The Impact of APEC's Free Trade Commitment

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PREFACE

The Industry Commission and its predecessor institutions have a long history of undertaking trade policy analysis.

Under its tariff review function, the Commission has examined the implications for Australia of a number of unilateral trade reforms: at the individual tariff item level; sector-wide; or on a general, across-the-board basis. The Commission has developed and maintained tools to assist in such analysis, most notably measures of nominal and effective rates of protection indicating the level and dispersion of assistance across industries, and partial and general equilibrium models giving a broad indication of the likely effects of unilateral reforms.

Given the recent importance of multilateral trade policy initiatives, particularly through the Uruguay Round of GATT negotiations and the Asia Pacific Economic Cooperation (APEC) forum, the Commission has extended its analysis to multilateral trade policy issues. It has cooperated in producing a recent inventory of impediments to trade and investment in the APEC region (PECC 1995). It has also extended its modelling capability into the multiregional sphere. Initially, at the request of the Department of Foreign Affairs and Trade, it developed Salter, a multisectoral, multiregional model of world trade (Jomini et al. 1994). Commission staff have also undertaken a number of studies looking at the implications for Australia of economic growth and trade reform in a multilateral context (Dee, Jomini and McDougall 1992; Dee and Findlay 1995; Dee, Tormey and Welsh 1995; IC 1993; Dee 1994; and Dee and Welsh 1994).

With this background, the Commission was in 1995 approached by the Department of Prime Minister and Cabinet to assist in analysing the likely implications of APEC's commitment to free trade, as preparation for the APEC forum summit at Osaka.

This publication reports the results of that research effort. The analysis makes use of a multisector, multiregion model framework. Even with the best data and theory available, such frameworks inevitably are imperfect representations of reality. Because of this, considerable judgment is required in applying such frameworks. Judgment is also required in interpreting their results. When wisely used, such models can provide insights into some of the key mechanisms influencing the outcomes of policy initiatives such as those under APEC. They can also provide indicative orders of magnitude. Where differences of view persist, the modelling can hopefully provide a framework within which to identify more clearly the areas of disagreement.

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EXECUTIVE SUMMARY

What is the full extent of the long-term impacts of APEC's free trade commitment made at Bogor and endorsed at Osaka? Previous studies have examined the impact of APEC liberalisation of merchandise trade, and one has also examined the potential impact of a posited increase in foreign direct investment in East Asia. But none to date have examined the impact of APEC services trade liberalisation, nor of APEC's trade facilitation measures. The first purpose of this paper is therefore to add consideration of these measures, in a context that allows for international capital flows.

The analysis suggests that both services trade liberalisation and trade facilitation measures can add significantly to the benefits from liberalisation of merchandise trade. It also suggests that were agriculture to be excluded, the APEC region would forgo benefits amounting to fully 60 per cent of the gains from liberalisation of merchandise trade. Not only would the efficient agricultural exporters in the region stand to lose in an economy-wide sense, but so too would the economies that currently maintain relatively high protection of agriculture and rob themselves of gains from improved efficiency and greater specialisation.

Nevertheless, there were serious concerns expressed about the inclusion of agriculture in the lead-up to the the Osaka forum summit. A second purpose of this paper is to examine just how detrimental a comprehensive free trade commitment would be to the agricultural sectors in the APEC region.

The analysis suggests that APEC liberalisation would have a severe impact on agricultural employment in Japan and Korea, and that these economies could usefully use the full span of time available to them to phase the changes in slowly to match underlying labour force trends and thereby minimise the disruption. Elsewhere in the region, the adjustments in agricultural employment, while large in absolute terms in some of the larger economies, are relatively minor compared with the overall changes in the size of the workforce expected to occur in any event.

The analysis also suggests that in all cases, even in Japan and Korea, the improvements in efficiency and gains from greater specialisation would allow an increase in real per capita disposable incomes for those that remain in agriculture.

THE IMPACT OF APEC'S FREE TRADE COMMITMENT

1 Introduction

In the Bogor Declaration of November 1994, APEC members committed themselves to the long-term goal of free and open trade and investment in the Asia Pacific, at the latest by 2010 for industrialised countries and 2020 for developing countries.

> This goal will be pursued promptly by further reducing barriers to trade and investment and by promoting the free flow of goods, services and capital among our economies. We will achieve this goal in a GATT-consistent manner and believe our actions will be a powerful impetus for further liberalisation at the multilateral level to which we remain fully committed. (APEC Economic Leaders 1994)

The goal was clearly ambitious, with the commitment covering not just goods trade but also services trade and capital flows. The Bogor Declaration also gave considerable weight to APEC's trade and investment facilitation programs, which were to complement and support the process of liberalisation.

Twelve months later the key issue leading up to the Osaka meeting of APEC leaders was whether the APEC commitment could be comprehensive in its sectoral coverage. Four major APEC economies — Japan, Korea, China and Taiwan — indicated concerns about including their agricultural sectors in the commitment to free trade. The issue of comprehensiveness was one of the most difficult faced during the year. But at the Osaka meeting, the principle of comprehensiveness was firmly endorsed. Agriculture remains on the APEC agenda.

The first purpose of this paper is to examine the possible long-term impact of the free trade commitment made at Bogor and endorsed at Osaka. Previous studies have examined the impact of APEC liberalisation of merchandise trade (Dee and Welsh 1994, Murtough et al. 1995, Hertel et al. 1995), and one has also examined the potential impact of a posited increase in foreign direct investment in East Asia (World Bank 1994). But none to date have examined the impact of APEC services trade liberalisation nor of trade facilitation measures. The first purpose is therefore to add consideration of these measures, in a context that allows for international capital flows.

The analysis suggests that both services trade liberalisation and trade facilitation measures can add significantly to the benefits from liberalisation of merchandise trade. It also suggests that were agriculture to be excluded, the APEC region would forgo benefits amounting to fully 60 per cent of the gains from liberalisation of merchandise trade. Not only would the efficient agricultural exporters in the region stand to lose in an economy-wide sense, but so too would the economies that currently maintain relatively high protection of agriculture and rob themselves of gains from improved efficiency and greater specialisation.

It is unlikely, however, that economy-wide implications were the root cause of the concern about the inclusion of agriculture. Instead, it was domestic political considerations that Japan and its neighbours claimed made it hard to comply with APEC's free trade timetable. The political pressure came in large part from agricultural interests, particularly in Japan. A second purpose of this paper is therefore to examine just how detrimental a comprehensive free trade commitment would be to the agricultural sectors in the APEC region. The sectoral impacts would not always be as adverse as some might think, for several reasons.

Where high levels of agricultural support have artificially encouraged resources to stay in agriculture, it seems likely that liberalisation of agricultural trade would lead to some shrinkage. But it is not clear how large that shrinkage would need to be in economies such as Taiwan, for example, which started its post-War development as a successful exporter of processed agricultural products.

Nor is it clear that the resources displaced from agriculture would lack opportunities elsewhere. Broadly-based liberalisation throughout the region is likely to provide a wealth of potential economic opportunities in other sectors of the economy. In both Japan and some of the developing economies of the region, agricultural families already earn a portion of their income from non-agricultural activities. These families are likely to be able to take advantage of growing non-agricultural opportunities.

Finally, for those remaining in agriculture after liberalisation, it is not clear that life would be poorer than before. While it is true that eliminating agricultural subsidy programs would lower net returns to agricultural producers, a broadly-based liberalisation program would also tend to raise world prices of agricultural products, lower agricultural input costs and raise real wages, benefiting agricultural labourers though perhaps not agricultural land-owners.

The analysis suggests that APEC liberalisation would have a severe impact on agricultural employment in Japan and Korea, and that these economies could usefully use the full span of time available to them to phase the changes in slowly to match underlying labour force trends and thereby minimise the disruption. Elsewhere in the region, the adjustments in agricultural employment, while large in absolute terms in some of the larger economies, are relatively minor compared with the overall changes in the size of the workforce expected to occur in any event.

The analysis also suggests that in all cases, even in Japan and Korea, the improvements in efficiency and gains from greater specialisation would allow an increase in real per capita disposable incomes for those that remain in agriculture.

The paper is structured as follows. Section 2 briefly discusses the economic tools with which APEC liberalisation is examined, while some of the key assumptions underlying the analysis are outlined further in Appendix A. The analysis makes use of IC95, a new, hybrid model of international trade featuring economies of scale in production and gains from intra-industry specialisation.

Readers wanting to avoid technical detail can skip this material, but should be aware that the results of an exercise such as this can sometimes be very sensitive to some of the assumptions used. A systematic sensitivity analysis is provided in Appendix B. The discussion of results in the main body of the paper endeavours to draw on conclusions that are robust to the sensitivity tests chosen.

Section 3 then discusses the scope of the APEC commitment to free trade. It covers the likely scope of facilitation initiatives as well as trade liberalisation. One important consideration is to net out of the analysis the impact of trade liberalisation initiatives already agreed to in other fora. The key agreements netted out of the current consideration are the NAFTA and Uruguay Round agreements. The results show that despite the Uruguay Round's achievements in liberalising world trade in agricultural and processed food products, the agricultural and food sectors in some APEC economies would remain relatively highly protected, and subject to potentially severe structural adjustment as a result of APEC's commitment to free trade.

Section 4 then examines the projected impacts of APEC liberalisation for each of the key economic groupings in the region, focusing on the contributions from liberalisation of merchandise trade, services trade, and from trade facilitation measures. It also discusses the economy-wide implications were agriculture to be excluded from the liberalisation package.

Section 5 examines more closely the implications of agricultural liberalisation on the agricultural sectors of economies in the APEC region. It focuses on two aspects of the agricultural adjustment problem — the agricultural employment forgone as a result of comprehensive APEC liberalisation, and the impact on the real disposable incomes of those who remain in agriculture.

Section 6 gives suggestions for further research.

2 The framework for analysis

The analysis makes use of a multiregion, multisector model called IC95, a new hybrid model incorporating features from Jomini et al. (1994), Hertel (forthcoming), Francois, McDonald and Nordstrom (1995) and Brown et al. (1995). Its key features are:

- a database with a 1992 reference year from the GTAP model (Hertel forthcoming), but updated to incorporate more recent information on various forms of protection from GATT/WTO sources, and then adjusted to exclude the trade liberalisation already scheduled under the Uruguay Round and NAFTA agreements;
- an imperfectly competitive, monopolistic competition treatment of resources, food processing and other manufacturing industries along the lines of Francois, McDonald and Nordstrom (1995) and Brown et al. (1995); and
- a treatment of capital accumulation and international capital mobility midway between those of the Salter (Jomini et al. 1994) and GTAP models.

Each of these features is discussed in more detail in Appendix A of this paper.

The analysis uses the model to provide a long-run snapshot view of the impact of APEC's free trade commitment. Information on post-Uruguay, post-NAFTA levels of assistance gives an indication of how much further each APEC economy would need to go to achieve free trade. Several past studies are available that can give a likely indication of the scope for resources savings from trade and investment facilitation measures. These assistance changes and direct resource savings are fed into the model framework, to give an indication of the flow-on effects on wages, prices, and levels of economic activity.

