrate that larger regional trade groupings are economically preferable to a spaghetti bowl of smaller and overlapping agreements. Given the current activities of larger economies in the region – including China, the USA, Japan and India – in undertaking PTA studies and negotiations, there is clearly the risk that a hub-and-spoke system will dominate, with these leading

economies as the hubs. While ASEAN may also be a hub contender, this is complicated through individual ASEAN members also pursuing PTAs, especially with the USA and Japan. The resulting 'spaghetti bowl' of agreements and rules can enormously complicate the life of international traders. Where an exporter can enter another market under different sets of preferences where multiple agreements exist, information and other costs may prohibit preferences being realised and MFN entry may appear the least costly option.

While the negotiation of bilateral agreements is often politically easier than multilateral or regional approaches, is it possible that such agreements may eventually be aggregated to a wider grouping? A danger is that (apart from the exhaustion of negotiating resources) trade diversion costs imposed on non-members may lead to political frictions that impede wider integration, rather than act as the driving force. Regionalism is advanced as an alternative to the hub-and-spoke systems, which essentially requires the spokes also to be connected under PTA arrangements. The likelihood of trade creation is thereby enhanced and that of trade diversion reduced. A further advance on this approach is the "open regionalism" approach such as taken by APEC (Asia-Pacific Economic Cooperation) in its 1994 Bogor Declaration, in which the PTA's preferences would be extended to non-members (Scollay et al 2003). This has the advantage of simplifying administration procedures (e.g. rules of origin would not be necessary) and trade diversion costs would not exist.

Levy (2006) takes a positive view of the Asia-Pacific experiences with smaller bilateral or regional groupings to which new members may be successively added. Smaller steps are often easier from a political view, adjustment costs may be less problematic, while a momentum in favour of regional integration is developed. The process of progressive expansion may also serve to desensitise entrenched domestic interests to the benefits of regional liberalisation, and may also provide an "incubator" to enable domestic firms to adjust to new competitive pressures and to learn to trade regionally while being shielded from the full forces of international competition.

Agriculture, of course, is the problematic sensitive sector in many of the completed agreements as well as in ongoing negotiations. Asia-Pacific PTAs have followed a variety of approaches to incorporating agricultural preferences, and the agreements range from quite comprehensive to very restrictive coverage. Within the ASEAN Free Trade Area (AFTA), for example, a step-by-step approach to agricultural inclusivity is adopted using temporary exclusion, sensitive and highly sensitive product lists. These products are being liberalised according to an agreed timetable and end-of period tariffs and as a result very few products will be excluded from the common preferential tariff scheme (ESCAP 2007). The Early

Harvest Programme of the China-ASEAN Agreement presents another case where substantial agricultural inclusion is being achieved. Several ASEAN countries, including Thailand, have not excluded any such products and China will exactly match those concessions. The Korea-Chile FTA also provides wide coverage of agricultural liberalisation despite opposition from Korean farmers, albeit using tariff rate quotas to limit access and exclusion lists. Therefore there are some encouraging experiences from the region that suggest that sensitive sectors can be addressed in regional agreements even if with long transitional periods.

Motivation and Methodology

Motivation for this study comes from a number of areas. First, we have previously modelled the China-New Zealand FTA negotiations (Rae and Strutt 2005). Since then, China has begun negotiations with a number of other countries, and we were interested in how such additional agreements might impact on the potential gains to New Zealand. Second, we explore application of the GTAP dynamic model to bilateral and regional trade analysis. Third, and perhaps of most general importance, we share the concerns of many others over the way in which bilateralism is spreading throughout the Asia-Pacific region, and therefore share an interest in quantifying the superiority of alternative approaches to achieving regional trade integration and liberalisation. Finally, we are aware that many of the details included in PTA negotiations are often simplified or completely overlooked in the economic analysis of such agreements. We conclude the paper with discussion of some of these, and make suggestions for future research to improve the utility of dynamic computable general equilibrium (CGE) analysis to the evaluation of regional trade liberalisation.

Modelling regional agreements

Model and baseline

To project the anticipated impacts of a number of different Asia-Pacific preferential agreements, we use GTAP-Dyn, a dynamic version of the Global Trade Analysis Project (GTAP) model. The GTAP-Dyn model is recursive dynamic model that permits capital accumulation, along with international mobility and foreign ownership of capital (Ianchovichina and McDougall, 2001). Other features of the standard version of the GTAP CGE model are retained (Hertel 1997).[3]

The current study uses version 6 of the GTAP database, comprising 87 economic regions, and inter-industry linkages for 57 sectors (Dimaranan, 2006). The database is extended to facilitate

[3] See www.gtap.agecon.purdue.edu for detailed information on the GTAP model and database.

analysis of dynamic capital accumulation. We aggregate the database to 18 regions and 25 sectors, with Appendix Tables A1 and A2 detailing the aggregation of countries and commodities used. Five primary factors of production are used in the production system: land, primary sector-specific natural resources, physical capital, unskilled labour and skilled labour. The model is solved using GEMPACK software (Harrison and Pearson 1996), using the RunGDYN interface.

First we develop a baseline 'business as ususal' projection to 2020 from the benchmark 2001 GTAP 6 dynamic database. Results that include implementation of the preferential agreements are then compared with the baseline projection. To project the global economy forward in time, we make assumptions about economic and factor growth rates. We use exogenous projections of each region's GDP growth, as well as endowments of population, skilled and unskilled labour (Walmsley 2006).[4] These are detailed in Appendix Table A3. Total factor productivity is endogenized to accommodate the combination of these exogenous shocks. In the baseline, we include the WTO commitments of China and Taiwan and elimination of the MFA quotas (modeled as export tax equivalents).[5] Remaining bilateral tariffs between the regions under focus are provided in Appendix Table 4(a) and (b).

This baseline scenario is developed to provide a picture of how the global economy and world trade might look at the time of implementation of the trade agreements. It also facilitates comparison of how the trade agreements may impact economies over time, relative to what would have been the case without implementation of these agreements. Table 1 shows the changes in contribution to global GDP in the baseline scenario, between 2001 and 2020. Given the assumptions detailed in Table A3, the structure of the world economy is projected to change in a number of significant ways. In the baseline, changes in the structure of production for each region are driven by differences in the relative rates of factor accumulation, in combination with sectoral factor intensities, as well as price and income elasticities. In particular, given the differential between the growth rates of developed and developing countries, the regions that are comprised of predominantly developing regions increase their share of global GDP most significantly, giving rise to relatively large changes in the structure of output in these economies (Anderson, Hoekman and Strutt 2001).

In our baseline projection of the global economy from 2001 to 2020, the share of global GDP contributed by relatively high income regions tends to decrease, while developing countries

[4] Additional macroeconomic projections provided by Terrie Walmsley, based on Walmsley (2006)
[5] Supplied by Terrie Walmsley. We also eliminate bilateral tariffs between New Zealand and Australia in the initial dataset, to better reflect the CER agreement between these countries.

are projected to gain in significance, as shown in Table 1. While the economies of New Zealand and Australia contribute a fairly constant 0.16% and approximately 1.15% to global output, the economy of China increases from 3.1% of global GDP in 2001 to 8.7% in 2020. ASEAN economies increase their share of global GDP from just under 2% in 2001 to over 2.7% in 2020.

