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Liberating Middle Earth: How will Changes in the Global Trading System Affect New Zealand?

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Abstract

Trade liberalisation has gained momentum in recent decades due to the increased popularity of free trade areas and the continued progress of multilateral liberalisation via the World Trade Organisation (WTO). We analyse how likely changes in the global trading environment will influence New Zealand – a small, relatively open economy with a comparative advantage in the world’s most protected sector – using a computable general equilibrium (CGE) model of global production and trade. We find that most bilateral free trade agreements have a small but positive impact on New Zealand welfare and multilateral trade liberalisation generates significant benefits for New Zealand.

Key words: trade liberalisation, free trade agreements, computable general equilibrium modelling

JEL codes: F15, D58

1. Introduction

Prior to 2001, New Zealand's only free trade agreement (FTA) was the Australia New Zealand Closer Economic Relations Agreement (CER), signed in 1983. In more recent years, however, the New Zealand government has energetically pursued additional FTAs. New Zealand now has a free trade deal with Singapore and has initiated free trade negotiations with China, Hong Kong, Malaysia, Thailand, Chile, and the Association of South East Asian Nations (ASEAN).¹ According to The Ministry of Foreign Affairs and Trade, New Zealand's motivation for pursuing such agreements is to safeguard market access for exporters and move forward the process of multilateral liberalisation.

Other changes in the global trading system are also likely to influence the fortunes of the New Zealand economy. Regional trade deals involving New Zealand's important trading partners and other countries, such as the Free Trade Area of the Americas (FTAA), will disadvantage New Zealand exporters. Additionally, multilateral trade liberalisation will result in widespread reforms. In this connection, reducing distortions concerning trade in agriculture as set out by the WTO's Doha Development Agenda is a programme New Zealand, a member of the Cairns group, has championed.

We do not seek to explore the consequences of any one particular free trade deal in detail. Instead, our analysis provides a broad overview of the economic consequences of several liberalisation scenarios that have recently taken place or seem likely to occur using a consistent framework. This is an interesting exercise as, in addition to being a small open economy, New Zealand's comparative advantage lies in the

world's most distorted sector. As might be expected, we find that: (a) welfare gains resulting from FTAs that include New Zealand are greater the larger the amount of trade involving member nations and the higher initial tariffs on intra-regional trade, (b) FTAs that exclude New Zealand have a negative impact on New Zealand welfare, and (c) multilateral trade liberalisation, particularly the reduction of distortions concerning trade in agriculture, generates a significant benefit for New Zealand. We also investigate the impact of trade liberalisation on the income distribution in New Zealand. Our results show that multilateral trade liberalisation will increase the income of landowners and may adversely affect some types of unskilled labour in the short run. In the long-run, however, unskilled labour benefits from trade liberalisation.

This paper has four further sections. Section 2 outlines the salient features of our CGE model and database. Section 3 describes our liberalisation scenarios and reports results from our modelling exercises. Section 4 details results from our sensitivity analysis. Section 5 summarises our results and offers some conclusions.

2. Model Structure and Aggregation

We conduct simulations using the GTAPinGAMS model (Rutherford and Paltsev 2000). The model is a perfectly competitive, static, general equilibrium representation of global trade and production. An overview of the model is provided below.

Expenditure

Expenditure on final goods and services in each region is controlled by a representative consumer who allocates expenditure in a utility-maximising fashion across investment, government consumption, and private consumption. Total

investment and government expenditure are fixed in each region. Private consumption is governed by a Cobb-Douglas utility function, where each commodity is represented by a composite of domestically produced and imported varieties. Government expenditure is modelled in an identical fashion, which allows the composition of public expenditure to respond to changes in relative prices even though the aggregate level of public expenditure is exogenous.

Production

Composites of intermediate inputs and primary factors are combined in a Leontief nest in the top level of the production specification for each sector. The intermediate input composite is derived from a further Leontief aggregation of intermediate inputs by product type. Primary factors enter in a Cobb-Douglas aggregator. Capital and skilled and unskilled labour are employed in all sectors. Land and natural resources are only used in agricultural and resource-based sectors respectively.

Imports

Imports are differentiated from domestic commodities and by region of origin according to the Armington assumption (Armington 1969). That is, for each good, imports from different regions are gathered in a constant elasticity of substitution (CES) nest to create an import composite.² The import composite is combined in a further CES nest with the domestically produced variety to generate a composite that is purchased by firms, the government, or the private household. Transport costs are also included in the import specification. Transport services from different regions are brought together by a Cobb-Douglas aggregator to produce a transport composite. The transport composite and exports are used in fixed proportions.

Closure

With respect to fiscal closure, as a representative household controls all consumption expenditure, budget deficits are financed via (implicit) transfers from households. A neoclassical factor market closure is used. Specifically, factor prices are endogenous and factors are perfectly mobile across sectors. Macroeconomic closure is such that savings is investment driven and the real exchange rate adjusts to maintain a constant current account deficit.

Database

Our model is calibrated using the Beta Release of Version 6 of the Global Trade Analysis (GTAP) database (Dimaranan and McDougall 2002). The database “combines detailed bilateral trade, transport and protection data characterising economic linkages among regions, together with individual country input-output data bases which account for inter-sectoral linkages within regions” (Hertel 2002, p.1-2). The most recent version of the database provides a representation of the global economy in 2001 and identifies 87 regions, 57 sectors and five factors of production.

Aggregation of the database is necessary for computational convenience. Our regional and commodity aggregations and the composition of each in terms of components recognised by the GTAP database are outlined in Table 1. Our regional aggregation identifies New Zealand and its key trading partners (e.g., Australia and the EU), potential and current free trade partners (e.g., Singapore and China), and regions included in FTAs not involving New Zealand (e.g., Newly accessed EU and Mercosur nations).³ Important export commodities (e.g., meat and dairy products) and sensitive

import-competing industries, such as textiles clothing and footwear (TCF), are identified in our sectoral aggregation. As the GTAP database does not quantify barriers relating to trade in services, we group these industries in a single sector. Our factor aggregation recognises the complete set of GTAP factors.

We report New Zealand import shares in Table 2. Cells in the final column of the table detail sectoral import shares (e.g., agriculture accounts for 1.73% of total New Zealand imports). Cells in the bottom row of each table indicate the share of total imports sourced from each region (e.g., 19.56% of the total value of New Zealand imports are sourced from Australia). Internal cells display regional import shares for each commodity (e.g., imports from Australia account for 41.66% of total New Zealand imports of agriculture). Table 3 displays export shares and is interpreted analogously to Table 2. The two tables indicate that: (a) Australia, the US, the EU15, Rest of World, and China are New Zealand's most important trading partners, (b) electronic machinery and equipment (21.86%), chemical and metal products (20.16%) and transport equipment (13.87%) are New Zealand's most significant import commodities, and (c) New Zealand's major exports include dairy products (17.76%), chemical and metal products (16.19%), agriculture (13.86%), and meat products (13.43%).