The liberalisation and facilitation measures will be phased in over time, and it will also take time for each APEC economy to adjust to the changes. During this phasing and adjustment period, a myriad of other changes will also affect

each APEC economy. These other changes are not taken into account in the current analysis. For this reason, the results from the model should not be interpreted as indicating the likely changes over time that will occur in each APEC economy — such results would require *all* changes, not just changes in assistance, to be taken into account. The model results should instead be seen as providing an indication, at some future point in time after all the phasing and adjustment has taken place, of how different each economy would be, compared with the alternative situation at the same point in time, had the liberalisation not taken place.

The distinction is important to keep in mind. Sometimes to aid fluency, the results are couched as if key economy indicators 'rise' or 'fall'. This should not be interpreted to mean that the indicators would be higher or lower than they are now. It means that they would, at some future time, be higher or lower than they otherwise would have been had the liberalisation not occurred. In both cases, in a growing economy, these indicators could be higher than they are now.

3 The scope of APEC's free trade commitment

Liberalisation

Any assessment of APEC's free trade commitment needs to net out the impact of other trade liberalisation initiatives agreed to in other fora. As noted above, the current assessment nets out the impact of the NAFTA and Uruguay Round agreements. It does not net out the impact of the AFTA agreement, since both the degree of liberalisation under AFTA, and its relation to APEC liberalisation, are unclear for at least some countries.

The levels of protection remaining in APEC economies, once the NAFTA and Uruguay Round agreements are netted out, are shown in Table 1. For comparison purposes, it also shows the equivalent protection levels in non-APEC regions. For each region, the table shows average protection levels for three broad sectors, being weighted averages of protection levels for the 37 industry groups included in the IC95 model for which post-Uruguay data were obtained from the World Bank. The sectoral breakdown of the IC95 model is shown in appendix Table A1.

Table 1: **Estimated post-NAFTA, post-Uruguay levels of protection** (per cent)

	Aus	*NZ*	*NAFTA*	*Jpn*	*Kor*	*Ind*	*Mal*	*Phl*	*Sng*	*Tha*	*Chn*	*Twn*	*EU*	*ROW*
Import tariffs														
Agric & food[a]	1.4	1.9	7.6	61.8	36.2	15.4	32.8	37.0	7.8	39.2	6.1	37.9	33.1	9.8
Res & manuf[a]	6.2	5.8	1.5	1.2	9.0	18.3	9.9	22.0	2.3	27.4	11.3	6.5	3.2	11.7
Services[b]	109.0	107.6	63.1	68.2	54.5	49.1	52.2	51.3	50.8	47.7	47.2	52.6	98.9	110.5
Export subsidies														
Agric & food[a]	0.9	..	1.6	..	..	..	..	..	..	..	..	..	8.1	0.1
Production subsidies														
Agric & food[a]	0.8	0.6	3.2	3.4	7.2	1.4	..	..	..	0.4	..	..	..	..

[a] Estimates from World Bank (as also reported in Hertel et al. 1995), Incgo (1995) and Francois, McDonald and Nordstrom (1995). See Appendix A for further details.

[b] Estimates from Hoekman (1995), reported in Brown et al. (1995). The cross-regional pattern of these estimates relative to Australia and New Zealand lacks plausibility, but the estimates provide the only comprehensive attempt to date to quantify barriers to services trade. See Appendix A for further comments and qualifications.

For most industries, including those in the services sector, post-NAFTA, post-Uruguay protection is measured by a single tariff rate or tariff equivalent of non-tariff protection against imports. For agriculture and food processing, protection is currently granted by a range of non-tariff barriers and domestic support measures, as well as by explicit tariffs and export subsidies. Under the Uruguay Round agreement, non-tariff barriers on agriculture are to be converted to explicit tariffs. The average tariff rate for agriculture and food in Table 1 therefore shows the average tariff protection level that will apply once tariffication and associated tariff bindings are in place. Similarly, the average export subsidy and production subsidy rates show post-Uruguay levels of export subsidy and domestic support. [1]

The average levels of protection in Table 1 give a broad indication of the scope of APEC's free trade commitment. In what follows, it is assumed that a move to free trade involves the complete elimination of the protection summarised in

[1] The summary information in Table 1 fir st aggregates distinct bilateral tariff rates for each region across the range of other regions supplying the imports. This averaging across source regions has been done at the 37 industry level using import weights. Thus for example, the average tariff levels for the NAFTA region take into account that for a range of goods, tariffs will be zero for NAFTA's trade with itself. It then aggregates protection levels across industries. For each broad sector and for each type of protection, the sector average protection level has been obtained as a production weighted average of rates across the relevant industries. The sectoral averages for services differ slightly from those reported in Brown et al. (1995) because of a slightly different method of aggregation.

Table 1. There has been debate by some APEC members on whether free trade would mean absolutely zero tariffs on merchandise trade. If not, the current treatment might be slightly overstated. In the services area, where some barriers tend to be of an all-or-nothing nature, the current treatment is more likely to be appropriate.

The Bogor declaration also commits APEC members to achieving their free trade goal in a GATT-consistent manner. In itself, this does not necessarily commit members to liberalise on a non-discriminatory or most-favoured-nation basis. For example, Article XXIV of the GATT allows discriminatory action so long as it liberalises 'substantially all trade' and so long as barriers to non-members are not raised. The enabling clause of the Tokyo Round Agreement effectively removes this constraint with respect to the imports and exports of developing countries. Snape (1995) has nevertheless argued that it would be extremely difficult for a preferential APEC agreement to meet all the requirements of GATT consistency. The current assessment of APEC liberalisation assumes that the liberalisation occurs in a non-discriminatory manner, consistent with the notions of open regionalism and concerted unilateralism. Indeed, the principle of non-discrimination was endorsed at the Osaka summit in November 1995.

According to Table 1, the areas of highest average assistance are in the service sectors of most APEC economies. As noted above, the assistance 'guesstimates' are obtained indirectly. Where a region failed to make an offer during the GATS negotiations, this was interpreted as indicating the existence of a range of barriers prohibiting market access. Since no economy scheduled more than about 65 per cent of the total number of possible sectors (Hoekman 1995, p. 41), and since the tariff equivalent of a prohibitive trade restriction was assumed to be 200 per cent, it is not surprising that the guesstimated tariff equivalents of all services trade restrictions averaged between 50 and 100 per cent. It is nevertheless difficult to fully understand the cross-regional pattern of estimates. In any event, were an alternative interpretation put on the failure to make an offer, the tariff equivalents would be smaller (Warren forthcoming, PECC 1995).

Since very little services trade liberalisation has been achieved so far under the GATS agreement, there is considerable scope for liberalisation under APEC's free trade commitment. Any assessment of the impact of such liberalisation needs to be qualified, however, not just by cautions about the quality or interpretation of the trade restriction guesstimates, but also by qualifications

on the quality and extent of data on initial levels of services trade, and on the way that services are modelled. [2]

The database for a model such as IC95 can, at best, draw on data for the total levels of services trade by service category obtained originally for balance of payments purposes and subsequently incorporated into regional input-output frameworks. The data therefore tend to be better for the service categories such as 'trade and transport' that are relatively well-measured for balance of payments purposes, but less reliable for some of the other service categories, particularly private services (including business services such as technical consultancy, software development) that are often measured as a pure residual. Even where trade totals are measured with reasonable reliability, it needs to be remembered that the bilateral patterns of such trade are obtained by pure estimation (typically from bilateral patterns of goods trade or by using some form of gravity model), since no bilateral services trade data are collected directly in any systematic fashion.

Services trade can perform a number of functions. Services can be required in their own right, such as when an engineering firm wins a contract to provide consultancy services on a foreign construction project. Alternatively, services can be traded internationally to facilitate trade in merchandise. Trade and transport services (wholesaling, retailing, air, sea, road and rail transport services) are the most obvious example, but it appears that many financial services are also 'traded', via the permanent presence of a banking or insurance facility in another country, to facilitate goods trade between the two countries. The benefits of trade liberalisation are likely to be greater, and more evenly spread, when services play a dual role, because the linkages to other parts of the economy are more pervasive.

Like Salter and GTAP, IC95 captures the dual role of trade and transport services as being traded in their own right as well as facilitating goods trade. It does not capture a dual role for any other service category, despite this probably being an important feature of why they are traded. To the extent that the data are reliable, the dual role has been captured for the most important category, since trade and transport services are more heavily traded than other

[2] It is nevertheless easy to overestimate the extent to which services require a modelling treatment different from that for goods. Brown, Deardorff and Stern (1995) have considered this in some detail, and conclude that the key difference requiring a different treatment is the characteristic identified by Ethier and Horn (1991), that producers of services typically specialise their products to the particular needs of customers. This is a level of product differentiation below the firm-level differentiation captured in IC95 (see Appendix A), and is also an argument for possible diseconomies of scope.

service categories in most economies. To the extent that a dual role for other services has not been recognised, the benefits from services trade liberalisation may be understated.

Table 1 shows that next to service sectors, the agricultural and food sectors in Japan, Korea and Taiwan have among the highest levels of protection within the APEC region, even taking into account the liberalisation already agreed to under the Uruguay Round agreement. However, the agriculture and food sectors in Thailand, the Philippines and Malaysia are also relatively highly protected. China does not appear to be heavily protected, although this may be an artifice of the way that the agricultural estimates in China have been constructed.

As in most countries, agriculture in China is affected by explicit tariffs, domestic price controls (though many of those on agriculture were lifted in the 1980s) and a range of regional tax/subsidy arrangements. Because China has not yet acceded to the GATT, what is less clear is how much of China's internal pricing policies are up for negotiation in international trade fora. Different models have made different assumptions on that score. The Salter model, for example, allows explicit tariffs to be included in trade liberalisation scenarios, while all other domestic pricing arrangements (because they are modelled by means *other* than via tariff equivalents) are generally excluded. By contrast, the GTAP database, on which IC95's estimates for China are based, includes in its overall measure of tariff assistance the net impact of explicit tariffs and a range of domestic support arrangements. The small net tariff equivalents reflect relatively large explicit tariffs being offset by negative assistance via domestic measures. As a result, Chinese agriculture appears to be lightly assisted. However, it needs to be remembered that when these small tariff equivalents are eliminated in trade liberalisation scenarios, the liberalisation is assumed to cover both explicit tariffs and a range of internal pricing arrangements.

The estimates of agricultural protection in Table 1 do not include the impact of quarantine restrictions. If APEC's free trade commitment removes other restrictions on agricultural trade but if quarantine restrictions remain, even for the best of reasons, then the effective liberalisation of agricultural trade could be considerably less than the estimates in Table 1 would suggest. This is an important qualification to the impacts of agricultural liberalisation estimated in the next section.

Outside of agriculture and services, post-NAFTA, post-Uruguay assistance levels are generally more moderate, although low sectoral averages for resources and non-food manufacturing in some economies disguise a relatively

wide dispersion of assistance at the industry level around the sectoral average. In particular, tariffs on textiles and clothing are still relatively high in Australia and New Zealand, importing economies not otherwise affected by the Uruguay Round commitment to dismantle the Multifibre Arrangement. Assistance to motor vehicles is also high in these economies. Assistance to textiles, clothing and lumber products tends to be high in Indonesia and Malaysia. Within non-food manufacturing, assistance tends to be high across the board in the Philippines and Thailand.

Facilitation

According to UNCTAD, a comprehensive US assessment of the costs involved in document preparation and handling in connection with the movement of goods in international trade concluded that the total cost of paperwork and procedures could amount to 10 to 15 per cent of the value of goods traded. This was recognised as a conservative estimate by UN experts.