Table 1 Regional contributions to global GDP, exports and imports (%)

	Proportion of world GDP (%)	
Region	2001	2020
Australia	1.14	1.15
New Zealand	0.16	0.16
China	3.71	8.71
High Income Asian	16.14	13.84
ASEAN	1.97	2.71
NAFTA	36.49	35.24
Europe	29.98	25.19
Rest of the world	10.40	13.00

Simulations conducted

We begin with a simulation to assess how a trade agreement between a large and a small country (China and New Zealand) may impact the small country. However, if China then proceeds to implement agreements with other trading partners, these will also impact on New Zealand. With this in mind, we consider the impact if bilateral arrangements are implemented with two other regions, Australia and ASEAN. We then consider how these impacts may change if the agreements were instead in the form of a free trade area between all four regions. Finally, we consider the impact of allowing a small number of sectors to be classified as 'sensitive', with slower liberalization of these sectors.

From the baseline simulation, four scenarios are modeled:

1. China-New Zealand bilateral agreement (China-NZ)
   In this simulation, all remaining bilateral tariffs between China and New Zealand are eliminated in 2010.

2. China bilateral agreements (Hub-and-spoke)
   All bilateral tariffs are removed in 2010 between China (the hub) and three regions: New Zealand, Australia and ASEAN (including tariffs within ASEAN).

3. Regional free trade area (RFTA)

   All bilateral tariffs are removed in 2010 resulting in a free trade area comprising China, New Zealand, Australia and ASEAN. China is no longer the hub, and all spokes are joined through free trade.

4. Regional free trade area with sensitive products (RFTA_Sens)

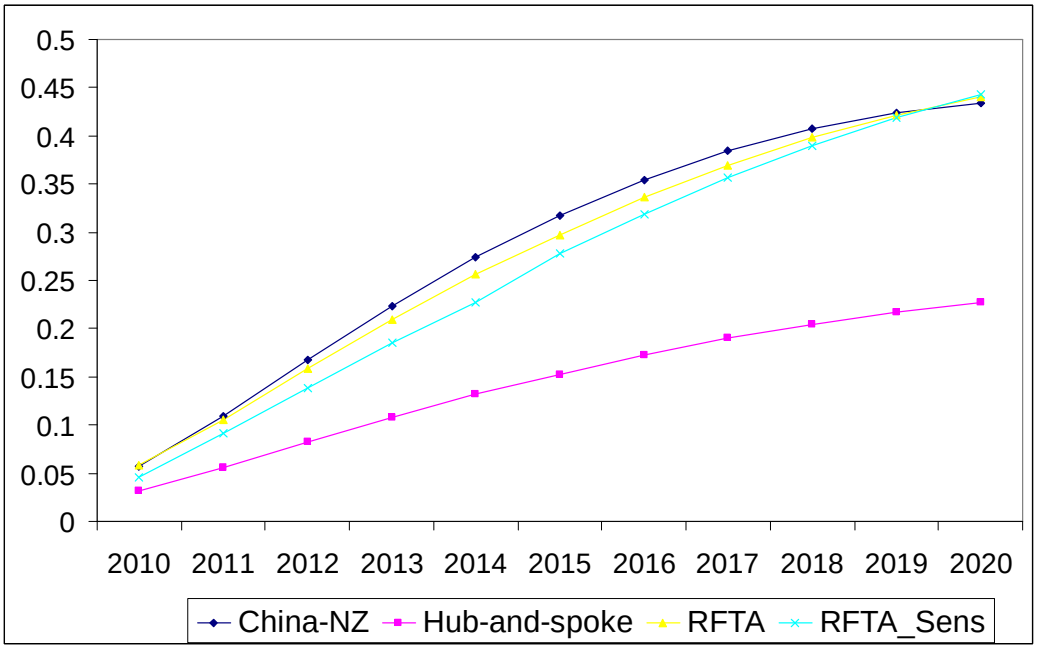
   The same as in 3 above, but this time 'sensitive sectors' are not liberalized until 2015. All regions are likely to have sensitive sectors that will cause difficulties for negotiators. The products deemed to be sensitive are imports of dairy products for China and ASEAN with imports of textiles and wearing apparel assumed to be sensitive for New Zealand and Australia.

Results and discussion

We begin by comparing the impact of these four agreements on New Zealand. From this illustrative example, more general insights can be gained into how interacting future trade agreements may change the nature of the anticipated gains from the agreement originally negotiated. We begin by comparing the results from the first bilateral agreement with the more extensive agreements detailed in the remaining three simulations. We then move to more general discussion of the more extensive agreements on the other regions under focus.

What are the effects of an agreement between China and New Zealand, and how will these be impacted if China implements PTAs with other regions in addition to New Zealand? First we look at changes in real GDP. Figure 1 indicates that if New Zealand alone successfully negotiates and implements an agreement with China, there is relatively strong output growth projected for New Zealand. This will be significantly lower if China also implements other bilateral agreements. However, if a regional free trade area can be negotiated, whereby New Zealand also gives and gains full access to the ASEAN region, real GDP closely tracks and eventually exceeds the anticipated changes in real GDP if New Zealand alone cuts a deal. Even the inclusion of sensitive products implies little change to this finding, with the growth in real GDP matching the regional FTA growth level by 2019.

Figure 1 New Zealand's change in real GDP (%), relative to baseline

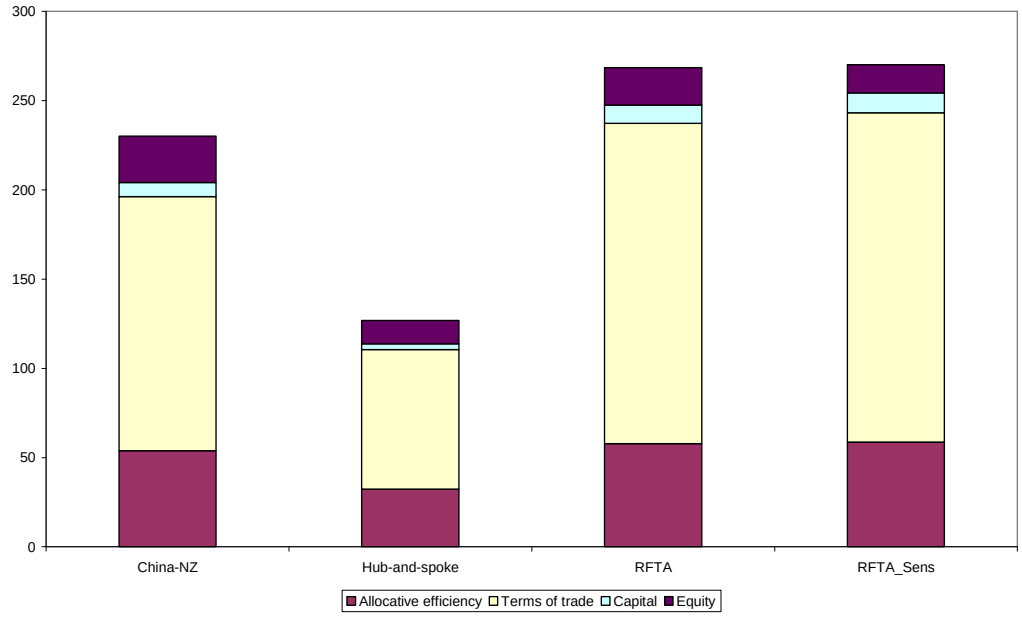


We now turn to examine changes in welfare implied by these four alternative scenarios. GTAP-Dyn welfare results are complicated by the lack of an intertemporal utility function and the path dependence of the welfare decomposition used in the comparative static version of GTAP (Ianchovichina and McDougall, 2001; Hertel and Huff, 2001). We therefore follow the approach of Walmsley and Hertel (2001) and Walmsley, Hertel and Ianchovichina (2006) in using a comparative static simulation which repeats the dynamic simulation but removes the impact of time-dependent variables. This enables determination of the difference in welfare at a given point in time, with and without implementation of the preferential trade agreements described above.