*Ad vlore*m tariffs levied on goods imported into New Zealand are displayed in Table 4.⁴ Import-weighted average tariffs by commodity are presented in the final column of the table and corresponding calculations for each region are reported in the final row.⁵ Table 5 reports tariffs imposed on New Zealand goods by other countries. In general, New Zealand products entering overseas markets face higher tariffs than foreign

goods sold in New Zealand. Regions that impose high average tariffs on New Zealand goods include the Rest of the FTAA (27.10%), Newly accessed EU nations (23.38%), Rest of Mercosur (14.90%), and Thailand (13.53%). New Zealand exports subject to relatively high tariffs include dairy products (22.62%), other food products (11.94%) and meat products (8.02%).⁶

3. Liberalisation Scenarios and Results

Our simulations are both backward and forward looking. Specifically, we first examine the influence of recently completed FTAs important to New Zealand before turning our attention to economic reforms currently in the pipeline. Unless stated otherwise, each shock eliminates import tariffs on all trade between relevant FTA members. Percentage changes in our forward-looking scenarios are calculated using base values generated in our backward looking simulations; that is, we create an updated database by simulating our backward looking shocks prior to implementing our forward looking scenarios.⁷ As we use a static model, reported changes should be interpreted as those occurring after all adjustments are complete.

In our retrospective simulations, we consider New Zealand-Singapore and Australia-US free trade deals, and the enlargement of the EU in 2004. Looking forward, we examine the impact, one at a time, of the expansion of the US free trade deal with Australia to include New Zealand, all free trade talks involving New Zealand currently in-play – New Zealand-Chile-Singapore, New Zealand-China, New Zealand-Hong Kong, New Zealand-Malaysia, New Zealand-Thailand, Australia-NZ-ASEAN, and New Zealand-ASEAN FTAs – an EU-Mercosur free trade deal, global free trade, and the removal of distortions concerning trade in agriculture.

Liberalisation scenarios and their abbreviations are detailed in Table 6 for ease of reference.

The results from simulating each liberalisation scenario are summarised in Tables 7-13. Changes in welfare are the summary statistics of most interest. We measure these changes using the Hicksian equivalent variation in income. Equivalent variation in 2001 US dollars and equivalent variation as a fraction of GDP are reported in Tables 7 and 8 respectively. Data reported in other tables is as follows: Table 9 presents changes in New Zealand output by sector, Tables 11 and 12 collect percentage changes in New Zealand sectoral and regional imports respectively, and Tables 12 and 13 display changes in New Zealand exports.⁸

The results for simulation (1) indicate that a New Zealand-Singapore free trade deal – an agreement between two small nations with low tariffs on each other’s exports – will have little or no impact on most nations. As New Zealand imports of other manufacturing and TCF from Singapore increase by 21.76% and 19.09% respectively, the small decrease in New Zealand welfare appears to result from trade diversion.⁹

Simulations (2) and (3) address free trade between Australasian countries and the US. Simulation (2) suggests that the Australia-US FTA resulted in a small reduction in New Zealand welfare, and small increases in Australian and US welfare. Although New Zealand exports of agricultural products to Australia increase, a relatively large reduction in manufactured exports to this country results in a decline in aggregate New Zealand exports to Australia of 1.60%. There is also a significant decrease (4.95%) in New Zealand meat products exported to the US. Overall, New Zealand

exports to the world's largest economy fall by 0.97%. These observations indicate that the decline in New Zealand welfare can be attributed to reduced competitiveness in important exports markets.¹⁰

Simulation (3) implies that New Zealand would be better off by around US\$90 million and Australia and the US would experience small welfare losses should the US extend its free trade deal with Australia to include New Zealand. New Zealand's gain is largely due to increased exports of dairy products (95.77%) and meat products (31.14%) to the US. Overall, aggregate New Zealand exports to and imports from the US increase by 16.54% and 7.45% respectively.¹¹

Simulation (4) indicates that the enlargement of the EU in 2004 had a larger negative impact on New Zealand welfare than the Australia-US free trade deal. The simulated change in welfare is, however, relatively small. Aggregate New Zealand exports to the EU15 and new EU nations fall by 1.76% and 18.52% respectively, with dairy and meat products experiencing the most dramatic declines.

Simulation (6) considers free trade between New Zealand and China. The annual gain to New Zealand from this arrangement is over \$100 million, which represents the largest increase in welfare from any regional trade agreement currently under consideration. This is because China is one of New Zealand's more significant trading partners and bilateral tariffs on trade between the two nations are relatively high. There are also large changes in import and export volumes. Aggregate New Zealand exports to and imports from China increase by 51.62% and 28.11% respectively. Major contributors to the increase in New Zealand bilateral exports include meat

products (100.37%), dairy products (90.62%), and TCF (65.52%). New Zealand's imports of TCF from China increase by around 57.18%. Total imports (from all sources) of this product increase by 3.82%. Improved market access for New Zealand goods and domestic allocative efficiency gains are, therefore, both major contributors to the increase in New Zealand welfare.¹²

The next three simulations evaluate bilateral trade deals between New Zealand and three small South East Asian economies. Simulation (7) indicates that a New Zealand-Hong Kong free trade deal would have little impact on either economy. A small increase in welfare (0.015%) is observed when a New Zealand-Malaysia FTA is simulated in scenario (8) and a moderate gain (0.091%) is recorded when free trade between New Zealand and Thailand is considered in simulation (9). The estimated increase in New Zealand welfare is much larger in simulation (9) than simulation (8) because Thailand's average tariff on New Zealand products (13.53%) is much larger than that imposed by Malaysia (1.87%). Differences in average tariffs also explain differences in changes in bilateral trade flows. New Zealand exports to and imports from Malaysia increase by 12.10% and 8.63% respectively in the simulation (8). The corresponding figures for New Zealand trade with Thailand in simulation (9) are 93.83% and 18.23%.¹³

Simulations (10) and (11) examine Australasia-ASEAN free trade. Scenario (10) simulates free trade within ASEAN and also free trade between ASEAN and New Zealand and Australia. The results suggest that this scenario would result in small welfare gains for New Zealand and Australia, moderate improvements in welfare in Malaysia, Thailand and the Rest of ASEAN region, and a significant welfare gain for

Singapore. Simulation (11), which considers free trade within ASEAN and between ASEAN and New Zealand, indicates that should John Howard's reluctance to sign the Treaty of Amity and Cooperation shut Australia out of free trade talks with ASEAN, the gain to New Zealand from free trade with ASEAN would be much greater than if Australia was included in such an agreement.