The estimate was made in 1971, and did not take account of indirect costs

> which can be quite substantial, although they are not easy to quantify, like those caused by delays in transport resulting from cumbersome procedures, delays in payment caused by errors in documentary credits, losses due to deterioration or pilferage while cargo is waiting for clearance or onward transportation, etc. Neither did it refer to lost opportunities, nor the strong disincentive for potential exporters caused by the complication of international trade procedures. (UNCTAD 1992, p. 99)

UNCTAD noted that while there have been substantial cost improvements since 1971, the range of 10 to 15 per cent of the value of goods traded is 'still generally accepted in trade facilitation circles as an order of magnitude for the direct and indirect costs of procedures'. For economies such as South Korea where trade is 40 per cent of GDP, the estimated costs of doing trade could therefore account for as much as 4 to 6 per cent of GDP.

A more recent study of the potential cost savings from market integration in Europe estimated the direct and indirect costs of border controls and customs red tape to be smaller than the UNCTAD study, although other types of savings from market integration were also considered.

The Cecchini studies, (Cecchini 1988) looked at a range of barriers that could be targeted in a single European market:

- border controls and customs red tape;
- divergent standards and technical regulations;
- conflicting business laws and tax regulations; and

- protectionist procurement practices.

The study used survey techniques to examine the direct and indirect costs of border controls and customs red tape, including administration costs, consignment delays and turnover foregone. It also gave estimates of the government spending on the resources required to operate the customs controls. Direct administration costs were estimated at around 1.5 per cent of the value of trans-border trade, while delays added a further 0.5 per cent. The cost of business foregone was between 1 and 3 per cent of the value of trade, while the cost of government expenditure added only 0.1 to 0.2 per cent. In total, therefore, the direct and indirect costs of border controls and customs read tape were up to 5 per cent of the value of trade.

In the European context, the border controls were needed for a variety of reasons: because of differences in VAT and excise rates, because of the need to adjust farm product prices in accordance with Europe's Common Agricultural Policy, for veterinary checks, transport controls, statistical formalities or to enforce bilateral trade quotas and other quantity restrictions with non-EC countries to certain goods. The costs of border controls and customs red tape were highest for small businesses.

In the face of the kind of economic integration aimed for in Europe, many of these reasons for border controls would disappear. It is not as clear that APEC's liberalisation and facilitation initiatives would allow the complete elimination of intra-APEC border controls in the short term. But a comparsion with the European example highlights at least one instance where border controls would need to be retained — if APEC's trade liberalisation were to form a free trade area on a discriminatory basis, requiring the monitoring and enforcement of rules of origin that can often be extremely complex. [3] Krueger (1995) reports that during the first six months of Mexico's membership of NAFTA, for example, traders experienced increased paperwork and confusion, while some firms also claimed the tariffs they faced on entry into the United States had increased.

As noted above, the Cecchini studies also looked at a range of other measures affecting either goods trade or cross-border investment. These measures could,

[3] In NAFTA, for example, textiles and clothing will qualify for preferential treatment only if they pass a 'triple transformation test', under which the final product must be made from materials made in NAFTA countries, which in turn must be fabricated from fibres grown or produced in North America (as reported in Krueger 1995). Were APEC instead to form a customs union with common external tariffs, as in Europe, at least some rules of origin could be dispensed with.

on a broad interpretation, be taken as potential areas of action for the facilitation of trade or investment flows.

Divergent technical regulations and standards, along with duplication of testing and certification procedures, were found to affect a range of manufacturing goods (particularly food, pharmaceuticals, motor vehicles, telecommunications equipment and building materials).

The cost of regulatory diversity hit hardest in sectors combining high levels of both technology and regulation (pharmaceuticals and telecommunications equipment), while mature industries like motor vehicles and consumer electronics were also severely penalised. Regulations were also identified as imposing barriers to market entry in the service sector, particularly in finance, insurance and securities, telecommunications services, and other business services, eg advertising, engineering, computing and legal services.

Energy, transport, telecommunications and water supply were characterised as having nationalistic procurement practices for strategic reasons. Specific cost savings from open competition were identified in pharmaceuticals, office machinery and instrumentation, telephone switching, telephones. electrical equipment, motor vehicles and coal.

The Cecchini studies measured the total gains from market integration in several different ways. One method added together the gains from the following sources:

- the gains from removing barriers that directly affect intra-EC trade, essentially customs formalities and related delays;
- the gains from removing barriers to production, ie. barriers which hinder foreign market entrants and thus the free play of competition;
- the cost reductions achieved by business through exploiting more fully potential economies of scale; and
- other gains in efficiency due to intensified pressures of competition.

The total gains from all these sources were in the range from 4.3 to 6.4 per cent of the EC's GDP. Estimates derived by alternative means were in the same ballpark.

Thus the Cecchini studies identified potential gains from narrowly-defined trade facilitation measures that were smaller than those in the UNCTAD study, but gave estimates of a similar order to the UNCTAD study when potential savings on a broader front from economic integration were included.

One purpose of this study is to examine the flow-on impact of savings from facilitation measures. The indirect savings incorporated in the above estimates give one indication. Another approach is to take the direct cost savings from the above analysis, and to use the IC95 model framework to estimate the associated indirect flow-on effects. This has the advantage of providing an estimated impact on a basis consistent with the method used to examine the impact of liberalisation.

The approach has been to adopt two alternative estimates of the potential direct cost savings from facilitation measures — 5 per cent and 10 per cent of the value of goods traded. The lower figure is larger than the upper bound of 2 per cent direct cost savings from administration and delays associated with customs controls and red tape, but allows for some limited action on facilitation of investment flows.

The upper figure is a possible estimate of the direct cost savings from a more extensive set of facilitation measures. The Osaka action agenda lists a range of objectives that hold out the prospect of more significant gains. The APEC economies have pledged not only to simplify and harmonise customs procedures and to enhance the mobility of business people, but also to:

- ensure the transparency of standards and conformity assessment, align both mandatory and voluntary standards with international ones, achieve mutual recognition of conformity assessment, and promote cooperation for technical infrastructure development to facilitate broad participation in mutual recognition arrangements;
- introduce or maintain effective and adequate competition policy and/or laws associated with enforcement policies, ensure the transparency of the above, and promote cooperation among APEC economies;
- develop a common understanding on government procurement policies and systems, and achieve liberalisation of government procurement markets throughout the Asia-Pacific region in accordance with the principles and objectives of the Bogor Declaration; and
- promote the transparency of their respective regulatory regimes, and eliminate trade and investment distortions arising from domestic regulations which not only impede free and open trade and investment but are also more trade and/or investment restricting than necessary to fulfil a legitimate objective.

These objectives hold out the prospect of more significant gains from facilitation measures.

To model the flow-on effects and indirect cost savings associated with facilitation measures, an indication is needed of where the direct resource savings will occur. Trade and investment facilitation measures presumably lower the resource cost of moving goods and capital between regions. As noted above, the IC95 model recognises the role that trade and transport services play moving goods and other services internationally. This broad sector includes the activities of freight forwarders and others directly involved in trade facilitation. The approach has therefore been to calculate the dollar savings equivalent to 5 or 10 per cent of the value of total trade (as measured by imports), and to assume that trade facilitation measures will produce direct resource savings in the trade and transport service sector (technically, via a productivity improvement) equivalent to this dollar amount.

Thus the benefits of facilitation are assumed to accrue by being able to economise directly on existing resources in a given use, which is analogous to having more resources. This is in contrast to the benefits of trade liberalisation, which are expected to accrue primarily through efficiency gains associated with reallocating existing resources to better uses. The returns from trade facilitation measures are therefore likely to be substantial by comparison with the returns from liberalisation. However, it needs to be remembered that trade liberalisation, particularly if it is non-discriminatory, could well be a necessary precondition for significant direct resource savings on the facilitation front.

4 The economy-wide impacts of APEC's free trade commitment

Liberalisation

The economy-wide and broad sectoral impacts of APEC trade liberalisation, covering all sectors including services and implemented on a non-discriminatory basis, are shown in Table 2.

As noted above, a key benefit of non-discriminatory trade liberalisation is the opportunity to make use of the cheapest imports from the best sources, allowing some existing resources in import-competing industries to be reallocated to better uses domestically. In addition to these traditional static allocative efficiency gains, the current model allows for additional gains from increased international specialisation. As explained in Appendix A, the gains from specialisation tend to magnify the overall effects of trade liberalisation.

Table 2: **Welfare and sectoral implications of APEC liberalisation[a]**

	Aus	*NZ*	*NAFTA*	*Jpn*	*Kor*	*Ind*	*Mal*	*Phl*	*Sng*	*Tha*	*Chn*[b]	*Twn*	*EU*	*ROW*
Welfare effects														
Real income	4.4	9.6	0.7	1.5	2.1	2.9	3.8	2.4	17.2	4.1	1.8	1.7	0.3	0.3
Real GDP	3.4	5.6	0.7	1.5	3.9	5.1	4.9	4.2	6.9	4.5	3.1	1.4	..	..
Terms of trade	1.3	4.8	0.2	-1.9	-3.7	-5.2	-2.4	-4.2	2.9	-0.3	-2.5	-0.4	1.7	0.9
Trade effects														
Exports	48.5	36.6	18.4	29.1	40.8	66.0	25.0	56.8	8.5	45.1	54.1	28.2	5.3	2.4
Imports	52.4	51.1	18.1	35.2	36.0	63.8	27.0	49.8	10.1	34.8	45.5	40.1	6.8	3.1
Balance of trade (% of GDP)	0.2	-0.2	..	-0.2	-0.2	1.0	0.4	0.3	4.2	3.0	0.7	-0.3	..	..
Output volume														
Agriculture	12.3	13.2	-6.4	-42.3	-37.3	0.2	-0.2	-5.5	-6.1	8.1	-0.3	19.6	2.5	4.1
Resources	36.0	36.9	6.8	6.5	-12.3	-13.3	-18.3	-10.7	70.2	-33.6	-15.0	-10.1	-4.2	-4.4
Manufacturing	-2.8	-2.6	-0.9	1.6	7.8	27.0	9.3	11.0	-6.7	2.9	2.4	1.9	-1.6	-2.3
Services	-2.2	-1.1	..	-0.7	1.2	0.4	4.1	1.4	11.8	2.0	2.5	0.2	0.6	0.7

[a] IC95 model projections. All results represent deviations from control. Most variables are measured in percentage changes, except for the balance of trade as a proportion of GDP, which is an absolute change measured in percentage points.

[b] Includes Hong Kong.

The combined effect of gains in static efficiency and from specialisation could be measured by the change in an index of real final output (say, real GDP), minus a change in the index of real primary factor usage. Such a measure is not reported directly in Table 2, however, because it gives only half the story.

An important additional, dynamic benefit of trade liberalisation is when gains in allocative efficiency and from increasing international specialisation provide incentives for an economy to increase its underlying resource base. This source of dynamic gain has been highlighted recently in the United States, particularly by Baldwin (1992), and is captured in models such as IC95 or Salter that allow for more capital to be accumulated than otherwise on the face of beneficial policy initiatives. As noted in Appendix A, IC95 also makes provision for induced employment gains in economies with a high proportion of the workforce in non-wage agriculture initially. These induced increases in resource base also tend to magnify the overall effects of trade policy initiatives.