Figure 2 shows the projected change in economic welfare[6] for New Zealand under each of the four agreements. Clearly some significant gains from the China-NZ agreement will be lost if China also enters into bilateral agreements with the other two regions. However, if the regions are able to form a regional FTA, with all tariffs in the region removed, this could be even more beneficial to New Zealand than just a deal with China. As can be seen in the decomposition of the bars, terms of trade effects tend to dominate the welfare results. This improvement in the terms of trade is largely driven by an increase in the regional export price for New Zealand exports, particularly dairy products, but also cattle and sheep meat and services exports. Improvements in allocative efficiency are also significant contributors to welfare, with equity and capital further enhancing the overall increase in welfare.

[6] As measured by an equivalent variation in income (see Hertel 1997, especially Chapter 2).

Figure 2 Decomposition of welfare changes for New Zealand, relative to 2020 baseline ($USm)



Even if New Zealand is successful in negotiating an agreement with China, it very likely that China will also come to a successful agreement with other regions. Therefore, analysis of the China-NZ agreement alone is perhaps less important than understanding a range of interacting regional agreements. We now turn to an examination of the anticipated impacts of the three possible agreements involving other regions, broadening our focus to examine the impacts on all participating regions.

Figure 3 presents welfare results for 2010 for the hub-and-spoke, RFTA and RFTA_Sens simulations that involve China, New Zealand, Australia and ASEAN. All regions participating in the agreements experience a welfare increase, with the rest of the world experiencing a decline in welfare under all scenarios. The gain in dollar terms is relatively small for Australia, and even more so for New Zealand. However, given the relatively small size of their economies, these are still significant potential gains (as can be seen in Figure 2, with a scale more appropriate to assess New Zealand's gains). As might be anticipated, China gains the most from the hub-and-spoke bilateral arrangements. However, the other regions have much more to gain from a regional FTA arrangement, with all projected to experience significantly larger increases in economic welfare than if only the three bilateral deals are implemented. Of the two RFTA scenarios, not liberalizing sensitive products has the most strongly adverse impact on China, affecting ASEAN to a lesser extent. The overall impact on New Zealand is negligible and it is slightly positive for Australia. This slightly higher welfare

for Australia is due to a much smaller negative impact on welfare due to changes in financial equity owned by the region in the sensitive product simulation.[7]

Figure 3 Welfare change from 2010 base (US$m)

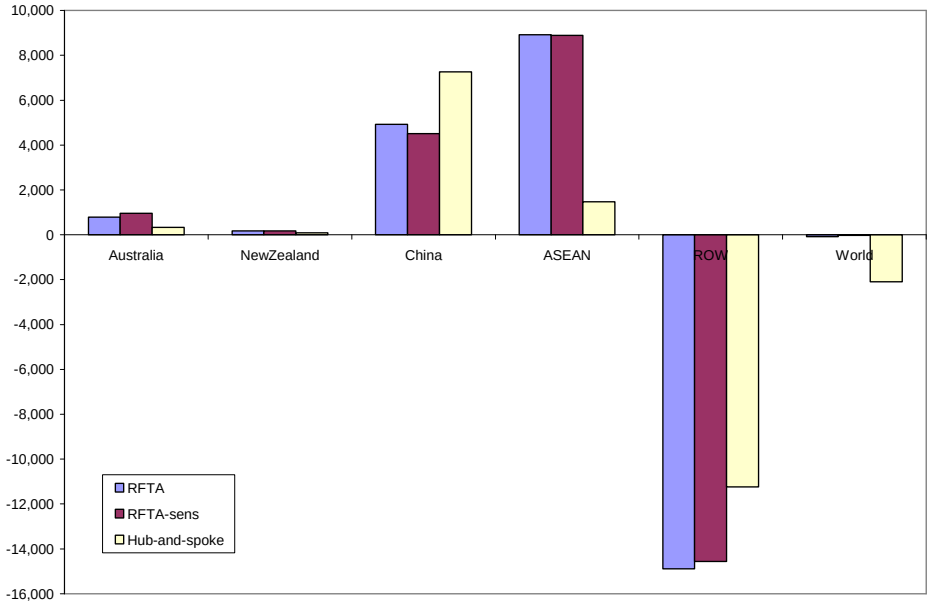


Figure 4 presents a similar set of results, but now relative to the 2020 baseline. The changes in welfare move in the same direction as in Figure 3, but now tend to be much larger in magnitude. The differences between the sensitive product and full RFTA are now all very small, since all sectors were assumed liberalized by 2015 and the economies have had time to adjust to the new trading environment. The overall gain to the liberalizing regions now more than offsets the losses to the rest of the world (ROW) not participating in the PTAs simulated, leading to a global welfare gain.

Table 2 presents a detailed decomposition of welfare changes for each scenario, relative to the 2020 baseline. There is little difference between the two versions of the RFTA, with all products now fully liberalized. However a significant difference is clear with the hub-and-spoke scenario. China's gains in total welfare are estimated to be around 60% higher if only bilateral deals are struck with the other three areas. However, if only bilateral deals are negotiated with China, the other regions stand to gain much less than with a regional FTA.

[7] The two components of this are the contribution of changes in capital used in the region and the net contribution due to foreign ownership in and by the region. It is this second component that is much less negative in the sensitive goods scenario (net returns from ownership of foreign assets are less negative, with the higher ownership in foreign assets more than compensating for the slightly higher ownership by foreign entities in domestic assets).

For New Zealand, almost 50% of the potential gains are lost, with 60-70% lost by Australia and ASEAN.

Figure 4 Welfare change from 2020 base (US$m)