Two FTAs that exclude New Zealand are evaluated in simulations (12) and (13). The results indicate that the FTAA and free trade between the EU and Mercosur nations will reduce New Zealand welfare by 0.16% and 0.19% respectively. In the FTAA simulation, the decrease in welfare is due to significant decreases in New Zealand exports to the Rest of FTAA and Mercosur regions and reduced New Zealand imports from FTAA members.¹⁴ The most significant factor in the decrease in New Zealand welfare in the EU-Mercosur free trade simulation appears to be the large reduction in New Zealand exports to the EU15, which fall by more than 10%. This is largely due to a reduction in New Zealand meat products exported to the EU15 of around 57%.

The removal of all tariffs worldwide in simulation (14) produces a significant welfare gain for New Zealand. The simulation results in large increases in New Zealand exports to the EU15, Newly accessed EU nations, Rest of FTAA, and Rest of Mercosur. New Zealand exports to all other regions except Chile fall. New Zealand exports of dairy products increase by nearly 150% and exports of all other commodities except other food products fall. New Zealand imports from China (16.41%), Rest of FTAA (14.94%), EU15 (11.90%), and Newly accessed EU nations (11.43%) increase significantly. Agriculture (40.64%), dairy products (35.18%) and meat products (19.98%), commodities that are used intensively by agriculture-based

industries, are the product categories that experience the largest growth in imports. Other regions that experience significant welfare gains from global free trade include Singapore, Thailand, Hong Kong and Rest of Mercosur.

Our final exercise, simulation (15), addresses the liberalisation of trade in agriculture by removing all import tariffs, export subsidies, and output and factor subsidies concerning agriculture-based production.¹⁵ New Zealand experiences a welfare gain of more than one billion US dollars in this scenario, which is the largest welfare gain relative to GDP in any region. The regional and sectoral changes in New Zealand export volumes are similar to those in simulation (15); that is, New Zealand exports to the EU15, Newly accessed EU nations, Rest of FTAA, and Rest of Mercosur increase significantly and aggregate exports of dairy products grow substantial at the expense of all other exports except other food products. Changes in imports by sector and region are also similar to those in simulation (14).¹⁶

Winners and losers

It is widely accepted that the gains from trade liberalisation are not distributed evenly amongst a nation's population. To assess issues concerning income distribution, we report changes in New Zealand real factor prices in Table 14. These calculations indicate that, with the exception of land rent, unit returns are largely unaffected by the regional trade agreements under consideration. There are, however, significant changes in most unit factor payments when global free trade and the liberalisation of agricultural trade are simulated. The large increase in land rents in these scenarios reflects New Zealand's comparative advantage in agricultural products. Agricultural

products also make relative intensive use of unskilled labour, which brings about moderate increases in the unskilled wage in simulations (14) and (15).

One concern expressed by many commentators, especially the New Zealand Council of Trade Unions, relating to trade talks between New Zealand and China (and trade liberalisation in general) is the adverse affect of trade liberalisation on workers employed in the TCF sector. Downward pressure on the wage paid to unskilled labour employed in the TCF industry presents a dilemma for policy makers as these workers are typically in the lower tail of the income distribution. We examine changes in unit returns under various assumptions about the mobility of unskilled labour employed in the TCF industry (TCF labour) to assess this concern. Table 15 reports changes in unit returns under the assumption that TCF labour is immobile. As such, reported changes should be viewed as occurring in the very short run. In general, FTAs between New Zealand and unskilled labour abundant regions, such as China and ASEAN, produce small decreases in the TCF wage. In contrast, decreases in this wage are substantial (17.86% and 12.97% respectively) when global trade liberalisation and the liberalisation of agricultural trade are considered. The reason why the TCF wage decreases in the liberalisation of agricultural trade simulation even though TCF tariffs are maintained is because other factors leave this sector to seek employment in expanding sectors.

Table 16 presents results from simulations that assume that TCF labour is imperfectly mobile. Imperfect labour mobility is modelled by specifying a constant elasticity of transformation (CET) function that allows regional households to allocate aggregate unskilled labour between “normal” unskilled and TCF labour.¹⁷ The results suggest

that a moderate amount of labour mobility (a relatively small CET parameter) can alleviate a large amount of downward pressure on the TCF wage.

4. Sensitivity Analysis

Although our model is built on a global database reflecting actual production and trade flows, we need to specify elasticity parameters to calibrate the model. Parameters of particular significance to our analysis include elasticities of substitution in the import specification (Armington elasticities). These parameters are important because they have a large influence on the degree to which consumers in FTA member countries are willing to replace domestic varieties with imported goods.

Our sensitivity analysis examines changes in New Zealand welfare when all Armington elasticities are multiplied by 0.5 and 2. The results, along with those for the base case (Armington multiplier = 1) are illustrated in Figure 1. In general, the greater the substitutability in the import specification, the greater the gain to New Zealand from being included in a FTA. We also observe that doubling the Armington elasticities results in much larger deviations (in absolute value) from the base case than when these parameters are reduced by 50 percent.

The largest variation in results concerns the simulation of a New Zealand-Thailand FTA. The increase in New Zealand welfare is 67% greater than in the base simulation when Armington elasticities are doubled and 12% lower when these parameters are multiplied by 0.5. Other scenarios relatively sensitive to the choice of Armington elasticities include our global free trade and liberalisation of agricultural trade simulations – the corresponding departures from our base estimates are +56% and -

21%, and +55% and -14% respectively in these simulations. The large variation in results in these simulations appears to be due to high initial tariffs imposed on New Zealand exports by regions that undergo tariff reform. Overall, our sensitivity analysis reveals that the direction of welfare changes for New Zealand are not affected by plausible alternative Armington elasticity parameters and that the magnitude of estimates are only sensitive to these parameters when initial tariffs are large.

5. Conclusion

This study has analysed changes in the global trading system that have recently been implemented or seem likely to eventuate. Our results indicate that New Zealand's interests are best served by multilateral liberalisation, particularly the removal of distortions concerning trade in agriculture. However, our modelling framework does not recognise the arduous nature of multilateral trade negotiations. If large amounts of New Zealand's negotiating capital are required to reach a multilateral agreement, it may be wise for policy makers to pursue regional trade agreements, especially if these agreements can be used as stepping stones towards global free trade. In this connection, the estimated increase in New Zealand welfare when all probable FTAs involving this nation – liberalisation scenarios (5) – (10) – are considered jointly is equivalent to 0.44% of GDP.

Finally, several caveats should be noted in interpreting our results. First, the non-existence of tariffs on trade in services represents a shortcoming in our analysis. Second, our simulations do not capture welfare changes associated with the realisation of economies of scale, dynamic gains due to additions to the capital stock, and productivity improvements due to the transfer of technology. Third, many of the

FTAs considered will be dominated by broader trade liberalisation in the near future. For example: (a) many of New Zealand's free trade deals with South East Asian nations will be redundant when APEC's Bogor goals are achieved, (b) annual benefits to New Zealand from a free trade deal with China will diminish in future years as Chinese tariffs are reduced in accordance with WTO guidelines, and (c) the extent to which New Zealand exporters are disadvantaged by the FTAA will diminish as the WTO facilitates greater multilateral trade liberalisation. Consequently, in the absence of any first-mover advantages for exporters, New Zealand's new regional trade agreements will only bring forward the gains from freer trade and the losses from being excluded from regional trade agreements may only occur for a short period of time.