By definition, the combined gains from allocative efficiency, increased specialisation, and the dynamic gains from induced increases in resource base can be measured by the change in an index of real final output, ie. real GDP.

Table 2 confirms that APEC liberalisation on a non-discriminatory basis would lead to real GDP being higher than otherwise in all APEC economies.

The real GDP gains tend to be bigger in the smaller and more open economies. They are greatest in Singapore, largely because of Singapore's entrepôt role as a conduit for cheaper imports from outside the APEC region (recall that liberalisation is assumed to be on a non-discriminatory basis). Indeed, if APEC liberalisation were instead on a preferential basis (assuming the same rules of origin as for AFTA, namely 40 per cent of content), Singapore's gain in real GDP would fall to be about the same order as Indonesia's, and less than New Zealand's (with these real GDP gains in turn being smaller than in Table 2 because of the preferential nature of the liberalisation).

Nevertheless, welfare in each region is affected not just by increases in economic activity, but also by changes in the prices of the goods and services a region produces to derive income, relative to the prices of the goods and services that consumers (public and private) purchase to yield utility. One important element of this is changes in a region's terms of trade.

Trade liberalisation would tend to raise the average world prices of agricultural and food products, since liberalisation will have the effect of reducing the export and production subsidies afforded these products in many countries. Conversely, liberalisation would have the effect of lowering the average world prices of resources, non-food manufacturing and services, areas currently protected primarily via tariffs or tariff equivalents (in the case of services, essentially by assumption).

Table 2 confirms that terms of trade would tend to improve for agricultural exporting regions such as New Zealand, Australia, and to a lesser extent the NAFTA region, while falling either in agricultural importing regions such as Japan and Korea, or in regions with significant levels of tariff protection in resources and/or non-food manufacturing such as Indonesia, Malaysia, the Philippines, Thailand and China. Singapore's terms of trade improve as some of its traditional entrepôt trade (eg. machinery and equipment) contracts to make way for entrepôt trade in areas where its neighbours are newly competitive, such as agricultural and food products, textiles and clothing.

In some regions, therefore, terms of trade improvements magnify the real GDP gains from trade liberalisation, while in other regions, terms of trade declines moderate the real GDP gains. Nevertheless, all regions are projected to gain in

terms of real income, a measure that takes both factors into account and is therefore a better measure of the impact on overall welfare of each region. [4]

Table 2 also confirms that trade liberalisation is projected to be accompanied by a major expansion in regional trade levels, above what they would otherwise have been. The projected changes in sectoral output also suggest the need for significant structural adjustment in some economies, although it needs to be recognised that in some cases, the measured percentage changes in sectoral output disguise the real scope of the adjustment. For example, the very high percentage expansion in Singapore's resource sector (which includes forestry and fishing) is from a very low base. At the other extreme, the relatively modest percentage changes in service sector output may represent significant adjustments, given the large sizes of the service sectors in some economies. Given that several APEC economies showed considerable concern about the impact of extending trade liberalisation to their agricultural sectors, the extent of structural adjustment in agriculture implied by a full liberalisation package is discussed more fully in the next section.

Economy-wide effects of excluding agriculture

Table 3 is designed to give an indication of the economy-wide implications of excluding agriculture from the liberalisation package. A comparison with Table 2 shows a number of interesting features.

In all but one case (the exception being China), the real income gains to APEC members are lower when agriculture is excluded from the liberalisation package. This drop off in projected gains is most noticeable for two quite different categories of region — the relatively efficient agricultural exporters, and the regions with very highly assisted agricultural sectors. The best examples in the former category are Thailand, an efficient exporter of processed rice, and New Zealand, and efficient exporter of dairy products. When agriculture is excluded from the liberalisation package, the real income

[4] In IC95, real income is measured as net national product, deflated by a price index for net national expenditure (private and public consumption and net investment). This is essentially the same as the equivalent variation measure of welfare in the GTAP model, but differs from the measure of real income in the Salter model by including the price of investment goods in the overall price deflator. IC95's measure therefore recognises that if trade liberalisation allows cheaper net additions to capital stocks, this will improve future productive capacity and hence future consumption prospects. Irrespective of which measure is used, one potential influence on welfare is minimised in the current analysis. In the absence of additional foreign borrowing or lending, real income is not affected by major changes in debt service obligations to foreigners, other than those arising from induced changes in interest rates.

Table 3: **Welfare and sectoral implications of APEC liberalisation that excludes agriculture**[a]

	Aus	*NZ*	*NAFTA*	*Jpn*	*Kor*	*Ind*	*Mal*	*Phl*	*Sng*	*Tha*	*Chn*[b]	*Twn*	*EU*	*ROW*
Welfare effects														
Real income	3.2	5.4	0.5	0.7	1.5	2.4	2.4	2.0	16.4	1.0	1.8	1.0	0.4	0.1
Real GDP	3.1	5.1	0.5	0.7	1.6	4.4	3.0	3.6	6.6	4.0	3.2	0.5	0.1	0.1
Terms of trade	-1.8	-2.1	-0.2	-0.7	-0.4	-4.8	-1.6	-3.7	2.8	4.1	-2.5	-0.1	1.7	0.7
Trade effects														
Exports	48.0	36.9	16.5	24.0	25.6	56.1	19.1	51.4	8.0	44.6	52.3	24.9	4.8	1.5
Imports	47.6	41.8	16.1	29.1	24.4	55.2	21.2	45.0	9.6	30.8	43.9	35.5	6.3	2.3
Balance of trade (% of GDP)	0.2	-0.3	-0.1	-0.1	0.3	0.6	0.3	0.4	4.1	2.2	0.7	-0.1	..	..
Output volume														
Agriculture	1.7	-0.7	1.3	1.1	-1.5	-0.8	0.1	-4.4	-6.6	-1.1	-0.4	0.7	-0.3	-0.2
Resources	44.5	58.9	4.7	3.1	-9.8	-8.2	-13.1	-10.8	69.2	-25.7	-16.9	-9.3	-4.0	-2.9
Manufacturing	-3.0	-4.9	-0.4	2.4	1.1	20.5	4.3	12.8	-7.1	4.9	3.8	0.4	-1.4	-1.6
Services	-2.4	-0.4	-0.1	-1.2	0.6	0.4	3.5	1.0	12.0	2.3	2.4	..	0.7	1.0

[a] IC95 model projections. All results represent deviations from control. Most variables are measured in percentage changes, except for the balance of trade as a proportion of GDP, which is an absolute change measured in percentage points.

[b] Includes Hong Kong.

gains to these regions fall by three-quarters and one-half, respectively. The best example in the latter category is Japan, with only one half the real income gain when agriculture is excluded.

For both Japan and Korea, the exclusion of agriculture essentially eliminates the significant pressure for structural adjustment in both the agricultural sector and in processed food. However, it also leads to significantly smaller gains arising from better allocative efficiency and international specialisation (with their reinforcing dynamic effects), as indicated by the significantly smaller projected gains in real GDP. This effect more than outweighs the easing in terms of trade that comes about from less upward pressure on the average world prices of agricultural products. For Japan and Korea, therefore, excluding agriculture may allow these economies to avoid significant sectoral adjustment, but at a significant economy-wide cost. [5]

[5] This conclusion does not depend on the assumption, implicit in Table 3, that agriculture is excluded from the liberalisation package in every APEC region. In a scenario in which only Japan, Korea, Taiwan and China excluded agriculture, the projected real income gains in Japan and Korea were even smaller. Their real GDP gains were smaller as resources were actually attracted into agriculture, while the terms of trade movements were more adverse because of agricultural liberalisation elsewhere.

The picture in Taiwan is more mixed. The real income gains in Taiwan are smaller when agriculture is excluded, but somewhat surprisingly, the projected change in agricultural output is not nearly as favourable as when agricultural liberalisation is included. The reason is that Taiwan's agricultural sector is projected to gain more from agricultural liberalisation elsewhere in the region than it is projected to lose from agricultural liberalisation at home. The assistance estimates built into the IC95 database (sourced originally from the GTAP model) suggest that while Taiwan heavily assists grain and dairy production, its production of meat products and other food products is relatively lightly assisted. These latter sectors have significant export sales to Japan, and are projected to expand strongly when Japan liberalises its agriculture as part of the full APEC liberalisation scenario. The inability to pursue this source of comparative advantage explains the lower overall real income gains for Taiwan when agriculture is excluded from the liberalisation package.

Finally, China is projected to be just as well off whether agriculture is excluded as when it is included, although in terms of real GDP, China is projected to do slightly better when agriculture is excluded. This may well be an artifice of the way assistance in China has been measured. As noted in the previous section, Chinese agriculture appears to be relatively lightly assisted in the IC95 model, the net result of having combined relatively high explicit tariffs with a range of domestic pricing arrangements that implicitly tax agriculture. It is a moot point whether both will be up for negotiation or action in an APEC context. The down payment that China offered at Osaka seemed to be limited to explicit tariffs and import control measures. Were that trend to continue, the pattern of adjustment could well be more like that of an economy with relatively high formal border measures, but some existing agricultural trade with other economies in the region. In that case, the projected results for Taiwan may offer a rough indication of the likely implications for China.

Contribution of services trade liberalisation

One of the motivations of the current study is to examine the implications of services trade liberalisation in an APEC context. The contribution of services trade liberalisation can be measured in one of several ways — either by looking at the implications of services trade liberalisation alone, or by comparing the effects of a full liberalisation package with a package that excludes services. In principle, if there are significant non-linear interaction effects between merchandise trade and services trade liberalisation, the two approaches need

Table 4: Welfare and sectoral implications of APEC liberalisation for services only[a]

	Aus	*NZ*	*NAFTA*	*Jpn*	*Kor*	*Ind*	*Mal*	*Phl*	*Sng*	*Tha*	*Chn*[b]	*Twn*	*EU*	*ROW*
Welfare effects														
Real income	2.8	5.0	0.5	0.6	0.5	0.4	0.8	1.0	7.3	0.8	0.5	1.3	0.1	0.2
Real GDP	2.6	4.5	0.4	0.7	0.4	0.3	0.6	0.5	3.6	0.3	0.4	0.9	..	0.1
Terms of trade	-1.6	-1.7	..	-1.7	0.1	0.1	..	1.0	1.1	1.0	0.1	0.3	0.4	0.5
Trade effects														
Exports	30.0	29.4	11.2	15.6	4.4	3.9	4.0	4.3	0.7	0.6	4.2	8.6	1.4	1.2
Imports	29.4	33.5	10.6	17.3	4.7	5.4	4.8	5.4	1.4	1.2	3.9	12.6	1.7	1.6
Balance of trade (% of GDP)	0.1	-0.3	..	..	-0.1	-0.2	0.1	..	1.8	0.2	0.1	..	..	..
Output volume														
Agriculture	1.2	-1.4	0.2	1.4	-0.3	0.3	0.2	-0.6	-2.1	-1.2	-0.2	-0.2	..	-0.2
Resources	18.2	45.2	1.5	5.2	-2.1	2.5	-5.7	-4.1	76.8	-7.3	-1.3	-3.0	-1.5	-2.5
Manufacturing	6.1	-0.5	0.7	2.6	-1.6	0.6	-0.8	-2.7	-15.3	-3.5	-1.3	-0.6	-0.9	-1.3
Services	-2.6	-1.4	-0.3	-1.3	0.6	-1.2	2.7	1.8	16.0	3.0	1.6	0.3	0.4	0.9

[a] IC95 model projections. All results represent deviations from control. Most variables are measured in percentage changes, except for the balance of trade as a proportion of GDP, which is an absolute change measured in percentage points.