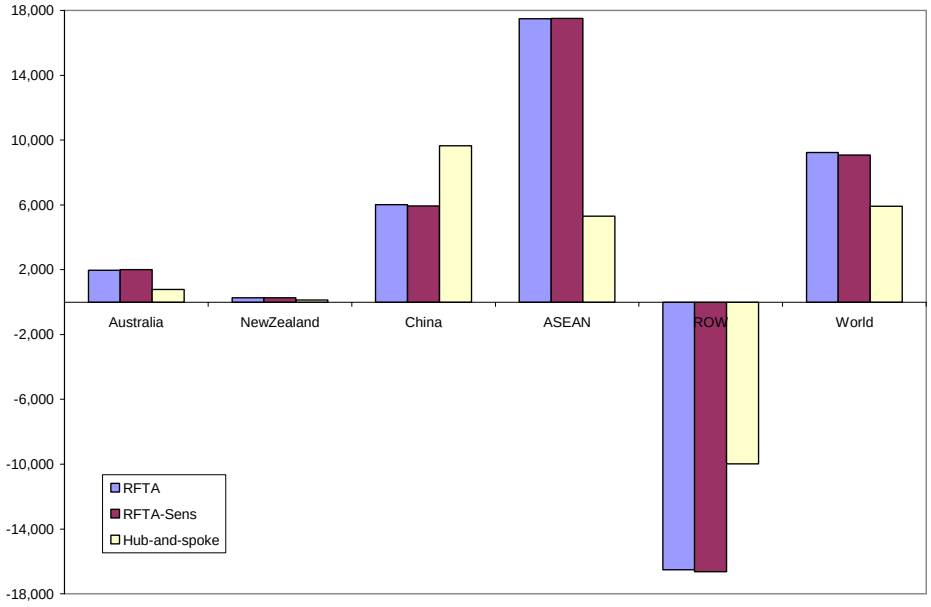


Table 2 Welfare decomposition, from 2020 base

		Welfare (US$m)	Allocative efficiency (%)	Terms of trade (%)	Capital (%)	Equity (%)
Australia	RFTA	1,968	33.6	64.8	13.3	-11.7
	RFTA_sens	2,010	33.2	65.0	14.1	-12.3
	Hub-and-spoke	794	39.8	61.2	2.5	-3.5
NZ	RFTA	268	21.5	66.8	3.8	7.8
	RFTA_sens	270	21.8	68.2	4.1	5.9
	Hub-and-spoke	127	25.5	61.6	2.4	10.5
China	RFTA	6,026	30.0	26.4	-19.2	62.8
	RFTA_sens	5,934	30.1	27.9	-19.8	61.7
	Hub-and-spoke	9,657	32.0	33.2	-10.6	45.3
ASEAN	RFTA	17,498	69.8	-2.3	-3.8	36.2
	RFTA_sens	17,504	69.8	-2.2	-3.7	36.1
	Hub-and-spoke	5,308	86.8	-22.3	-4.9	40.4

What happens to the real output of the economies, as measured by GDP, under the RFTA? Figure 5 shows that the dynamics of the model give rise to quite different paths being followed by Australia, New Zealand and China. Australia has a steady increase in the cumulative change in real GDP, while there is a more rapid increase for New Zealand. In the

case of China, the cumulative increase in real GDP tapers off from around 2016, thereafter declining a little. Figure 6 shows that, for ASEAN countries, the gains in terms of real GDP all tend to increase in cumulative terms over time and are significantly higher than for China and Australasia, particularly in the case of Vietnam and Thailand.

Figure 5 Real change in GDP from 2020 baseline (%), RFTA simulation

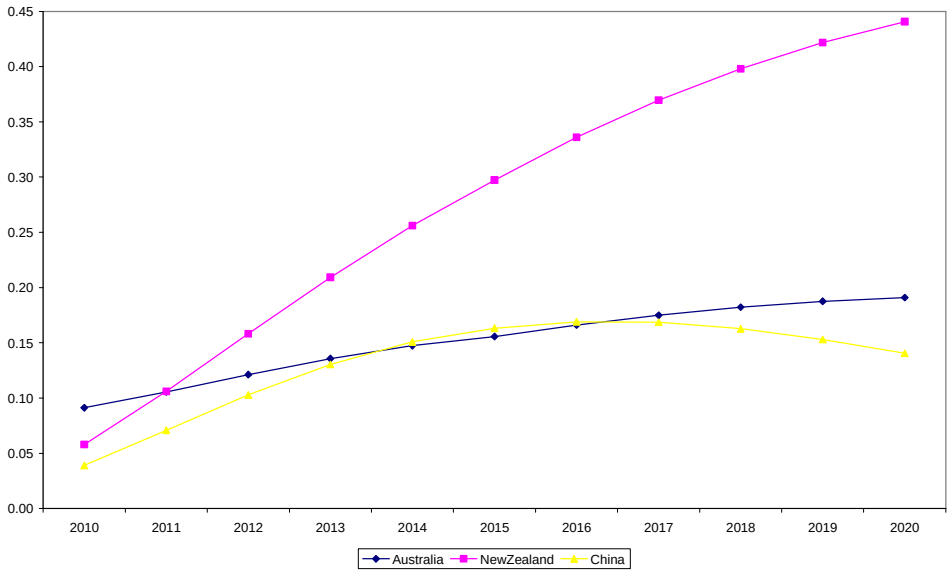


Figure 6 Changes in real GDP for ASEAN regions, from 2020 baseline with RFTA

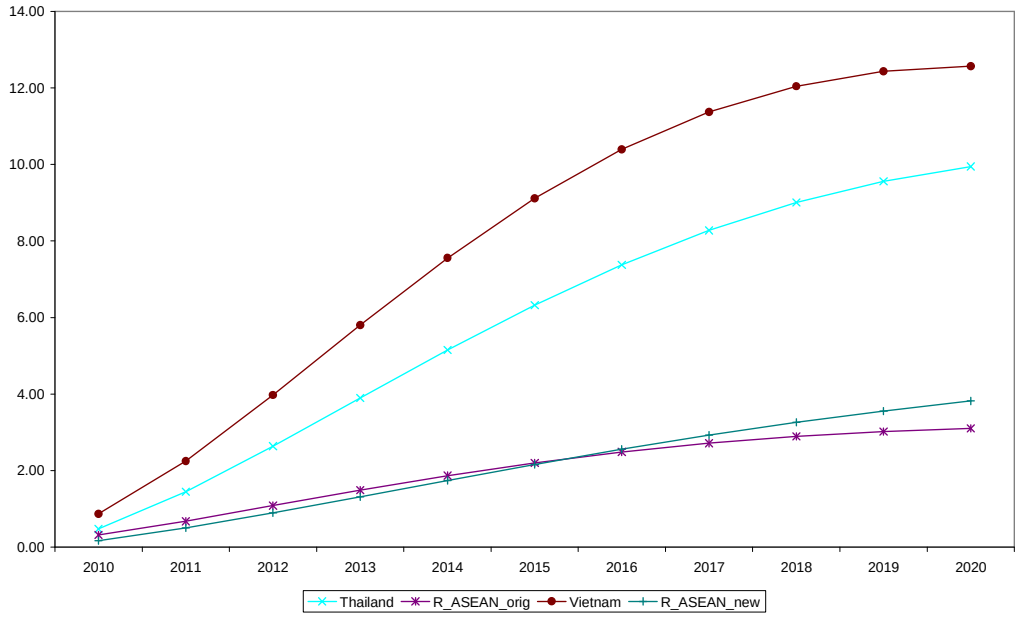


Table 3 Cumulative changes in some key indicators from 2020 baseline (%)