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Endnotes

¹ ASEAN nations include Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.

² Our elasticity parameters in the import specification are sourced from the GTAP database and listed in the appendix.

³ As there are a number of composite regions in the GTAP database, there are several small inconsistencies in our regional aggregation. These discrepancies are highlighted in the notes to Table 1.

⁴ An irregularity in the database is that tariffs on trade between New Zealand and Australia are non-zero for some product categories despite a long-standing free trade deal involving the two countries. We remove these tariffs using Rutherford's "impose" routine (see Rutherford and Paltsev, 2000) before undertaking our simulations.

⁵ Due to data limitations concerning trade distortions in the service sector, average tariff calculations exclude data for this sector.

⁶ We also calculate simple average tariffs (not reported) to assess the extent to which the well-known endogeneity problem biases volume-weighted average tariffs in a downward direction. We do not find any cases where the use of volume-weighted tariffs significantly alters our calculations.

⁷ We also simulate tariff reductions representative of China's accession to the WTO before undertaking our forward-looking simulations.

⁸ We also note changes in bilateral trade flows by product category in our discussion of the results. These data are not reported but are available from the author upon request.

⁹ Simulation (5) also addresses a FTA involving Singapore. The results indicate that the extension of the New Zealand-Singapore FTA to include Chile will not result in significant benefits to member countries. These observations are similar to those noted by Scollay and Gilbert (2001), who, like us, employ the GTAPinGAMS model.

¹⁰ Several other studies have investigated the consequences of an Australia-US FTA. Brown, Kiyota and Stern (2005) estimate that the agreement will generate welfare gains of 0.20%, 1.8% and 0.03% for the US, Australia and New Zealand respectively. Likewise, a study by the Centre for International

Economics (2001) predicts that free trade between Australia and the US will result in larger welfare gains to member countries than what we estimate. There are several potential reasons for these differences. First, Brown, Kiyota and Stern (2005) use the Michigan Model, which models manufacturing and services as monopolistically competitive. The authors' simulations, therefore, capture gains due to the realisation of economies of scale which are not present in our simulations. Second, the benchmark dataset used by these authors includes estimates of barriers to trade concerning services and ours does not.

The Centre for International Economics study also differs from ours. The Centre uses the Asia Pacific G-Cubed Model to produce one set of results. As this model is dynamic, comparison between our results and the Centre's implies that the gains from Australia-US free trade are larger when the aggregate stock of capital is endogenous than when it is fixed. In the Centre's simulations based on a model more similar to ours – the standard GTAP model – a significant difference is that the Centre's protection data is based on estimates for 1998-99 while our reference year is 2001.

Turning to studies that produce estimates similar to our, Andriamanajara and Tsigas (2004) estimate welfare increases relative to GDP resulting from an Australia-US FTA of 0.011% and 0.005% for Australia and the US respectively. Corresponding calculations by Winchester and Richardson (2003) are 0.013% and 0.002%. The agreement also generated a decrease in New Zealand welfare of 0.042% according to these authors.

¹¹ A New Zealand-US FTA is also examined by Andriamanajara and Tsigas (2004) and Winchester and Richardson (2003). The former study simulates free trade between FTA members while maintaining tariffs on Australia-US trade. The results suggest welfare increases in New Zealand and the US of 0.2120% and 0.0002% respectively. Winchester and Richardson's (2003) estimate that a regional FTA involving Australia, New Zealand and the US will result in welfare changes of -0.008%, 0.507% and 0.021%, respectively, in the three countries. As tariffs recorded in Version 6 of the GTAP database are generally lower than those in Version 5, these estimates are not out of line with our numbers.

¹² Free trade between New Zealand and China is also analysed in a study jointly commissioned by the Chinese Ministry of Commerce and the New Zealand Ministry of Foreign Affairs and Trade (Ministry of Foreign Affairs and Trade, 2004). The study draws on the Asia Pacific G-Cubed model and reports changes in real GDP and real consumption to approximate changes in welfare. The study's most

optimistic estimates of changes in GDP and consumption for New Zealand are 0.25% and 0.55% respectively. The corresponding changes for China are 0.007% and 0.17%. Thus, our estimate of the change in New Zealand welfare is similar to that produced by the joint study but our numbers for China are not. We investigate the change in Chinese welfare in more detail using a modified aggregation of the database and employing the welfare decomposition tool packaged with the standard GTAP model. This analysis reveals that, although there are efficiency gains in both nations, China experiences a significant deterioration in its terms of trade following the formation of a New Zealand-China FTA. Brown (1987) demonstrates that terms of trade movements are considerable in Armington-type models because national product differentiation implies a country has a complete monopoly in the market for its exports. Under this assumption, the removal of a nation's tariffs results in a reallocation of resources and increased export supply, which ultimately causes its terms of trade to deteriorate. With respect to simulation (6), the driving force behind the decline in China's terms of trade is the reduction in the price of Chinese TCF, which falls by 0.015%.

It is unclear whether terms of trade effects are also significant in the G-Cubed model. Perhaps the most significant reason for the different predictions produced by the GTAPinGAMS and G-Cubed models is that the former is static while the latter is dynamic.

¹³ Like China, Thailand experiences a decrease in welfare due the formation of an FTA with New Zealand because of the dominance of terms of trade effects. The principal factor in the deterioration in Thailand's terms of trade in simulation (9) is the decrease in the price of Thai other food products.

¹⁴ Our regional aggregation does not allow us to examine the impact of the FTAA on member nations. The interested reader should consult Hertel, Hummels, Ivanic and Keeney (2004).

¹⁵ The liberalisation scenario we consider cuts deeper than the likely outcome of the Doha Round of trade negotiations. Our results, therefore, approximate the upper bounds of welfare changes due the latest round of multilateral trade negotiations.

¹⁶ The liberalisation of trade in agriculture is also examined by, amongst others, Beghin, Roland-Holst, and van der Mensbrugge (2002); Bushfisher, Robinson, and Thierfelder (2002); Bouet, Bureau, and Jean (2004); and Shakur, Rae, and Chatterjee (2004). It is, however, difficult to compare our study with

these articles as the authors focus on the consequences for developing countries and do not identify New Zealand as a separate region.

¹⁷ In this specification, an elasticity parameter of zero is consistent with immobile TCF labour and an elasticity parameter of infinity equates to perfect labour mobility.