[b] Includes Hong Kong.

not give the same answer. As it happens, both approaches have been tried, and they give very much the same answer, at least for a key aggregate like real income.[6] Table 4 shows the broad welfare and sectoral implications of service trade liberalisation on its own.

Comparing Tables 2 and 4 suggests that services trade liberalisation can provide a significant proportion of the total gains from trade liberalisation, although this conclusion is subject to a number of provisos discussed in the previous section. Services trade liberalisation is projected to provide between 13 and 30 per cent of the total gains for Korea, Indonesia, Malaysia, Thailand and China, 40 per cent of the total gains for Japan and between 50 and 75 per cent of the total gains for Australia, New Zealand, the NAFTA region and Taiwan. Services trade liberalisation contributes a greater share of the total gains in economies where the services sector accounts for a relatively large share of GDP initially, and/or where services trade barriers have been assessed as relatively high.

[6] For all regions except Singapore, they give the same answer for real income to within a decimal point. For Singapore, they give the same answer to within half a percent.

Whether services trade liberalisation leads to a contraction or expansion of services sector output in an economy also depends primarily on whether barriers to services trade have been assessed as being high by international standards. The projected flow-on effects to other sectors in each region reflect the combination of several factors. The first is a reaction to the resource flows into or out of the services sector — resource movements into services, for example, that cannot be met by additional resource accumulation will need to be transferred from other sectors.

However, some other sectors will themselves gain significantly from more competitive service provision. In particular, recall that the IC95 model recognises explicitly that the trade and transport service industry plays a direct role in transporting other traded goods and services internationally. Other sectors that will tend to benefit significantly from services trade liberalisation are those, such as the resource sectors in Australia and New Zealand, for which transport costs to foreign markets are an important determinant of international competitiveness.
[7]

Facilitation

The Bogor declaration identifies trade and investment facilitation measures as being just as important a component of the free trade commitment as liberalisation initiatives. And liberalisation on a non-discriminatory basis is likely to be an important precondition for the harmonisation and/or streamlining of trade procedures.

As discussed in the previous section, a direct cost saving equivalent to 5 per cent of the value of trade seems an upper limit to the potential gains from a relatively narrow set of trade and investment facilitation measures. With the broader objectives regarding standards, competition policy, procurement and regulation endorsed at Osaka, then the direct cost savings could rise to as much as 10 per cent of the value of trade.

[7] The theoretical structure of IC95 does not allow for tariffs on those trade and transport services imported indirectly as the transport 'margin' on imports of other goods and services. But to the extent that lowering tariffs on direct 'non-margin' imports of trade and transport services reduces the domestic costs of producing those services, this flows on to the cost of international transport margins supplied by the domestic industry. Thus the model captures, albeit in an indirect way, the way in which lowering barriers to service trade can lower the cost of international service margins.

Table 5: **Welfare and sectoral implications of APEC facilitation measures equivalent to 5 per cent of the value of imports[a]**

	Aus	*NZ*	*NAFTA*	*Jpn*	*Kor*	*Ind*	*Mal*	*Phl*	*Sng*	*Tha*	*Chn*[b]	*Twn*	*EU*	*ROW*
Welfare effects														
Real income	1.2	2.2	0.8	0.7	2.3	1.9	3.7	2.1	5.3	2.9	2.8	1.7	0.1	0.2
Real GDP	1.1	2.0	0.7	0.6	2.3	1.8	4.2	2.1	4.9	3.0	2.8	1.7	..	0.1
Terms of trade	..	..	..	0.4	-0.3	..	-1.1	-0.7	-0.2	-0.5	-0.7	-0.2	0.1	0.3
Trade effects														
Exports	1.0	1.4	0.7	0.6	1.5	1.2	3.9	1.7	0.8	2.5	3.4	1.4	..	0.2
Imports	0.8	1.4	1.0	0.7	0.4	1.0	2.3	0.9	0.4	0.9	1.8	1.0	0.4	0.7
Balance of trade (% of GDP)	..	..	..	..	0.3	0.1	0.3	0.1	1.4	0.5	0.4	..	..	-0.1
Output volume														
Agriculture	..	-0.4	0.2	0.2	0.4	0.4	-0.1	0.1	-0.3	0.2	0.4	0.4	0.1	0.1
Resources	0.7	2.1	-0.1	0.1	0.2	-0.5	-4.6	1.0	3.1	1.0	-2.8	-1.6	0.4	0.8
Manufacturing	0.3	-0.4	0.3	0.4	-0.3	1.5	1.8	0.3	-2.1	1.3	1.2	..	0.2	..
Services	0.9	1.5	0.5	0.3	2.5	1.9	6.6	2.4	6.1	2.9	3.7	2.2	-0.1	-0.2

[a] IC95 model projections. All results represent deviations from control. Most variables are measured in percentage changes, except for the balance of trade as a proportion of GDP, which is an absolute change measured in percentage points.

[b] Includes Hong Kong.

The flow-on effects of facilitation measures by APEC members with direct resource savings equivalent to 5 per cent of the value of imports are shown in Table 5. Although the IC95 model is not linear by design, its projected impacts of facilitation measures that save 10 per cent of the value of imports is very close to twice the impact shown in Table 5.

The direct resource savings have been assumed to accrue in the trade and transport service industry. This industry has a particularly critical role to play in facilitating the international movement of goods and other services, although it has other functions as well. Table 5 suggests that some of the resources freed by streamlining of trade procedures could stay on in the sector to facilitate a greater flow of traded goods and services. But some of the resources could also be redeployed, particularly elsewhere in the service sector, to perform other functions.

Almost by definition, the size of the overall real income gains is greater for regions with a high trade share in GDP. Since a resource saving of this sort is akin to having more resources in total in a region, overall income gains can be achieved without the need for significant structural adjustment. Thus trade

facilitation measures equivalent to 5 per cent of the value of imports are projected to yield real income gains that can be as great or greater than those achieved through trade liberalisation, but with significantly less relative movement in the sectoral composition of output.

Summing up

The overall dollar impact of liberalisation and facilitation initiatives on the real income of each region is shown in Table 6. It also shows the total impact for the APEC region as a whole.

The key findings are as follows:

- elimination of all trade barriers, including in services, could eventually involve real income gains of US$303 billion per annum for APEC members, over and above what real incomes otherwise would have been;
- relatively narrow trade facilitation measures could add up to US$216 billion, while more extensive measures covering standards, competition policy, procurement and regulation could add up to US$442 billion, giving a maximum total of US$745 billion;
- but excluding sensitive sectors, especially in agriculture, would dramatically reduce the economic benefits. Failure to advance agricultural liberalisation beyond the Uruguay Round commitments would mean forgoing US$106 billion of real income gains — that is 61 per cent of the total benefits of US$175 billion from liberalisation in traded goods, or 35 per cent of total trade liberalisation benefits of US$303 billion after inclusion of services. Moreover, if agriculture is excluded, US$10 billion of annual free rider gains would flow to the EU.

Table 6: **Real income gains from APEC trade liberalisation and facilitation**

	Facilitation				Liberalisation								Total gains from liberalisation and facilitation (at 5%)	
	At 5% of imports		At 10% of imports		Non-agriculture liberalisation		Agriculture		Services		Total			
Change in	*Real Y%*	*Real Y$*	*Real Y%*	*Real Y$*	*Real Y%*	*Real Y$*	*Real Y%*	*Real Y$*	*Real Y%*	*Real Y$*	*Real Y%*	*Real Y$*	*Real Y%*	*Real Y$*
Region														
Australia	1.2	5	2.5	11	0.4	2	1.2	5	2.8	12	4.4	18	5.6	23
New Zealand	2.2	1	4.5	3	0.5	..	4.1	3	5.0	3	9.6	6	11.8	8
NAFTA	0.8	70	1.5	140	..	4	0.3	23	0.5	43	0.7	70	1.5	140
Japan	0.7	39	1.4	80	0.2	8	0.8	44	0.6	34	1.5	86	2.2	125
Republic of Korea	2.3	17	4.8	35	1.0	7	0.7	5	0.5	4	2.1	16	4.4	33
Indonesia	1.9	7	4.0	15	2.0	8	0.5	2	0.4	2	2.9	11	4.8	18
Malaysia	3.7	7	7.7	14	1.6	3	1.4	2	0.8	1	3.8	7	7.5	13
Philippines	2.1	3	4.3	6	1.1	1	0.4	..	1.0	1	2.4	3	4.5	6
Singapore	5.3	9	11.2	19	9.1	16	0.8	1	7.3	12	17.2	30	22.4	39
Thailand	2.9	9	6.0	18	0.2	1	3.1	9	0.8	2	4.1	12	7.0	20
China	2.8	41	5.7	85	1.4	20	0.6	9	0.5	7	2.4	36	5.2	78
Taiwan	1.7	8	3.5	17	-0.3	-2	0.7	3	1.3	6	1.7	8	3.4	16
EU	0.1	4	0.1	9	0.3	27	-0.1	-10	0.1	8	0.3	25	0.3	29
Rest of the world	0.2	5	0.3	12	-0.2	-7	0.2	7	0.2	8	0.3	9	0.4	14
Total APEC		**216**		**442**		**69**		**106**		**128**		**303**		**519**

Assumptions: Trade facilitation induces a productivity improvement in the trade and transport services sector equal to 5 or 10 percent of imports.

Measured benefits do not include liberalisation under the Uruguay Round or NAFTA.

IC95 model projections. As noted in the text, IC95 probably understimates pure border protection in China post-Uruguay Round. For this table, the projected benefits from agricultural reform in China have been modified. These results are based on the assumption that agricultural liberalisation would have a similar impact on the economies of Taiwan and China (in percentage term). So freeing agricultural trade was assumed to increase real income in China by 0.6 percent compared with 0.7 percent for Taiwan.

Real income (Real Y) gains expressed in $US are based on the estimated size of the world economy in 2010.

5 Structural adjustment in agriculture

One of the key findings of the previous section is that excluding agriculture from the liberalisation package can significantly reduce the overall economy-wide gains, even for the economies that showed concern about the inclusion of agriculture in the lead up to the Osaka meeting.

But those economies clearly did not view agriculture as sensitive because of the economy-wide implications. For various reasons they were concerned about the structural adjustment that would be imposed on their agricultural sectors, and the short-term economic and political impact that such adjustment would have.

There would appear to be at least two key elements to the structural ajustment problem. The first is the size of the workforce that would forgo employment in the agricultural sector. The second is the impact of trade liberalisation on the real disposable incomes of those who remain in agriculture.

The impact of a full trade liberalisation package on these key indicators is shown in Table 7. The liberalisation package covers all sectors, including agriculture and services (as in Table 2). In most cases, accompanying trade facilitation measures would ameliorate the impact on agricultural sectors. In a few cases it would exacerbate the adjustment problem, but only to a minor extent (see the projections for agricultural output in Table 5).