	Welfare (p.c. in utility)			Real GDP			Exports			Imports			Terms of trade			Rental		
	RFTA	Sens	Bilat	RFTA	Sens	Bilat	RFTA	Sens	Bilat	RFTA	Sens	Bilat	RFTA	Sens	Bilat	RFTA	Sens	Bilat
Australia	0.27	0.28	0.11	0.19	0.20	0.05	3.05	2.87	1.55	3.60	3.55	1.79	0.68	0.69	0.33	0.61	0.68	0.02
NewZealand	0.36	0.37	0.17	0.44	0.44	0.23	1.31	1.24	0.86	2.15	2.14	1.33	0.66	0.63	0.35	0.15	0.19	0.02
China	0.09	0.09	0.16	0.14	0.14	0.30	2.72	2.69	2.90	3.66	3.66	4.11	0.32	0.32	0.42	0.14	0.15	0.15
HongKong	-0.11	-0.12	-0.12	-0.32	-0.32	-0.20	-0.32	-0.31	-0.24	-0.49	-0.49	-0.38	-0.06	-0.06	-0.09	0.18	0.17	0.06
Japan_Kor	-0.08	-0.08	-0.05	-0.12	-0.12	-0.06	-0.67	-0.66	-0.46	-0.43	-0.43	-0.29	-0.35	-0.35	-0.22	0.00	0.00	-0.06
Taiwan	-0.44	-0.44	-0.30	-0.45	-0.45	-0.30	-0.36	-0.36	-0.27	-0.98	-0.98	-0.69	-0.42	-0.42	-0.30	-0.19	-0.19	-0.19
Thailand	1.68	1.68	0.84	9.95	9.94	3.71	24.55	24.52	9.44	26.09	26.08	9.79	0.60	0.61	0.48	-3.86	-3.85	-1.20
R_ASEAN_orig	1.09	1.09	0.23	3.10	3.10	1.00	5.96	5.96	2.17	6.43	6.43	2.41	0.36	0.36	0.14	-0.54	-0.54	-0.29
Vietnam	4.50	4.50	1.32	12.57	12.56	6.12	29.68	29.67	16.86	28.10	28.10	14.80	-0.71	-0.71	-1.02	-6.51	-6.50	-4.93
R_ASEAN_new	0.52	0.52	0.36	3.82	3.80	1.73	11.82	11.64	4.66	21.67	21.69	12.18	0.65	0.69	2.06	1.09	1.13	1.68
SouthAsia	-0.28	-0.28	-0.15	-0.41	-0.41	-0.21	0.31	0.33	0.16	-1.18	-1.17	-0.62	-0.79	-0.79	-0.44	-0.19	-0.19	-0.16
NAFTA	-0.04	-0.04	-0.02	-0.12	-0.12	-0.05	-0.29	-0.28	-0.20	-0.30	-0.30	-0.16	-0.13	-0.13	-0.08	0.05	0.05	-0.01
Chile	-0.07	-0.08	-0.05	-0.33	-0.33	-0.19	-0.43	-0.43	-0.28	-0.70	-0.70	-0.42	-0.04	-0.04	-0.04	0.10	0.10	0.02
C_SthAmer	-0.01	-0.01	0.01	-0.17	-0.17	-0.08	-0.32	-0.32	-0.19	-0.24	-0.24	-0.10	0.17	0.17	0.11	0.09	0.09	0.01
EU	-0.05	-0.05	-0.03	-0.10	-0.10	-0.04	-0.26	-0.25	-0.13	-0.18	-0.18	-0.08	-0.06	-0.06	-0.04	0.14	0.14	0.03
EU_new	-0.07	-0.08	-0.03	-0.21	-0.21	-0.09	-0.23	-0.22	-0.10	-0.34	-0.34	-0.14	-0.04	-0.04	-0.02	0.13	0.13	0.03
OtherEurope	0.19	0.19	0.10	-0.12	-0.12	-0.06	-0.41	-0.41	-0.23	0.07	0.07	0.03	0.57	0.57	0.31	0.26	0.26	0.09
ROW	0.25	0.25	0.14	-0.21	-0.21	-0.12	-0.78	-0.77	-0.44	-0.05	-0.05	-0.03	0.83	0.82	0.45	0.22	0.22	0.07

As can be see in Table 3, the change in per capita welfare and real GDP projected for all regions relative to the 2020 baseline are virtually the same, regardless of whether sensitive products are liberalized later. However, as we move to a more detailed examination of results, we find that there are some significant differences in results for exports, imports, terms of trade and rental rates. In particular, regional exports remain a little lower, even 5 years after the sensitive products are liberalized and rental rates for capital are a little higher in the sensitive product of the RFTA simulation. Not surprisingly, all results tend to be significantly smaller under the hub-and-spoke bilateral arrangement, with the notable exception of China.

In terms of total exports, Figure 7 shows that for Australia and New Zealand, the increase projected from the regional free trade area is greater than if sensitive products are specified, even once the sensitive products are also liberalized. However, the difference is relatively small, particularly in the case of New Zealand.

Figure 7 Change in regional exports, from 2020 baseline (%), Australia and New Zealand, RFTA and RFTA_Sens

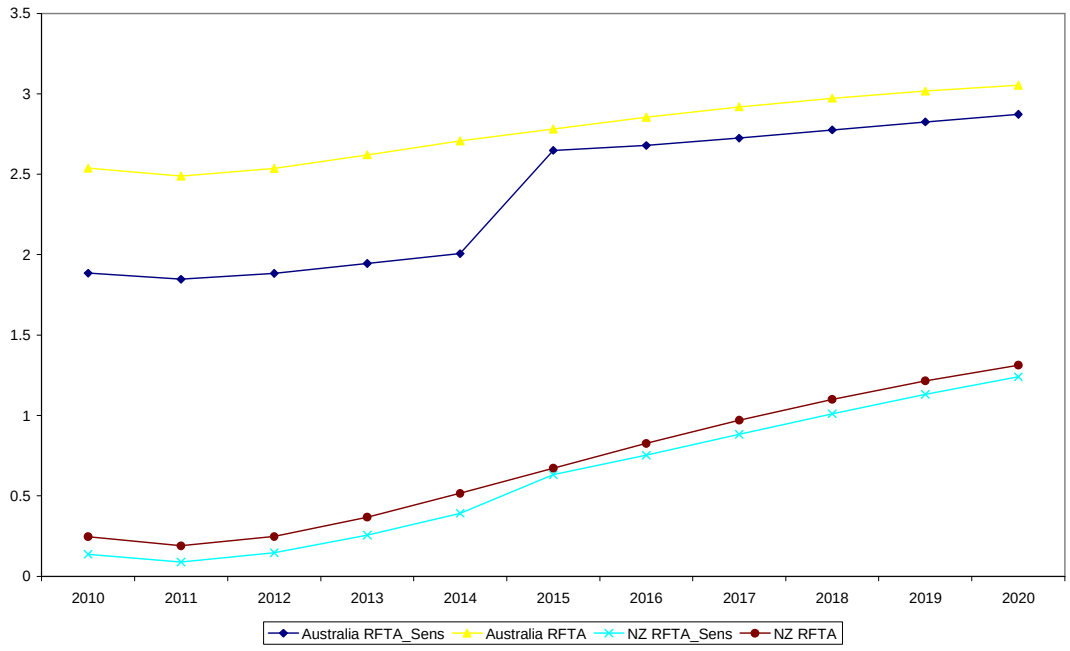


Table 4 provides detailed results for each of the sensitive sectors, in terms of real output and the quantity of exports and imports projected under each scenario. As can be seen, there is little difference between the RFTA and RFTA_Sens projections for output and trade of these products by the year 2020. However, the bilateral arrangements are generally projected to

lead to much smaller changes in output and trade, with the exception of China. These results are as expected, given that China is the only country to gain the full benefits of market access in this simulation, as well as the regional FTA simulations. Interestingly, Australia's textile and wearing apparel sectors are projected to increase by a substantial percentage. Most of this increase reflects increased exports to China, which is projected to be the market for over half of Australia's exports in these sectors. However, it must be remembered that these are still relatively small sectors, accounting for well under 0.5% of Australia's total exports, even after the substantial proportional increases.