Table 1: Regional and commodity aggregation

Regions	Commodities
1. New Zealand	1. Agriculture
2. Australia	Paddy rice; wheat; cereal grains;
3. United States	vegetables, fruit, nuts; oil seeds; sugar
4. Chile	cane, sugar beet; plant-based fibres;
5. China	crops nec; bovine cattle, sheep and
6. Hong Kong	goats, horses; animal product nec; raw
7. Malaysia	milk; wool, silk-worm cocoons;
8. Singapore	forestry; fishing
9. Thailand	2. Resource based sectors
10. Rest of ASEAN¹	Coal, oil, gas, mineral nec
Indonesia, Philippines, Vietnam,	3. Meat products
Rest of South East Asia	Bovine meat products; meat products
11. Rest of FTAA²	nec
Canada, Mexico, Columbia,	4. Dairy products
Peru, Venezuela, Rest of	5. Other food products
Andean Pact, Rest of South	Vegetable oils and fats, processed rice,
America, Rest of FTAA	sugar, food products nec, beverages and
12. EU15	tobacco products
Austria, Belgium, Denmark,	6. Textiles, clothing and footwear
Finland, France, Germany,	Textiles; wearing apparel, leather
Great Britain, Greece, Ireland,	products
Italy, Luxemburg, Netherlands,	7. Wood and paper products
Portugal, Spain, Sweden	Wood products; paper products,
13. Newly accessed EU nations	publishing
(EU+10)	8. Chemical and metal products
Cyprus, Czech Republic,	Petroleum, coal products; chemical,
Estonia, Hungary, Latvia,	rubber, plastic products, mineral
Lithuania, Malta, Poland,	products nec; ferrous metals; metal nec;
Slovakia, Slovenia	metal products
14. Rest of Mercosur³	9. Transport equipment
Argentina, Brazil, Uruguay,	Motor vehicles and parts, transport
Rest of Andean Pact, Rest of	equipment nec
South America	10. Electronic machinery and equipment
15. ROW	Electronic equipment, machinery and
All other regions	equipment nec
	11. Manufactures nec
	12. Services
	Electricity; gas manufacture,
	distribution; water; construction; trade;
	transport nec; water transport; air
	transport; communication; financial
	services nec; insurance; business
	services nec; recreational and other
	services; public administration, defence,
	education, health; dwellings

Note: (1) Includes Timor-Leste; (2) Includes Bermuda, Greenland, Saint Pierre and Miquelon, Falkland Islands, and French Guiana; (3) Includes Ecuador and excludes Paraguay.

Table 2: New Zealand import shares (percent)

Commodity	Australia	Chile	China	Hong Kong	Malaysia	Singapore	Thailand	US	ASEAN	Rest of FTAA	EU15	EU+10	Rest of Mercosur	ROW	Aggregate
Agriculture	41.66	1.39	2.99	0.02	1.11	0.76	0.61	12.91	5.97	10.02	5.42	0.13	1.26	15.75	1.73
Resources	10.30	0.10	2.53	0.00	10.91	0.32	0.70	1.52	3.46	1.06	0.44	0.12	0.02	68.53	4.00
Meat products	50.32	0.14	0.49	0.01	3.74	0.74	0.27	7.52	0.38	23.75	7.18	0.45	0.58	4.42	0.44
Other food	49.02	0.55	1.89	0.29	1.94	1.45	3.89	10.96	1.59	2.97	12.84	0.18	1.61	10.83	5.26
Dairy products	74.65	0.03	0.65	0.04	0.31	0.18	0.47	5.43	2.21	0.70	11.55	0.52	0.19	3.07	0.17
TCF	16.34	0.06	39.38	0.31	1.13	0.31	1.62	3.74	4.95	0.88	11.21	0.45	0.34	19.28	5.70
Wood and paper	38.63	0.08	5.12	0.39	2.41	1.90	1.03	10.95	7.58	1.83	22.83	0.25	0.13	6.85	4.79
Chemicals & metals	31.32	0.10	4.07	0.14	1.45	3.95	1.81	12.39	1.70	2.10	19.42	0.27	0.25	21.03	20.16
Transport equip.	13.66	0.00	0.55	0.00	0.19	0.35	0.84	35.54	0.10	1.48	15.15	0.11	0.12	31.90	13.87
Electronic & mach.	17.20	0.00	5.66	0.13	3.64	5.29	1.94	16.66	0.84	2.26	25.77	0.37	0.27	19.98	21.86
Manuf. nec	22.41	0.25	23.06	0.16	1.58	0.84	1.52	16.07	1.69	0.89	14.40	0.45	0.39	16.30	2.10
Services	1.39	0.25	1.46	4.89	1.43	1.57	0.99	21.16	0.79	5.10	41.32	2.25	1.04	16.34	19.91
Aggregate	19.56	0.14	5.66	1.08	2.19	2.55	1.52	17.26	1.71	2.77	22.75	0.67	0.48	21.66	100.00

Source: GTAP 6 Database.

Table 3: New Zealand export shares (percent)

Commodity	Australia	Chile	China	Hong Kong	Malaysia	Singapore	Thailand	US	ASEAN	Rest of FTAA	EU15	EU+10	Rest of Mercosur	ROW	Aggregate
Agriculture	4.61	0.07	12.92	1.87	0.88	0.74	0.62	6.35	1.63	1.50	26.53	0.55	0.21	41.53	13.86
Resources	55.83	3.16	2.70	0.05	0.13	0.10	0.11	2.37	0.20	0.17	2.38	0.14	0.07	32.60	1.91
Meat products	0.45	0.02	4.43	0.55	1.39	0.71	0.11	28.49	0.69	8.94	36.08	0.33	0.01	17.79	13.43
Other food	22.06	0.28	5.22	2.11	2.86	1.53	4.41	13.54	2.90	1.66	13.32	0.23	0.22	29.67	7.48
Dairy products	3.95	0.17	4.43	2.01	5.45	1.22	3.01	5.49	15.72	14.80	11.58	1.00	0.47	30.68	17.70
TCF	40.09	0.07	7.21	3.23	0.34	0.35	1.39	10.14	3.04	1.10	20.19	0.17	0.32	12.37	3.27
Wood and paper	29.41	0.05	11.75	0.78	1.20	0.70	1.19	16.04	5.27	0.58	1.57	0.04	0.12	31.28	9.33
Chemicals & metals	22.66	0.09	3.66	0.45	1.60	1.32	0.60	16.38	1.13	3.51	9.17	0.37	0.67	38.39	16.19
Transport equip.	24.08	0.12	0.38	0.29	0.97	4.51	0.78	30.99	0.58	1.93	20.23	0.34	0.22	14.57	1.41
Electronic & mach.	34.75	0.46	3.52	1.09	1.83	2.77	0.95	19.28	1.00	3.20	15.03	0.39	1.67	14.05	7.13
Manuf. nec	16.09	0.19	11.34	0.67	1.91	1.24	0.11	18.11	0.78	2.31	23.90	0.71	0.75	21.90	1.64
Services	1.37	0.32	1.84	1.53	0.66	1.11	0.60	18.69	1.69	5.04	42.19	1.63	1.94	21.38	21.10
Aggregate	13.29	0.22	5.56	1.32	1.91	1.17	1.25	15.09	3.97	5.39	21.46	0.68	0.70	27.99	100.00

Source: GTAP 6 Database.