Table 7: **Structural adjustment in APEC agriculture under full trade liberalisation**[a]

	Aus	*NZ*	*NAFTA*	*Jpn*	*Kor*	*Ind*	*Mal*	*Phl*	*Sng*	*Tha*	*Chn*	*Twn*
Agric. employment change:												
- per cent	17.8	21.9	-6.9	-42.9	-55.4	-1.9	-0.1	-7.9	-12.0	9.3	-0.7	2.8
- numbers ('000)	82	36	-791	-1,718	-1,749	-748	-3	-902	..	1,819	-3,221	32
- ratio to ave annual lab force growth	1.0	4.5	-0.6	8.2	-16.8	-0.7	..	-1.9	..	9.8	-1.1	0.5
Per cent change in:												
Land rentals	35.7	67.9	-12.0	-63.8	-75.0	4.4	5.4	-6.3	8.0	64.4	4.1	8.7
Capital rentals	-5.1	-4.7	-3.5	-2.4	-2.0	-3.5	-5.3	-7.0	1.6	-13.8	-6.6	-3.9
Nominal wages	1.3	6.7	-1.8	-0.9	6.3	8.2	6.1	8.6	33.7	8.9	5.4	3.6
Cons. price index	-6.6	-10.4	-3.1	-5.7	-4.1	-0.4	-6.6	-3.1	-5.1	-5.0	-3.5	-7.1
Real disposable primary factor income per head	3.6	21.9	2.7	15.3	20.7	6.1	10.5	11.5	28.8	25.8	8.7	9.3

[a] IC95 model projections. All results represent deviations from control.

Employment

In percentage terms, the agricultural employment losses are projected to be the most severe in Japan and Korea — agricultural employment is projected to be about half what it would otherwise be as a result of a move to free trade. In numerical terms, and based on current agricultural workforce sizes (World Bank 1995), this means that agricultural employment would be 1.7 million lower than otherwise in each economy as a result of APEC's move to free trade.

To put these numbers in further perspective, they can be compared with the annual employment changes that would occur annually in any event, as a result of demographic trends. Japan's total workforce is expected to shrink by about 0.35 per cent annually over the period 1995–2025, or by just over 200,000 a year on current levels (World Bank 1995). Further, because of the relative age of the agricultural workforce, a more than proportionate share of the total workforce shrinkage is expected to occur within the agricultural sector itself. The agricultural jobs forgone as a result of trade liberalisation would therefore be equivalent to just over 8 times the annual shrinkage in total employment expected to occur in any event. But remember that the developed nations such as Japan have until 2010 to achieve their commitment to free trade. In Korea, the agricultural jobs forgone as a result of trade liberalisation would be equivalent to just over 16 times the annual growth in total employment expected to occur in any event. For both Japan and Korea, no matter how the scale of the problem is measured, the agricultural employment forgone represents a relatively serious problem, although the phasing of reform allows some time for the sizable adjustments to occur.

In percentage terms, the adjustments in agricultural employment elsewhere in the region are much more modest than in Japan or Korea. In numerical terms, they are in some cases much greater, but generally because the baseline workforces are very much bigger. Compared with the annual changes in employment expected to occur in any event, the adjustments induced by a move to free trade appear minor.

For example in China, a mere 0.7 per cent forgone agricultural employment translates into almost 3 million jobs at current rates, but this in turn is about the same as a year's worth of total labour force growth. The story is similar in Indonesia, the Philippines and the NAFTA region. In Thailand, the expected gains in agricultural employment would be equivalent to about 10 times annual economy-wide workforce growth. In Taiwan, there would also be agricultural employment gains in response to agricultural liberalisation elsewhere in the

region, with these being equivalent to about half the total annual labour force growth.

Agricultural incomes

Another potential concern may be for the real per capita disposable incomes of those that remain on the land. Table 7 suggests that such concerns may be unfounded, for a number of reasons.

While liberalisation may remove various kinds of subsidies to agricultural production, it will also tend to raise pre-subsidy prices of agricultural output and to lower agricultural input costs. What then matters in the first instance is the difference between the two, as measured by primary factor income. This is a good measure of the net incomes of those agricultural households remaining on the land if those households own all of the resources used on the land, and if this is their sole source of income. [8]

Table 7 gives projections for some of the components of primary factor income generated in agriculture. It shows that while the elimination of agricultural assistance can lead to severe reductions in the returns to agricultural land in regions with high levels of assistance initially, the more efficient use of the resources that remain in agriculture can often allow increases in returns to labour, in the form of increases in nominal wages, compared with what they might otherwise have been. Capital rentals may generally be lower than otherwise in nominals terms, although in no case does this mean a reduction in the *rate* of return to capital, since tariff reductions on capital goods also reduce the replacement cost of capital. But in many cases the fall in return to capital is not a great as the fall in the consumer price index, a proxy indicator for the change in prices of goods on which agricultural families will spend their net income to contribute to their well-being.

The resulting projections for real disposable primary factor incomes per head, shown on the last line of Table 7, take into account one additional source of influence on agricultural incomes. As noted in Appendix A, trade liberalisation would involve a loss of tariff revenue that for some governments could amount to a significant share of total revenue. The projections in this paper allow for governments to adjust other taxes (in this case, these are assumed to be income taxes) so as to maintain government savings rates constant in the face of the

[8] This latter assumption is a poo r one, both in countries like Japan, and in some developing countries, where a portion of income for agricultural families also accrues from non-agricultural employment.

lost tariff revenue. The projected real disposable incomes in Table 7 take into account the induced increases in income taxes. [9] To the extent that agricultural families would be exempted from the burden of increases in other taxation, the projected estimates in Table 7 will understate the increases in their real disposable incomes.

In general, therefore, it appears that despite the severe reductions in returns to agricultural land, the real disposable agricultural incomes per head of those remaining in agriculture are projected to rise as a result of APEC liberalisation.

6 Areas for further research

One of the conclusions of this paper is that the impacts of trade liberalisation and facilitation initiatives are shown to be positive throughout the APEC region. This conclusion is shown (in Appendix B) to be relatively robust, at least in direction if not in magnitude, to variations in key parameters. Significantly, it is also shown to be robust to certain changes in model specification. Nevertheless, there is scope for further research into the reasons for the changes that are observed. There is also scope for relaxing the model's relatively constrained treatment of capital mobility. A more realistic treatment would allow for a limited degree of international capital mobility, but would require empirical research into how much capital would flow in response to international rate of return differentials. With a less severely constrained treatment of capital flows, the projections shown here would tend to be amplified.

Another conclusion of this paper is that both services trade liberalisation and trade facilitation measures could add significantly to the benefits from liberalisation of merchandise trade. However, the analysis of the benefits of services trade is based on a set of stylised guestimates of the current impacts of services trade restrictions. A key area for further research would be to get a more direct understanding of the nature and size of the barriers to services trade, as well as a more up-to-date estimates of the direct benefits of trade facilitation measures. The recent PECC (1995) publication is an important step in improving the information base on trade barriers within the APEC region.

[9] The real disposable income measure is also net of transfers from governments to households, but these transfers are simply assumed to move in line with changes in pre-transfer income.

APPENDIX A: KEY FEATURES OF THE IC95 MODEL

Database

The starting point for the database was the GTAP multiregion database from 1992. Since then, the World Bank has released data on pre- and post-Uruguay Round tariff rates for the sectors incorporated in the GTAP and Salter models, (see, for example, Hertel et al. 1995), obtained in turn from the WTO. There has also been recent work estimating the tariff equivalents of restrictions applying to services trade (reported in Brown et al. 1995, and based in turn on pioneering work by Hoekman 1995).

The World Bank pre-Uruguay tariff rates differ from those built into the original GTAP database. This raises the question of which set of starting estimates to adopt. In many cases the World Bank estimates are more dated, being centred around 1988 with some from as early as 1986. However, the World Bank estimates appear to provide more comprehensive country coverage, particularly for some of the economies in the ASEAN region. The World Bank's post-Uruguay data are obviously valuable for summarising the offers made during the Uruguay negotiating process.

The approach here has been to replace the GTAP tariff estimates with the World Bank's pre-Uruguay estimates, except in the following cases. In agriculture, fishing, and food processing, the GTAP estimate was retained when it was higher than the World Bank's estimate. This is the approach of Hertel et al. (1995), who argue that the World Bank rates for agriculture and food may not adequately capture the tariffication of some agricultural assistance. The GTAP tariff rates were also retained in toto for the three Chinas, (the People's Republic, Hong Kong and Taiwan), regions for which the World Bank provided no data.

The tariff equivalents of restrictions to services trade reported in Brown et al. (1995) were also built into the database. As noted, these were taken in turn from work by Hoekman, who used the presence or absence of offers made during the GATS agreement as an kind of 'revealed preference' indicator of the assistance likely to be afforded currently by particular measures in each region. The procedure was then to assign tariff equivalents to individual measures (200 per cent for measures judged to be prohibitive, and rates of between 20 and 50

per cent for other measures), so as to provide a weighted average assistance estimate for each sector.

These measures of assistance to services sectors suffer from at least two key weaknesses. The scope of services trade as defined in the GATS agreement extended well beyond trade as conventionally defined. It also covered services delivered by way of permanent presence in the host country, ie. via direct foreign investment rather than via trade more narrowly defined. Particularly in a model that makes explicit provision for capital accumulation and its possible mobility, it may be preferable to model interventions affecting capital mobility directly, rather than converting them to tariff equivalents on services trade.

In addition, the estimates assume that an absence of offers implies a prohibitive trade restriction. This is clearly arguable — a country may equally fail to make offers for a lowly assisted service sector with a strong competitive advantage. Work is progressing to derive alternative tariff equivalents based on alternative assumptions (Warren forthcoming, PECC 1995).

For other forms of assistance, specifically the export subsidies and production subsidies applying to agriculture and food and the export tax equivalents of the Multifibre Arrangement, the GTAP estimates have been retained.

The resulting database incorporates the measures of assistance that predate the reductions agreed to under the Uruguay Round and NAFTA agreements. In order to exclude the influence of these agreements on the current assessment of the APEC free trade commitment, NAFTA and Uruguay Round liberalisation experiments were conducted on the database to produce a database incorporating post-Uruguay and post-NAFTA levels of assistance, while taking account of the structural adjustments that these agreements will cause.

Specifically, NAFTA liberalisation was modelled as the elimination of tariffs and export subsidies on trade in agriculture and food, resources and manufacturing within the NAFTA region (United States, Canada and Mexico).[10] Starting with a post-NAFTA database, Uruguay Round liberalisation was then modelled as follows. Tariffs for all sectors except services were reduced to their post-Uruguay Round levels, using the World

[10] This approach does not adequately recognise the special arrangements that have been made for some sensitive products: automobiles, clothing and textiles, electronics, sugar, meat, eggs, poultry and dairy products. It is unclear the extent to which NAFTA will result in liberalisation of services trade. The agreement takes a negative list approach so that all services trade is liberalised unless explicitly excluded, but then allows a grandfathering of all existing restrictions. Snape (1995) discusses the possible interactions between APEC and other regional agreements, covering NAFTA, the Americas, AFTA and CER.