Table 4 Changes in the real output and trade by sector (%), relative to 2020 baseline

	Real output			Quantity of exports			Quantity of imports		
	Dairy	Textiles	WAP	Dairy	Textiles	WAP	Dairy	Textiles	WAP
RFTA									
Australia	2.3	-14.8	-20.8	7.1	84.2	90.2	0.6	14.8	29.4
NewZealand	3.9	-12.2	-19.1	4.8	-32.0	-31.0	5.1	3.0	16.8
China	-4.4	0.6	-0.2	-6.1	4.5	-0.2	14.7	5.9	6.0
Thailand	10.5	10.8	4.8	38.7	38.6	20.6	9.9	50.3	136.8
R_ASEAN_orig	5.8	11.2	5.6	19.9	21.7	8.4	2.6	15.8	7.5
Vietnam	-10.0	40.8	77.8	50.1	96.4	91.1	12.3	73.8	73.3
R_ASEAN_new	0.6	-6.0	-2.1	246.0	-3.1	-4.5	6.8	26.0	63.5
RFTA_Sens									
Australia	2.2	-14.9	-20.8	6.8	83.7	89.8	0.8	13.9	29.2
NewZealand	3.9	-12.2	-19.2	4.8	-32.0	-31.1	5.1	2.4	16.2
China	-4.4	0.6	-0.2	-6.1	4.5	-0.2	15.2	5.9	6.1
Thailand	10.5	10.8	4.8	38.7	38.5	20.5	10.6	50.3	136.7
R_ASEAN_orig	5.8	11.2	5.6	20.0	21.7	8.4	2.7	15.8	7.5
Vietnam	-10.0	40.8	77.8	50.1	96.4	91.1	13.0	73.8	73.2
R_ASEAN_new	0.6	-6.1	-2.2	246.3	-3.3	-4.7	7.8	26.0	63.6
Hub-and-spoke									
Australia	1.1	-13.7	-19.1	3.2	77.9	89.6	-0.5	13.8	27.8
NewZealand	0.9	-11.6	-18.3	1.1	-31.6	-30.4	2.6	2.4	15.7
China	-4.0	0.7	-0.3	3.9	5.0	-0.3	16.5	6.1	6.5
Thailand	0.1	2.7	2.2	-5.4	20.9	13.8	1.5	44.0	127.2
R_ASEAN_orig	1.6	6.5	4.7	2.3	13.1	7.1	0.1	10.3	4.8
Vietnam	2.6	37.8	66.2	7.0	86.5	77.7	1.4	64.8	62.7
R_ASEAN_new	2.0	-7.5	-3.4	3.8	-6.8	-6.9	2.1	21.2	38.8

Discussion

Our quantitative results clearly demonstrate the economic advantages of connecting the spokes within our illustratory hub-and-spoke system of four Asia-Pacific PTAs. While the gains for China (the 'hub') are eroded a little, the increased gains available to the 'spoke' regions more than offsets China's loss and leads to significantly higher overall gains when the spokes are connected. This begs the question of how, in practice, this outcome might be

realised? (Baldwin 2004, 2006). Where existing individual agreements differ widely in product coverage, the depth of preferences and the 'rules of the game', amalgamation of such disparate trade agreements will clearly be a challenge. We suggest that harmonisation of approaches can facilitate the extension and amalgamation of PTAs through the adoption of what Harrigan (2006) calls 'good practices'.[8] Examples were given in an earlier section of regional experiences in achieving wider product coverage through inclusion of sensitive sectors. In addition the selected use of safeguards, which may be harmonised if based on WTO rules, may also be valuable in achieving inclusivity for sensitive products if applied over a strict transitional period. Where the depth of preferences varies widely across agreements, transitional safeguards and differential national treatments according to stage of economic development, as in WTO agreements, may be useful.

Rules of origin (ROO) are used in PTAs to determine preference eligibility (Krishna and Krueger 1995; Augier et al 2005). ROO may lead to inefficiencies in production when imported raw materials are diverted from the lowest-cost source in order to meet the origin rules. Should a country belong to two or more agreements, other problems arise since the relevant rules are determined by the intended trade destination. ROO may permit no or only limited cumulation and may also divert purchases away from lowest-cost sources. ROO may also be used as a protective device where they are more severe for sensitive products. Amalgamation of PTAs can be facilitated if such ROO problems can be overcome through appropriate simplification and harmonisation, through recognition of the technical capacity of exporters, and through adoption of a harmonised set of rules such as may eventually be adopted by the WTO.

Some progress on regional harmonisation of SPS and TBT issues is found in some of the existing regional trade agreements. Adoption of relevant WTO agreements in these areas, and use of recognised international standards where they exist should further encourage such harmonisation, so facilitating the expansion and amalgamation of preferential trade agreements. Developed country partners in PTAs can and do play a role in assisting developing country members in improving their SPS and TBT regulations and inspection procedures – while in some cases this assistance may be provided to facilitate imports from foreign-based subsidiaries, the institutions and processes created will be available to all traders.

Future challenges: enhancing CGE analyses of regional trade agreements

There are several features of PTAs that tend to be either excluded from or only partially addressed in many CGE analyses and therefore are several directions in which CGE studies of

[8] These include product coverage, rules of origin, customs procedures, intellectual property protection, foreign direct investment, anti-dumping and dispute resolution, government procurement, competition and technical barriers to trade.

PTAs can potentially be improved. Data issues remain problematic – it is important that baselines incorporate the appropriate levels of tariff reduction and timing as negotiated in the agreement being modelled; tariff data should recognise any excluded products or those on temporary exclusion lists and special preferences offered to less-developed countries within the agreement, and MFN tariffs need to be accurate since these are critical in determining the achieved levels of preferences. Can safeguard components of agreements be usefully modelled, say based on results of preliminary baseline simulations that may be suggestive of where and how safeguards might be applied? While the 'devil is in the detail' we recognise that these data intentions will always be compromised by necessary product aggregation in the international databases that our CGE models access. Do we have adequate data for modelling of services liberalisation in PTAs?

Rules of origin have generally been excluded from CGE analyses, yet these rules are critical in determining whether or not preferences are realised and therefore impact directly on modelled welfare outcomes. While this raises complex modelling as well as data issues, it could be a fruitful area for innovative research. Trade data will show, at least at the country level, the sources of imported raw material purchases, and one can investigate whether or not these sources are members of the regional trade agreement under study and whether they fall under the umbrella of any relevant cumulation rules. That may inform subsequent decisions as to whether or not preferential tariffs ought to be applied to that industry's exports to other partner countries within the trade agreement. Modelling approaches may be devised (e.g. imposition of prohibitive tariffs on raw material imports from non-member countries) to achieve diversion of raw material imports from non-member countries to member countries in order for preferences to be realised on subsequent exports to partner countries. Indeed, this could open up a rich field of investigation into the trade diversion costs of rules of origin. A pioneering attempt is that of Gasiorek et al (2003), in a CGE analysis of the EU and Southern Mediterranean countries, where rules of origin constraints are measured as tariff-equivalents.

Trade facilitation costs such as those due to SPS and TBT rules and practices and other 'behind the border' barriers have been shown to be substantial in some cases (ESCAP 2006) and somewhat more progress appears to have been made in this area, compared with representation of ROO, in CGE modelling. Lowering of these barriers, along with development of appropriate institutions and infrastructure, has the potential to increase trade and to allow trade preferences to be realised. There are some recent examples of CGE studies that attempt to model the impact of trade liberalisation on transaction costs. Philippidis and Sanjuan (2007) make use of gravity models to estimate tariff equivalents of non-tariff barriers, and adopt the 'iceberg' approach (longer transit periods are associated with higher costs and a 'melting down' of the value of the good) of Hertel et al (2001) to incorporate these into the GTAP model. Decreux and Fontagne (2006) use an iceberg variable in their CGE model through imposition of an additional variable cost on producers aiming at acceding to foreign markets. While the 'iceberg' representation seems appropriate for indirect costs such

as border clearance times, it does not capture directly incurred trade transaction costs such as provision of documentation (OECD 2003). Consequently OECD (2003), Fox et al (2003) and Dennis (2006) incorporated trade facilitation into the GTAP model through splitting the costs into the indirect iceberg component and a tax component to capture the direct transaction costs. A considerable data problem is the measurement of exiting transaction costs, and of course a related issue is estimation of the impact of some degree of liberalisation on the level of those costs. Some of these studies have demonstrated substantial gains from reductions in transaction costs and trade margins, perhaps in excess of potential gains from tariff liberalisation. And is it too loopy to ask whether the investment flows generated within dynamic CGE models be linked to such cost reductions, through their role in institution and infrastructure building, in cases where trade agreements extend to services and foreign investment?