Table 4: Ad valorem import tariffs imposed by New Zealand

Commodity	Australia	Chile	China	Hong Kong	Malaysia	Singapore	Thailand	US	ASEAN	Rest of FTAA	EU15	EU+10	Rest of Mercosur	ROW	Average
Agriculture	0.00	0.05	0.09	0.21	0.69	1.12	0.38	0.09	0.18	0.00	0.20	0.00	0.81	0.23	0.10
Resources	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Meat products	0.00	1.32	1.24	2.63	2.00	2.15	3.00	1.98	1.81	0.00	2.88	0.21	0.50	0.78	0.51
Other food	0.00	2.80	1.34	4.43	1.50	2.90	1.14	3.74	1.41	13.58	4.66	4.17	1.74	8.43	2.55
Dairy products	0.00	0.00	3.80	0.00	3.25	0.48	2.25	4.71	3.68	0.40	1.26	0.00	0.00	1.31	0.57
TCF	0.00	4.15	10.11	5.51	2.57	2.34	5.99	4.59	6.85	5.37	5.16	6.07	4.77	4.13	6.11
Wood and paper	0.00	1.62	2.87	2.50	3.47	1.01	1.80	1.70	1.57	0.21	1.76	2.02	1.07	1.18	1.08
Chemicals & metals	0.00	1.63	3.00	2.26	2.00	1.39	1.81	1.83	2.14	0.23	2.10	3.49	1.60	1.94	1.34
Transport equip.	0.00	4.63	2.27	6.81	4.20	2.77	6.05	0.48	2.12	2.34	6.01	5.79	3.81	7.15	3.49
Electronic & mach.	0.00	1.96	1.84	1.67	1.07	0.98	2.26	2.02	2.06	1.20	2.47	1.85	2.41	2.58	1.79
Manuf. nec	0.00	3.23	3.08	3.51	2.29	2.68	2.32	4.15	2.98	2.00	3.27	2.44	1.82	3.66	2.64
Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average	0.00	1.70	5.58	3.00	1.26	1.25	2.48	1.52	2.51	2.06	3.05	3.10	2.10	3.38	2.17

Source: GTAP 6 Database.

Table 5: Ad valorem import tariffs imposed on New Zealand exports by other countries

Commodity	Australia	Chile	China	Hong Kong	Malaysia	Singapore	Thailand	US	ASEAN	Rest of FTAA	EU15	EU+10	Rest of Mercosur	ROW	Average
Agriculture	0.00	6.98	10.39	0.00	1.95	0.00	11.38	0.93	2.30	4.27	6.83	6.40	4.23	6.07	5.97
Resources	0.00	6.99	3.26	0.00	0.00	0.00	1.86	0.00	1.42	0.30	0.00	0.02	1.30	1.32	0.74
Meat products	0.00	7.00	16.36	0.00	0.05	0.00	48.44	4.41	6.68	10.83	2.95	46.68	10.73	21.05	8.02
Other food	0.00	6.95	15.48	0.00	2.05	0.30	25.30	3.01	8.57	11.88	8.61	12.67	16.81	26.51	11.94
Dairy products	0.00	7.00	25.70	0.00	0.76	0.00	9.87	11.07	7.93	44.24	53.45	37.39	19.60	19.79	22.62
TCF	0.00	7.00	10.75	0.00	8.13	0.00	8.70	4.35	1.30	7.77	2.07	8.25	14.66	11.22	3.36
Wood and paper	0.00	7.00	7.00	0.00	4.03	0.00	5.11	0.19	3.23	5.54	0.97	3.85	15.19	3.89	2.42
Chemicals & metals	0.00	6.87	9.92	0.00	4.65	0.00	7.93	2.40	4.17	8.75	4.52	5.08	14.85	2.58	2.76
Transport equip.	0.00	7.00	11.83	0.00	4.21	0.00	3.00	0.94	17.32	5.37	2.64	2.43	16.53	12.26	2.98
Electronic & mach.	0.00	7.00	12.29	0.00	3.28	0.00	6.74	1.13	3.82	4.63	1.49	5.46	13.57	6.60	2.39
Manuf. nec	0.00	7.00	13.26	0.00	5.75	0.00	19.35	2.10	14.60	9.90	2.05	10.87	20.40	5.44	4.28
Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average	0.00	6.98	12.78	0.00	1.87	0.03	13.53	3.17	6.72	27.10	10.79	23.38	14.90	10.73	8.44

Source: GTAP 6 Database.

Table 6: Liberalisation scenarios

Number	Abbreviation	Scenario
1	NZ-SGP	New Zealand-Singapore FTA
2	AUS-US	Australia-US FTA
3	ANZ-US	New Zealand-US FTA
4	EU25	EU enlargement
5	NZ-CHL-SGP	New Zealand-Chile-Singapore FTA
6	NZ-CHN	New Zealand-China FTA
7	NZ-HKG	New Zealand-Hong Kong FTA
8	MZ-MYS	New Zealand-Malaysia FTA
9	NZ-THA	New Zealand-Thailand FTA
10	ANZ-ASEAN	Australia-New Zealand-ASEAN FTA
11	NZ-ASEAN	New Zealand-ASEAN FTA
12	FTAA	Free Trade Area of the Americas
13	EU-MER	EU-Mercosur FTA
14	GLOBAL	Global free trade
15	LIBAG	Liberalisation of agricultural trade

Table 7: Global welfare effects (equivalent variation, 2001 US dollars, million)