Bank's data on post-Uruguay tariff rates. In agriculture and food processing, export subsidies were reduced by 34 per cent in industrial countries and 24 per cent in developing countries (Incgo 1995) while production subsidies were reduced by 20 per cent in industrial countries and 13 per cent in developing countries (Francois, McDonald and Nordstrom 1995). Finally, the export taxes used to model the impact of the Multifibre Arrangement were eliminated. No liberalisation of barriers to services trade was included. This is based on the assessments of Hoekman (1995) and others that little or no liberalisation in services was achieved in the Uruguay Round. However, the GATS agreement has served the very useful purpose of establishing a framework for future negotiation and of binding the status quo. [11]

These procedures produce a database with post-NAFTA, post-Uruguay levels of assistance, with which to assess the impact of the APEC commitment to free trade within the APEC region. Young and Huff (forthcoming) have already noted the importance of assessing APEC in a post-NAFTA environment. The procedures do not net out the impact of other existing trade agreements of importance in the APEC region, in particular, the ASEAN Free Trade Agreement (AFTA). However, Snape (1995, p. 9) notes that (unlike NAFTA), AFTA may be providing an alternative to APEC for some APEC members, 'and in this regard may be regarded as a "fallback" or a competitor, depending on one's perspective'.

Imperfect Competition

Many conventional models of trade incorporating the assumption of perfectly competitive industries are not perfectly competitive models at all. In particular, those that incorporate the Armington assumption allow a commodity or service from one region to be an imperfect substitute for the same commodity or service from other regions. This assumption of imperfect substitution is usually invoked in order to explain the observed phenomenon of two-way trade in a given commodity or service. However, it gives a particular region, even if it is small, a degree of market power. This manifests itself in a terms of trade decline when the region expands exports of a commodity or service, even if the region is sufficiently small that the average world price remains essentially unchanged. Examples of models incorporating the Armington assumption are Salter and GTAP.

[11] Francois and Martin (1995) have argued th at the binding process per se has a liberalising effect, by reducing both the mean and the variance of future protection measures.

By contrast, models that incorporate global monopolistic competition recognise that product differentiation is likely to occur at the firm, rather than the regional level. It is not so much that cars from Japan are imperfect substitutes for cars from the United States or Europe, but that Hondas are imperfect substitutes for Fords or BMWs. A model of firms producing differentiated products and competing globally therefore has some intuitive appeal.

Francois and Shiells (1994) have shown that analytically, the two approaches are very similar. They differ in only two respects. Firstly, the elasticities of substitution appropriate to firm level product differentiation tend to be larger than those used in models of regional product differentiation. This can be justified in several ways. One is simply the intuitive appeal of product differentiation at the firm level, together with the observation that firms are typically smaller than regions. Another is the observation that large elasticities of substitution are required before multi-country trade models can successfully reproduce historical changes in trade patterns. [12]

Secondly, models of firm level product differentiation typically incorporate a love of variety for its own sake, so that consumers and users are better off when there are more varieties (or firms) globally than when there are fewer. Since most trade is in intermediate goods, an appealing interpretation of this love of variety in a trade context is that with more variety, a firm can buy an intermediate input that is better tailored to its own particular use. This love of variety can be modelled as a productivity improvement that occurs when the number of varieties expands, or a productivity decline that occurs when the number of varieties contracts. This can affect the productivity of the commodity in both intermediate and final use. With this love of variety, models of monopolistic competition can capture gains from trade arising from specialisation in production, as well as those arising from comparative advantage. The productivity improvements associated with a love of variety tend to amplify the sectoral output adjustments that occur in conventional Armington models of trade.

Francois, McDonald and Nordstrom (1995) and IC (1995) provide examples of both these key differences. Francois, McDonald and Nordstrom also show how global imperfect competition can be built into a multiregion trade model in a particularly parsimonious fashion. With monopolistic competition, firms face increasing returns to scale but entry ensures no super-normal profits for any firm. With monopolistic competition, therefore, market power can be exploited

[12] See Gehlhar (forthcoming). Also required is an explicit treatment of human capital as a factor of production. There is no skill differentiation of labour in the current version of IC95.

to recover fixed costs, but no further. Under these conditions, there is a direct relationship between the extent of product differentiation and market power (as measured by elasticities of substitution between varieties) and the markup of price over marginal cost (which with free entry will be just sufficient to cover fixed costs). Francois, McDonald and Nordstrom therefore use estimates of scale elasticities obtained from engineering studies to measure markups of price over marginal cost, and hence the elasticities of substitution between varieties. These elasticity taste parameters also parameterise the extent of the productivity improvement when the number of varieties expands. [13]

Their approach, and their parameterisation, is adopted for the resources, food processing and other manufacturing sectors in the current model. In the absence of scale elasticity estimates for the remaining sectors, the 'perfect' competition, Armington treatment of Salter and GTAP is used, also as in Francois, McDonald and Nordstrom. The key parameters for the current exercise are shown in Table A1. [14]

Capital accumulation

The model used for the current exercise makes provision both for capital to accumulate in a given region, and for foreign borrowing to further facilitate the mobility of capital between regions, using the approach in the Salter model (McDougall 1993). In the current exercise, regions are permitted to accumulate capital, but only in a way that keeps their debt to income ratios fixed. Essentially, this means they must fund domestically any additional capital accumulation that would not have taken place otherwise.

[13] Under the assumptions they adopt, output per firm is fixed, so that industry output can be used as an indicator of the number of firms, and hence the number of varieties. Richer treatments of monopolistic competition (eg. Brown et al. 1995) allow output per firm and hence average production costs to adjust, leading to the possibility of additional procompetitive effects associated with trade liberalisation.

[14] In common with Brown et al. (1995), however, it was found that the productivity improvements associated with love of variety introduced model instability when parameterised strictly according to a Dixit-Stiglitz (1977) aggregator function. In this exercise, productivity is assumed to increase when industry output (the indicator of number of varieties) increases, but only at a tenth the rate suggested by a Dixit-Stiglitz aggregator. Brown et al. (1995) used a dampening factor of one half. Note that Brown et al. also extend their treatment of imperfect competition to the services sector (see Brown, Deardorff and Stern 1995).

Table A1: **Key elasticities in the IC92 model**

	Inverse Scale[a]	*Domestic/Import Armington*[b]	*Import/Import Armington*[b]	*Primary Factor Substitution*[c]
Paddy rice		2.2	4.4	0.56
Wheat		2.2	4.4	0.56
Other grains		2.2	4.4	0.56
Non-grain crops		2.2	4.4	0.56
Wool		2.2	4.4	0.56
Livestock products		2.8	5.6	0.56
Forestry		2.8	5.6	0.56
Fishing		2.8	5.6	0.56
Coal	0.95	20.0	20.0	1.12
Oil	0.95	20.0	20.0	1.12
Gas	0.95	20.0	20.0	1.12
Other minerals	0.95	20.0	20.0	1.12
Processed rice	0.85	6.7	6.7	1.12
Meat products	0.85	6.7	6.7	1.12
Milk products	0.85	6.7	6.7	1.12
Other food products	0.85	6.7	6.7	1.12
Beverages & Tobacco	0.85	6.7	6.7	1.12
Textiles	0.86	7.1	7.1	1.26
Wearing apparel	0.87	7.7	7.7	1.26
Leather & fur	0.88	8.3	8.3	1.26
Lumber & wood products	0.86	7.1	7.1	1.26
Pulp, paper & printing	0.86	7.1	7.1	1.12
Petroleum & coal products	0.92	12.5	12.5	1.26
Chemicals, rubber & plastics	0.85	6.7	6.7	1.26
Non-metallic minerals	0.88	8.3	8.3	1.26
Iron & steel	0.87	7.7	7.7	1.26
Non-ferrous metals	0.86	7.1	7.1	1.12
Fabricated metal products	0.88	8.3	8.3	1.12
Transport equip	0.85	6.7	6.7	1.26
Other machinery & equipment	0.85	6.7	6.7	1.26
Other manufacturing	0.88	8.3	8.3	1.26
Electricity, gas & water		2.8	5.6	1.26
Construction		1.9	3.8	1.40
Trade & transport		1.9	3.8	1.68
Private services		1.9	3.8	1.26
Govt services		1.9	3.8	1.26
Ownership of dwellings		1.9	3.8	1.26

[a] Under the assumptions in the model, inverse scale elasticities measure the ratio of marginal cost to average cost. For data sources on scale elasticities, see Francois, McDonald and Nordstrom (1995).

[b] For industries where inverse scale elasticities (s) are available, the Armington elasticities are given by 1/(1-s). For other industries, the Armington elasticities take the values normally used in the Salter and GTAP models.

[c] Taken from the GTAP model.

There are two possible justifications for this. One is the empirical observation, originating with Feldstein and Horioka (1980), that capital appears to be far from perfectly mobile internationally. Their original observation sparked a lively debate in the literature, but to date their observation has not been convincingly overturned. Savings and investment tend to be highly correlated over time, while uncovered interest rate differentials across countries appear too large to be explained by relative risk considerations alone.

Many dynamic models allow perfect capital mobility, in the sense that interest differentials are assumed to be arbitraged away, but still impose a so-called transversality condition (like a terminal condition in finite horizon models) that regions cannot accumulate debt 'forever'. In the current context, the imposition of a fixed debt-to-income ratio can be seen as imposing a terminal condition, given the long-term snapshot view of the current exercise, that debt-to-income ratios will not differ from what they otherwise would be in the face of trade liberalisation. In fully dynamic models, the transversality conditions are typically met by adjustments over time in exchange rates, consumption patterns and a range of other variables, although interest parity is also maintained. In the current exercise, debt-to-income ratios are held fixed by adjustments to interest rate differentials. In this respect, the treatment is more consistent with the empirical observations of Feldstein and Horioka. [15]

Other key assumptions

In most regions, both labour supplies and employment rates are held fixed (more precisely, are held at the values they otherwise would have had without the trade liberalisation in question). This means that the beneficial labour market impact of trade liberalisation is absorbed in the form of higher wages rather than higher employment levels.

There has been some debate in the literature as to whether this is the appropriate treatment for economies with a significant share of the labour force in subsistence agriculture. Dee, Jomini and McDougall (1992) have shown that one alternative treatment, in which employment varies enough to hold real wages fixed, can have a strong impact on the projected results from trade liberalisation scenarios. However, there is ample evidence of strong real wages growth historically in economies with large agricultural sectors (World Bank 1995), so that the assumption of fixed real wages in a trade policy context is

[15] The current treatment is also very much like the 'endogeous capital, fixed savings rate' treatment in Francois, McDonald and Nordstrom (1995).

probably too extreme. On the other hand, evidence on unemployment and underemployment is still too patchy or untrustworthy to provide a reliable alternative means of gauging the potential employment gains from trade liberalisation.

The current treatment is based on studies that have shown a reasonable degree of wage responsiveness of labour supply among households in subsistence agriculture. The distinguishing feature of these households is that consumption and production decisions are consolidated into a single decision-making unit. One study has shown wage elasticities of labour supply in the range 0.1 to 0.3 (Singh, Squire and Strauss 1986). For economies where more that 20 per cent of the workforce is in non-wage employment in agriculture (World Bank 1995, the economies being Malaysia, Indonesia, Philippines, Thailand and China), the elasticity of labour supply with respect to (post-tax) wages has been set at 0.2.