Finally, the competitive effects of regional trade integration may lead to productivity improvements over time, and further thought may be given to how these effects may be captured. There is a vast theoretical and empirical literature on this subject and an issue is how such technological gains might be estimated in relation to CGE analysis of regional trade agreements where liberalisation may be less-complete regionally but perhaps deeper sectorally than in multilateral liberalisations. Given econometric estimates of productivity gains, these can of course be imposed exogenously. But at least with dynamic CGE models, thought might be given to endogenising the link between liberalisation, openness, and productivity growth.

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Appendix Table A1 Regional Aggregation

Grouping	Region	Description
Australia	Australia	Australia.
New Zealand	New Zealand	New Zealand.
NAFTA	NAFTA	Canada; United States; Mexico.
Europe	European Union 15	Austria; Belgium; Denmark; Finland; France; Germany; United Kingdom; Greece; Ireland; Italy; Luxembourg; Netherlands; Portugal; Spain; Sweden.
	New EU 10	Cyprus; Czech Republic; Hungary; Malta; Poland; Slovakia; Slovenia; Estonia; Latvia; Lithuania.
	Rest of Europe	Switzerland; Rest of EFTA; Rest of Europe; Albania; Bulgaria; Croatia; Romania; Russian Federation; Rest of Former Soviet Union; Turkey.
High Income Asian	Japan and S. Korea	Japan; Korea.
	Hong Kong	Hong Kong.
	Taiwan	Taiwan.
China	China	China.
ASEAN	Thailand	Thailand.
	ASEAN-5	Indonesia; Malaysia; Philippines; Singapore (w/o Brunei)
	Vietnam	Vietnam.
	Other ASEAN	Other new ASEAN members Cambodia, Lao PDR, Myanmar (also Brunei, Timor)
Rest of the World	South Asia	Bangladesh; India; Sri Lanka; Rest of South Asia.
	Chile	Chile.
	C. & L. America	Rest of North America; Colombia; Peru; Venezuela; Rest of Andean Pact; Argentina; Brazil; Uruguay; Rest of South America; Central America; Rest of FTAA; Rest of the Caribbean.
	ROW	Rest of Oceania; Rest of East Asia; Rest of Middle East; Morocco; Tunisia; Rest of North Africa; Botswana; South Africa; Rest of South African CU; Malawi; Mozambique; Tanzania; Zambia; Zimbabwe; Rest of SADC; Madagascar; Uganda; Rest of Sub-Saharan Africa.

Appendix Table A2 Sectoral Aggregation

Grouping	Sector	Comprising
Crops	Veg. & fruit	Vegetables, fruit, nuts.
	Other crops	Paddy rice; Wheat; Cereal grains nec; Oil seeds; Sugar cane, sugar beet; Plant-based fibres; Crops nec.
Raw agricultural	Cattle & sheep	Cattle, sheep, goats, horses.
	Other animals	Animal products nec.
	Raw milk	Raw milk.
	Wool	Wool, silk-worm cocoons.
Forestry and fishing	Forestry	Forestry.
	Fishing	Fishing.
Minerals	Minerals	Coal; Oil; Gas; Minerals nec.
Cattle & sheep meats	Cattle & sheep meats	Meat: cattle, sheep, goats, horse.
Dairy products	Dairy products	Dairy products.
Other foods	Other foods	Meat products nec; Vegetable oils and fats; Processed rice; Sugar; Food products nec; Beverages and tobacco products.
Textiles, WAP, leather	Textiles	Textiles.
	Wearing apparel	Wearing apparel.
	Leather products	Leather products.
Electronics & machinery	Electronic equip.	Electronic equipment.
	Other machinery and equip.	Machinery and equipment nec.
Other manufactures	Wood products	Wood products.
	Paper products	Paper products, publishing.
	Chemical, rubber, plastics	Chemical, rubber, plastic prods.
	Other mineral prods	Petroleum, coal products; Mineral products nec.
	Metals	Ferrous metals; Metals nec; Metal products.
	Motor vehicles & trsp.	Motor vehicles and parts; Transport equipment nec.
	Other manufactures	Manufactures nec.
Services	Services	Electricity; Gas manufacture, distribution; Water; Construction; Trade; Transport nec; Sea transport; Air transport; Communication; Financial services nec; Insurance; Business services nec; Recreation and other services; PubAdmin/Defence/Health/Educat; Dwellings.

Appendix A3 Assumptions made in the projections: cumulative changes in GDP and factor endowments for the period 2001-2020 (%)

	GDP	Population	Unskilled labour	Skilled labour
Australia	86.9	14.9	-4.9	12.4
New Zealand	84.4	15.4	-1.5	14.9
China	334.5	12.5	11.0	38.1
Hong Kong	182.7	4.0	-11.5	-17.3
Japan and S. Korea	50.6	-0.5	-16.4	-2.4
Taiwan	118.6	6.1	-7.4	-13.2
Thailand	146.1	11.0	-4.8	-11.3
ASEAN-5	157.1	27.1	32.4	33.8
Vietnam	291.9	22.8	21.2	13.7
Other ASEAN	96.3	25.2	20.1	11.8
South Asia	214.1	29.4	38.9	52.0
NAFTA	78.6	18.3	18.4	10.8
Chile	154.0	21.2	22.3	29.5
C. & L. America	98.1	25.3	30.0	40.6
European Union 15	46.4	-0.3	-6.6	-0.8
New EU 10	106.3	-3.1	-6.5	-0.7
Rest of Europe	103.7	1.2	6.7	-1.2
Rest of the World	123.3	40.4	57.3	60.4

Source: Walmsley, personal communication 2007, based on Walmsley (2006).