	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
New Zealand	-1.686	-19.034	90.330	-22.643	4.293	102.627	-0.200	6.951	40.958	20.434	61.329	-72.478	-86.816	861.310	1115.600
Australia	-1.046	31.287	-13.066	-14.320	-0.251	-14.959	-0.097	-1.350	-4.172	120.459	-87.730	-46.353	12.500	1613.975	1879.681
Chile	0.074	-4.169	0.081	-1.006	-3.261	0.044	0.006	0.048	-0.010	-10.349	3.694	312.754	90.822	285.274	264.328
China	1.505	-101.258	0.823	-38.065	-0.664	-2.562	0.064	0.492	-1.055	-472.102	-107.160	-874.801	-833.074	8282.317	45.714
Hong Kong	-0.238	8.883	-0.924	18.659	-0.004	-0.397	0.567	-0.077	0.167	15.956	-17.089	-28.027	10.296	2604.103	453.201
Malaysia	0.711	-44.296	1.897	-4.948	-0.232	1.606	0.077	1.576	-0.598	241.563	360.295	-13.752	-38.371	812.669	-694.720
Singapore	5.298	-0.029	-1.487	3.674	4.094	-1.515	-0.018	-1.054	-0.405	1151.235	1130.572	-30.215	15.370	2359.316	836.233
Thailand	0.193	-20.679	0.116	-12.982	-0.114	-0.397	0.022	-0.237	-27.661	256.712	292.933	-86.534	-66.958	2460.975	1210.239
US	-6.960	503.399	-36.419	-123.501	0.830	-40.514	-0.702	-5.044	-4.079	484.977	-602.377	1982.613	-772.987	9182.772	15467.743
Rest of ASEAN	-0.043	-15.531	-2.211	-17.638	-0.303	-6.015	-0.001	-0.368	-1.217	396.461	334.455	-156.947	-21.716	1944.022	30.649
Rest of FTAA	0.520	-72.291	-15.322	-26.023	-0.851	-3.638	0.044	-0.029	-2.273	-87.886	11.915	247.495	-368.555	-2326.853	113.805
EU15	-0.189	-102.210	-10.021	455.803	-1.210	-11.555	0.002	-1.269	-0.597	-455.701	-265.923	-1486.535	3431.293	6810.772	5247.492
EU+10	-0.340	12.739	-1.655	369.710	0.081	-1.495	-0.032	-0.205	-0.409	25.161	-28.755	-31.160	-200.694	154.120	530.804
Rest of Mercosur	-0.150	-2.631	-1.577	-59.827	-2.047	-2.694	-0.016	-0.094	-1.032	-43.963	-56.449	1408.208	5391.401	8693.316	9378.313
ROW	2.287	-217.974	-8.099	-320.239	-2.032	-8.751	0.217	-0.720	-3.673	-1318.065	-682.671	-1371.974	-984.808	14859.700	-353.657

Table 8: Global welfare effects (equivalent variation as a fraction of GDP)

	Liberalisation scenario														
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	NZ-SNG	AUS-US	ANZ-US	EU25	NZ-CHL- SGP	NZ-CHN	NZ-HKG	MZ-MYS	NZ-THA	ANZ- ASEAN	NZ- ASEAN	FTAA	EU-MER	GLOBAL	LIBAG
New Zealand	-0.004	-0.042	0.200	-0.050	0.010	0.227	0.000	0.015	0.091	0.045	0.136	-0.161	-0.192	1.909	2.473
Australia	0.000	0.010	-0.004	-0.004	0.000	-0.005	0.000	0.000	-0.001	0.037	-0.027	-0.014	0.004	0.497	0.579
Chile	0.000	-0.007	0.000	-0.002	-0.006	0.000	0.000	0.000	0.000	-0.018	0.006	0.535	0.155	0.488	0.452
China	0.000	-0.010	0.000	-0.004	0.000	0.000	0.000	0.000	0.000	-0.049	-0.011	-0.091	-0.086	0.860	0.005
Hong Kong	0.000	0.005	-0.001	0.012	0.000	0.000	0.000	0.000	0.000	0.010	-0.011	-0.017	0.006	1.602	0.279
Malaysia	0.001	-0.053	0.002	-0.006	0.000	0.002	0.000	0.002	-0.001	0.287	0.428	-0.016	-0.046	0.966	-0.826
Singapore	0.007	0.000	-0.002	0.005	0.006	-0.002	0.000	-0.001	-0.001	1.553	1.525	-0.041	0.021	3.182	1.128
Thailand	0.000	-0.021	0.000	-0.013	0.000	0.000	0.000	0.000	-0.028	0.259	0.296	-0.087	-0.068	2.485	1.222
US	0.000	0.005	0.000	-0.001	0.000	0.000	0.000	0.000	0.000	0.005	-0.006	0.020	-0.008	0.091	0.154
Rest of ASEAN	0.000	-0.005	-0.001	-0.006	0.000	-0.002	0.000	0.000	0.000	0.134	0.113	-0.053	-0.007	0.655	0.010
Rest of FTAA	0.000	-0.004	-0.001	-0.002	0.000	0.000	0.000	0.000	0.000	-0.005	0.001	0.015	-0.023	-0.144	0.007
EU15	0.000	-0.001	0.000	0.006	0.000	0.000	0.000	0.000	0.000	-0.006	-0.004	-0.021	0.048	0.096	0.074
EU+10	0.000	0.004	-0.001	0.115	0.000	0.000	0.000	0.000	0.000	0.008	-0.009	-0.010	-0.061	0.047	0.163
Rest of Mercosur	0.000	0.000	0.000	-0.009	0.000	0.000	0.000	0.000	0.000	-0.007	-0.008	0.210	0.805	1.299	1.401
ROW	0.000	-0.003	0.000	-0.005	0.000	0.000	0.000	0.000	0.000	-0.019	-0.010	-0.020	-0.014	0.216	-0.005

Table 9: Changes in New Zealand output (percent)

	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
Agriculture	0.017	0.057	0.228	-0.406	-0.612	1.086	-0.563	-0.600	-0.334	0.038	-0.078	-1.686	-1.655	12.746	16.827
Resources	-0.001	0.183	-0.905	0.561	1.636	-2.028	0.906	0.830	0.051	-2.718	-0.143	2.521	2.868	-22.462	-27.245
Meat products	0.021	-0.673	2.900	-1.003	-1.137	1.160	-1.045	-1.221	-0.636	-1.731	-2.395	-1.961	-12.462	-24.668	-25.592
Other food	0.008	-0.003	0.293	0.046	0.190	0.273	0.181	0.226	2.301	1.434	1.390	0.350	0.708	2.273	0.805
Dairy products	0.027	0.326	2.649	-1.213	0.349	2.052	0.360	0.437	1.027	3.895	4.853	-5.940	2.476	111.912	133.274
TCF	0.014	-0.170	-1.256	0.371	-1.350	-1.441	-1.321	-1.322	-1.520	-2.918	-2.115	-0.779	0.091	-27.556	-19.834
Wood and paper	0.002	0.003	-0.851	0.279	0.271	0.131	0.300	0.315	-0.008	-0.116	-0.184	1.249	1.414	-10.131	-12.966
Chemicals & metals	-0.021	-0.036	0.102	0.252	0.165	-0.563	0.207	0.314	-0.143	0.095	-0.197	0.957	1.273	-9.353	-12.250
Transport equip.	0.022	-0.110	-0.342	0.181	0.073	-0.647	0.090	0.096	-0.278	-0.127	-0.327	0.754	0.789	-12.291	-10.136
Electronic & mach.	-0.037	-0.193	-1.614	0.468	0.068	-0.810	-0.016	0.041	-0.623	-0.645	-0.865	1.282	1.440	-17.689	-22.793
Manuf. nec	0.002	0.047	-0.545	0.292	0.234	1.562	0.239	0.480	-0.216	0.428	0.174	1.075	1.315	-12.121	-14.809
Services	-0.001	0.010	-0.019	0.026	0.043	-0.099	0.046	0.040	0.021	0.019	0.007	0.126	0.108	-0.528	-0.899