This treatment raises a second, related issue. The current model contains a treatment of government finances along the lines of the Salter model. This allows IC95 to quantify the lost tariff revenue associated with trade liberalisation. In most regions, income tax rates on labour and non-labour income are assumed to increase equiproportionately so as to maintain government savings rates constant in the face of reduced tariff revenues, and the other changes precipitated by trade reform. In a few economies, tariff revenue constitutes a significant share of government revenue initially, so that the required changes in income tax rates can be substantial. In one case, Thailand, the induced increase in income tax rates on labour income was enough to ensure a reduction in post-tax wages, despite upward movement in pre-tax wages. This in turn induced a negative labour supply response, a result judged to be implausible. For Thailand and the Philippines, economies where income tax revenue is a relatively small share of total revenue *and* where implied labour income tax rates are very much higher than non-labour income tax rates initially, the burden of adjusting to lower tariff revenue was assumed to fall on non-labour income taxes alone.

APPENDIX B: SENSITIVITY ANALYSIS

The projected results from economic models can be sensitive to the values chosen for their demand and supply parameters, all of which are subject to some uncertainty. But economic models can also be sensitive to changes in their theoretical structure (see also Francois, McDonald and Nordstrom 1995).

This appendix tests the sensitivity of the key results of this paper to variations in both parameter values and theoretical structure. The sensitivity analysis is conducted on the projected implications of APEC trade liberalisation (the base case reported in Table 2), with the results reported for the model's welfare measure, real income, and its key components, real GDP and the terms of trade.

The base values for the key parameters of IC95 that determine the responsiveness of supply and demand were shown in Table A1 of Appendix A.

Because of the restrictions on international capital mobility assumed in IC95, the model does not project major changes in capital/labour ratios in any region. The model results therefore prove to be relatively insensitive to variations in the primary factor substitution elasticities, since these supply side parameters are not required to play a major role. Thus this appendix only reports sensitivity to the key demand parameters, these being the elasticities of substitution between imports from different sources and the elasticities of substitution between imported and domestic goods.

The first set of results, reported in Tables B1 to B3, show the effect on the welfare variables of varying these Armington elasticities uniformly by plus and minus 25 per cent, and by plus and minus 50 per cent. Real GDP and real income both prove to be approximately linear in the parameters, with both increasing for higher values of the trade parameters. The only sign reversals occur for real income in China when the elasticities are reduced by 50 per cent, and in real GDP in the Rest of the World when they are increased by 50 per cent.

While the terms of trade also appear to be approximately linear in the parameters, the direction of the response depends on each region's trade balance (the value of exports at fob prices less the value of imports at cif prices). The terms of trade effects are positively related to movements in the trade elasticities for net importing regions (eg. NAFTA, Singapore) and negatively related for net exporting regions (eg. Australia, New Zealand). The increased competition created by greater substitutability between imports from

different sources and between imports and domestic goods forces domestic firms to improve their efficiency more in the face of a given tariff cut. The larger cost reductions from import-competing firms mean that the average world prices of all commodities are reduced below what they were with lower trade elasticities. For net exporting regions this reduction in world prices has an unfavourable terms of trade effect, while the opposite is true for net importing regions. Again the only case of a sign reversal in the terms of trade effect occurs with a 50 per cent reduction in parameters, this time for Taiwan.

The results of this paper may also be sensitive to the model's theoretical structure, and so sensitivity analysis is conducted on the implementation of imperfect monopolistic competition.

The second set of results in Tables B4 to B6 show the effects of implementing an imperfect monopolistic competition treatment for the resources, food processing and other manufacturing industries, industries for which estimates of the necessary scale elasticities were available. As described in Appendix A, this treatment involved two key changes to the Armington-style perfectly competitive model. Firstly, the import substitution elasticities of the relevant industries were increased, and secondly, variety scaling of output was introduced. The tables show results for an Armington-style competitive model (using the standard Armington elasticity values from the Salter or GTAP models), the individual effects of the two additions, and then their combined effects.

The results in Table B4 show that for most regions, increasing the trade elasticities for the relevant subset of industries increases real GDP, while adding variety scaling causes only marginal changes compared with the standard Armington-style perfect competition model. Appendix A notes, however, that variety scaling has been introduced at only a tenth the rate suggested by the theory. Overall, the combined effects produce larger real GDP gains for most APEC regions, reinforcing the view that the modelled gains from specialisation tend to reinforce the gains from allocative efficiency.

The results for the terms of trade in Table B5 prove to be much more sensitive to variations in model specification. Part of the reason appears to be that the changes have been instituted primarily in manufacturing industries, and models such as this appear to be very sensitive to what happens in the manufacturing sector (eg. Dee and Welsh 1994). The variations in model specification are significant enough to cause sign reversals in projected terms of trade changes in four of the regions — Australia, NAFTA, Thailand and Taiwan. The combined effects on terms of trade are dominated by the trade elasticity increase.

Despite this, the results for real income are less sensitive to variations in model specification. In most regions, the modelled gains from greater specialisation are projected to reinforce those from allocative efficiency, and in no case is there a sign reversal.

As stated in the paper, the results of this sensitivity analysis offer comfort in the robustness of the qualitative results presented.

Table B1: **Implications of APEC trade liberalisation for real GDP — sensitivity to variations in Armington elasticities**

	minus 50%	*minus 25%*	***base case***	*plus 25%*	*plus 50%*
Australia	1.47	2.36	**3.41**	4.68	6.20
New Zealand	2.50	3.91	**5.63**	7.66	10.00
NAFTA	0.28	0.44	**0.65**	0.89	1.16
Japan	0.78	1.18	**1.53**	1.88	2.23
Korea	2.26	3.05	**3.86**	4.68	5.51
Indonesia	2.29	3.60	**5.12**	6.83	8.72
Malaysia	1.98	3.33	**4.89**	6.68	8.75
Philippines	2.57	3.34	**4.17**	5.06	6.00
Singapore	3.81	5.33	**6.86**	8.41	10.02
Thailand	2.42	3.42	**4.47**	5.65	7.05
China	1.32	2.17	**3.12**	4.16	5.30
Taiwan	0.56	0.96	**1.40**	1.90	2.45
EU	0.02	0.03	**0.03**	0.03	0.03
ROW	-0.08	-0.06	**-0.04**	-0.02	0.01

Table B2: **Implications of APEC trade liberalisation for terms of trade — sensitivity to variations in Armington elasticities**

	minus 50%	*minus 25%*	***base case***	*plus 25%*	*plus 50%*
Australia	2.37	1.91	**1.35**	0.90	0.54
New Zealand	6.76	5.54	**4.80**	4.36	3.92
NAFTA	0.13	0.17	**0.24**	0.32	0.43
Japan	-2.35	-2.14	**-1.95**	-1.81	-1.69
Korea	-4.15	-3.82	**-3.67**	-3.57	-3.50
Indonesia	-4.98	-5.03	**-5.24**	-5.48	-5.72
Malaysia	-2.30	-2.36	**-2.39**	-2.40	-2.41
Philippines	-5.16	-4.48	**-4.19**	-4.01	-3.87
Singapore	2.85	2.87	**2.92**	2.94	2.93
Thailand	-1.24	-0.53	**-0.28**	-0.17	-0.07
China	-2.70	-2.59	**-2.54**	-2.54	-2.56
Taiwan	0.21	-0.16	**-0.41**	-0.59	-0.73
EU	1.67	1.67	**1.72**	1.80	1.87
ROW	0.77	0.81	**0.91**	1.01	1.10

Table B3: **Implications of APEC trade liberalisation for real income — sensitivity to variations in Armington elasticities**

	minus 50%	*minus 25%*	***base case***	*plus 25%*	*plus 50%*
Australia	2.33	3.29	**4.38**	5.72	7.36
New Zealand	6.39	7.75	**9.57**	11.86	14.42
NAFTA	0.36	0.53	**0.74**	1.00	1.29
Japan	0.62	1.09	**1.51**	1.92	2.33
Korea	0.29	1.23	**2.11**	2.97	3.84
Indonesia	0.35	1.56	**2.88**	4.34	5.95
Malaysia	0.85	2.23	**3.84**	5.71	7.87
Philippines	0.37	1.44	**2.40**	3.37	4.38
Singapore	13.05	15.06	**17.16**	19.21	21.23
Thailand	1.28	2.79	**4.08**	5.43	7.03
China	-0.15	0.77	**1.75**	2.80	3.95
Taiwan	1.01	1.29	**1.65**	2.10	2.62
EU	0.26	0.27	**0.29**	0.30	0.31
ROW	0.16	0.20	**0.25**	0.31	0.38

Table B4: **Implications of APEC trade liberalisation for real GDP — sensitivity to variations in model specification**

	Armington-style perfect competition	*Higher trade elasticities*	*Variety scaling*	*Base case (both)*
Australia	2.75	3.38	2.78	**3.41**
New Zealand	5.51	5.66	5.52	**5.63**
NAFTA	0.53	0.64	0.53	**0.65**
Japan	1.05	1.48	1.09	**1.53**
Korea	2.43	3.63	2.55	**3.86**
Indonesia	3.63	4.50	4.19	**5.12**
Malaysia	3.01	4.57	3.13	**4.89**
Philippines	3.10	3.96	3.30	**4.17**
Singapore	5.37	7.02	5.12	**6.86**
Thailand	3.53	4.35	3.66	**4.47**
China	2.00	3.08	2.04	**3.12**
Taiwan	1.43	1.38	1.43	**1.40**
EU	0.04	0.04	0.03	**0.03**
ROW	-0.02	-0.01	-0.05	**-0.04**

Table B5: **Implications of APEC trade liberalisation for terms of trade — sensitivity to variations in model specification**

	Armington-style perfect competition	*Higher trade elasticities*	*Variety scaling*	*Base case (both)*
Australia	-0.65	1.30	-0.64	**1.35**
New Zealand	2.98	4.80	2.97	**4.80**
NAFTA	-0.13	0.19	-0.10	**0.24**
Japan	-2.82	-1.97	-2.81	**-1.95**
Korea	-2.8	-3.55	-2.96	**-3.67**
Indonesia	-1.37	-4.69	-1.61	**-5.24**
Malaysia	-1.38	-2.25	-1.44	**-2.39**
Philippines	-1.58	-3.89	-1.68	**-4.19**
Singapore	3.19	2.89	3.24	**2.92**
Thailand	0.08	-0.23	0.03	**-0.28**
China	-1.17	-2.45	-1.21	**-2.54**
Taiwan	0.22	-0.38	0.19	**-0.41**
EU	1.37	1.67	1.40	**1.72**
ROW	1.14	0.91	1.12	**0.91**

Table B6: **Implications of APEC trade liberalisation for real income — sensitivity to variations in model specification**

	Armington-style perfect competition	*Higher trade elasticities*	*Variety scaling*	*Base case (both)*
Australia	3.16	4.33	3.20	**4.38**
New Zealand	8.40	9.59	8.41	**9.57**
NAFTA	0.55	0.73	0.56	**0.74**
Japan	0.86	1.46	0.90	**1.51**
Korea	1.10	1.94	1.19	**2.11**
Indonesia	3.14	2.55	3.58	**2.88**
Malaysia	2.72	3.66	2.79	**3.84**
Philippines	2.73	2.34	2.90	**2.40**
Singapore	15.85	17.23	15.69	**17.16**
Thailand	3.18	3.97	3.29	**4.08**
China	1.42	1.76	1.44	**1.75**
Taiwan	1.98	1.66	1.97	**1.65**
EU	0.24	0.29	0.23	**0.29**
ROW	0.31	0.29	0.27	**0.25**

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