Table A4(a) Baseline bilateral tariff rates applied by China, Australia, New Zealand and ASEAN (%)

	China				**Australia**			**New Zealand**			**ASEAN**				
	Australia	NZ	ASEAN	ROW	China	ASEAN	ROW	China	ASEAN	ROW	Australia	NZ	China	ASEAN	ROW
Vegetables & fruit	20.2	12.8	17.4	11.1	0.5	0.1	2.1	0.0	0.0	0.0	3.7	5.0	6.6	3.3	4.6
Other crops	-1.1	44.5	7.8	1.9	0.7	0.0	0.0	0.3	0.2	0.3	2.6	8.2	5.9	24.3	12.9
Cattle & sheep	4.7	5.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	6.9	6.5	0.8
Other animal products	7.8	13.2	10.3	7.2	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.9	4.9	0.7	3.6
Wool	1.0	1.0	0.4	4.5	4.7	1.3	0.0	0.0	0.0	0.0	0.1	2.1	7.1	0.3	0.7
Forestry	0.7	-0.9	0.6	-0.8	0.3	0.1	0.2	0.0	0.0	0.0	0.2	0.4	4.4	0.6	0.8
Fishing	10.3	9.4	10.9	6.9	1.5	0.1	0.0	0.0	0.1	0.0	2.8	2.3	2.4	1.1	2.3
Minerals	-0.6	3.3	0.2	0.7	3.8	5.1	3.6	0.0	0.0	0.0	0.6	1.3	1.7	0.6	0.7
Meats	10.8	12.0	9.9	13.1	0.0	0.0	0.0	0.0	0.0	0.2	4.7	3.2	2.1	5.0	5.7
Dairy products	10.9	9.9	9.1	10.2	3.7	1.1	1.4	3.8	3.2	2.3	4.5	6.4	1.9	7.2	6.0
Other foods	3.5	9.9	-0.1	8.3	5.0	1.4	3.2	1.3	1.5	5.0	6.2	10.3	24.2	18.2	17.2
Textiles	23.3	6.0	7.2	8.3	18.1	9.1	11.7	8.0	2.0	3.3	9.0	5.9	12.3	6.8	13.0
Wearing apparel	14.3	17.7	14.8	15.4	22.4	22.4	21.2	11.9	11.2	9.9	12.8	2.3	10.4	3.6	12.7
Leather products	4.4	8.9	6.5	5.9	9.4	11.5	8.6	8.2	9.2	5.3	5.5	2.4	10.6	5.8	10.6
Wood products	5.3	2.6	3.6	3.1	4.8	4.8	4.1	3.6	3.6	2.7	8.4	4.8	5.1	4.0	5.8
Paper products	6.1	2.9	2.6	2.7	4.1	3.4	2.9	1.9	0.8	1.2	4.9	2.9	7.9	5.5	5.2
Chemical, rubber, plastics	5.0	6.7	10.8	6.5	4.5	4.4	2.7	2.9	1.8	1.6	4.0	4.0	5.0	4.9	4.8
Other mineral prods	8.1	8.4	7.7	8.7	3.9	3.0	3.4	3.5	1.4	2.2	1.7	5.7	6.4	2.6	3.6
Metals	5.2	2.2	5.0	4.4	5.2	1.9	3.9	2.7	2.7	2.8	2.5	2.4	4.4	4.1	5.5
Motor vehicles & trsp.	8.2	8.4	9.0	12.0	4.9	7.3	11.3	2.3	4.6	2.9	19.2	2.4	30.4	12.2	9.6
ElectricalEquip	1.0	0.1	1.2	1.0	1.3	0.8	0.5	1.3	0.8	1.6	1.7	1.1	2.0	0.9	0.5
Othermach	6.7	6.4	6.9	6.0	3.8	4.7	3.2	2.4	2.2	2.4	3.0	3.1	4.9	4.2	2.9
Othermanf	14.7	8.2	13.4	12.7	3.7	3.4	2.7	3.1	2.6	3.4	5.4	6.2	6.8	3.4	3.8
Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	1.2	6.1	4.3	4.2	7.3	3.4	3.6	4.2	1.5	1.7	3.0	4.7	6.2	3.1	3.2

Table A4(b) Baseline bilateral tariff rates faced by China, Australia, New Zealand and ASEAN (%)

	China				**Australia**			**New Zealand**			**ASEAN**				
	Australia	NZ	ASEAN	ROW	China	ASEAN	ROW	China	ASEAN	ROW	Australia	NZ	China	ASEAN	ROW
Vegetables & fruit	0.5	0.0	6.6	20.8	20.2	3.7	14.6	12.8	5.0	10.4	0.1	0.0	17.5	3.3	9.0
Other crops	0.7	0.3	5.9	73.0	-1.1	2.5	19.4	44.5	8.1	2.3	0.0	0.2	7.8	24.3	4.9
Cattle & sheep	0.0	0.0	7.1	0.1	4.7	1.5	3.8	5.0	0.0	3.4	0.0	0.0	0.0	6.5	1.2
Other animal products	0.0	0.0	5.0	3.1	7.8	1.7	2.2	13.2	0.9	4.3	0.0	0.0	10.3	0.7	4.5
Wool	4.7	0.0	7.4	9.3	1.0	0.1	-8.1	1.0	2.1	0.3	1.2	0.0	0.4	0.3	9.1
Forestry	0.3	0.0	4.5	3.3	0.7	0.2	2.8	-0.9	0.4	2.7	0.1	0.0	0.7	0.6	6.0
Fishing	1.5	0.0	2.5	5.6	10.3	2.8	2.0	9.4	2.3	6.3	0.1	0.1	10.9	1.1	3.3
Minerals	3.8	0.0	1.7	2.9	-0.6	0.6	3.4	3.3	1.3	4.9	5.1	0.0	0.2	0.6	4.2
Meats	0.0	0.0	2.1	7.5	10.8	4.7	26.3	12.0	3.2	8.7	0.0	0.0	10.0	5.0	25.5
Dairy products	3.7	3.8	1.9	6.1	10.9	4.5	27.1	9.9	6.4	24.8	1.1	3.2	9.1	7.2	28.8
Other foods	5.0	1.3	24.2	18.2	3.5	6.3	38.1	9.9	10.4	14.8	1.4	1.5	-0.1	18.2	18.9
Textiles	18.1	8.0	12.3	9.7	23.3	9.0	7.8	6.0	5.9	5.6	9.1	2.0	7.2	6.8	11.0
Wearing apparel	22.4	11.9	10.3	12.6	14.3	12.7	12.0	17.7	2.3	7.2	22.4	11.2	14.8	3.6	14.7
Leather products	9.4	8.2	10.6	10.9	4.4	5.5	3.9	8.9	2.4	5.1	11.5	9.2	6.5	5.8	9.6
Wood products	4.8	3.6	5.1	1.4	5.3	8.4	1.6	2.6	4.8	2.5	4.8	3.6	3.6	4.0	3.0
Paper products	4.1	1.9	7.8	1.0	6.1	4.9	3.5	2.9	2.9	2.3	3.4	0.8	2.6	5.5	3.6
Chemical, rubber, plastics	4.5	2.9	5.1	4.5	5.0	4.0	4.2	6.7	4.0	4.1	4.4	1.8	10.9	4.9	4.7
Other mineral prods	3.9	3.5	6.5	6.3	8.1	1.7	4.9	8.4	5.7	3.2	3.0	1.4	7.7	2.6	7.7
Metals	5.2	2.7	4.4	3.9	5.2	2.5	2.7	2.2	2.4	1.8	1.9	2.7	5.0	4.1	3.5
Motor vehicles & trsp.	4.9	2.3	30.1	4.2	8.2	19.2	6.2	8.4	2.4	4.7	7.3	4.6	8.9	12.2	4.6
ElectricalEquip	1.3	1.3	2.0	1.3	1.0	1.7	2.1	0.1	1.1	3.4	0.8	0.8	1.2	0.9	0.8
Othermach	3.8	2.4	4.9	2.8	6.7	3.0	3.1	6.4	3.1	3.5	4.7	2.2	6.9	4.2	3.2
Othermanf	3.7	3.1	6.8	3.0	14.7	5.4	4.0	8.2	6.2	4.4	3.4	2.6	13.4	3.4	6.3
Services	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Average	7.3	4.2	6.2	6.5	1.2	3.1	5.5	6.1	4.6	6.3	3.5	1.5	4.3	3.1	3.2