Table 10: Changes in New Zealand regional imports (percent)

	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
Australia	-0.278	-0.281	-0.723	-0.105	0.019	-1.125	-0.025	-0.139	0.112	-0.709	0.242	-0.640	-0.531	-8.136	-1.921
Chile	-0.106	-0.076	0.486	-0.275	6.103	0.131	-0.019	-0.008	0.466	0.550	0.601	-7.159	-5.012	8.756	10.169
China	-0.242	-0.115	-1.042	-0.074	0.019	28.108	-0.064	-0.170	-0.146	-1.196	-1.154	-0.217	-0.413	16.414	9.640
Hong Kong	-0.033	-0.175	0.754	-0.211	0.028	0.470	1.779	0.050	0.387	0.319	0.555	-0.640	-0.752	0.664	11.429
Malaysia	-0.295	-0.080	-0.778	-0.069	0.076	-0.640	-0.014	8.628	0.032	7.005	7.758	-0.623	-0.298	0.679	9.311
Singapore	9.121	-0.114	-1.297	-0.136	0.007	-0.250	-0.013	-0.188	-0.027	-5.086	-5.034	-0.693	-0.425	-12.071	7.099
Thailand	-0.293	-0.070	-0.872	-0.061	0.020	-1.475	-0.023	-0.132	18.231	15.775	15.925	-0.231	-0.172	7.216	4.442
US	-0.215	-0.292	7.448	-0.119	0.023	-0.074	-0.010	-0.085	0.045	-0.029	0.078	-2.235	-0.307	1.651	5.803
Rest of ASEAN	-0.194	-0.077	-0.239	-0.136	0.041	-3.955	-0.038	-0.133	0.142	15.352	16.118	-0.425	-0.592	9.219	14.923
Rest of FTAA	-0.183	-0.120	0.024	-0.185	0.028	0.140	-0.011	-0.066	0.246	0.176	0.255	-1.736	-0.724	14.944	14.912
EU15	-0.232	-0.134	-0.461	-0.277	0.024	-0.422	-0.013	-0.094	0.118	-0.003	0.064	-0.513	-0.319	11.904	13.677
EU+10	-0.050	-0.172	0.621	-2.820	0.031	0.134	-0.006	0.037	0.356	0.336	0.574	-0.745	0.026	11.433	13.738
Rest of Mercosur	-0.142	-0.118	0.092	-0.012	0.024	-0.335	-0.018	-0.031	0.336	0.455	0.538	-5.691	-17.356	-11.781	-18.388
ROW	-0.225	-0.127	-0.530	-0.071	0.057	-1.140	-0.015	-0.076	0.011	-0.009	0.120	-0.469	-0.341	19.706	15.468

Table 11: Changes in New Zealand sectoral imports (percent)

	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
Agriculture	0.011	-0.377	2.822	-0.884	0.027	2.357	0.000	0.073	0.976	1.258	1.946	-3.337	-3.251	40.635	52.195
Resources	-0.019	-0.177	0.793	-0.050	0.302	0.618	0.000	0.136	0.091	-0.917	0.320	-0.620	0.069	1.785	3.762
Meat products	0.039	-0.649	2.856	-0.548	0.075	2.264	-0.003	0.316	0.958	1.203	2.265	-1.750	-2.741	19.978	21.075
Other food	0.013	-0.195	1.088	-0.225	0.038	0.964	0.003	0.074	0.820	0.603	0.939	-1.110	-0.670	11.895	14.716
Dairy products	-0.021	-0.524	2.900	-0.533	0.073	2.245	-0.003	0.158	0.907	1.056	2.267	-2.448	-1.286	35.179	30.018
TCF	-0.003	-0.222	1.000	-0.115	0.026	3.824	0.016	0.104	0.429	0.341	0.772	-0.825	-0.379	6.163	6.622
Wood and paper	0.026	-0.278	1.060	-0.187	0.033	1.561	0.012	0.226	0.470	0.629	1.086	-0.939	-0.574	9.191	10.543
Chemicals & metals	0.039	-0.194	0.921	-0.126	0.031	0.846	0.002	0.120	0.319	0.398	0.609	-0.831	-0.250	7.377	8.241
Transport equip.	-0.012	-0.136	0.448	-0.096	0.018	0.380	-0.001	0.036	0.181	0.157	0.313	-0.685	-0.301	2.787	4.933
Electronic & mach.	0.011	-0.137	0.471	-0.080	0.024	0.491	0.000	0.061	0.182	0.169	0.318	-0.629	-0.261	3.161	4.199
Manuf. nec	0.024	-0.261	2.186	-0.259	0.054	2.095	0.007	0.151	0.552	0.543	0.955	-1.198	-0.917	14.141	14.617
Services	-0.011	-0.193	0.906	-0.232	0.030	0.940	-0.001	0.072	0.417	0.352	0.619	-1.088	-0.742	8.737	12.277

Table 12: Changes in New Zealand regional exports (percent)

	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
Australia	0.044	-1.599	-1.858	0.451	-0.151	-1.752	0.005	-0.135	-0.859	-4.052	-1.322	1.222	1.950	-27.380	-19.935
Chile	0.035	0.306	-2.069	0.479	59.260	-2.318	0.003	-0.151	-0.910	-0.148	-1.542	-13.700	-8.128	0.751	-9.050
China	0.031	0.296	-1.981	0.435	-0.093	51.615	0.004	-0.139	-0.897	-1.148	-1.733	1.289	3.532	-7.807	-18.597
Hong Kong	0.030	0.291	-1.810	0.475	-0.075	-1.735	0.006	-0.143	-0.827	-0.574	-1.110	1.191	2.163	-12.452	-15.699
Malaysia	0.035	0.237	-1.734	0.328	-0.075	-1.950	0.003	12.102	-0.959	4.026	4.684	1.004	1.616	-18.166	-18.263
Singapore	0.161	0.345	-1.831	0.418	-0.072	-2.017	0.004	-0.182	-0.903	3.645	3.052	1.283	2.194	-5.764	-3.247
Thailand	0.031	0.308	-1.683	0.283	-0.072	-1.759	0.004	-0.139	93.832	50.245	61.221	0.854	1.874	-3.818	1.235
US	0.037	-0.971	16.542	0.486	-0.085	-2.072	0.004	-0.141	-0.894	-0.823	-1.484	0.802	2.208	-9.844	-11.973
Rest of ASEAN	0.025	0.356	-1.672	0.333	-0.070	-1.778	0.003	-0.138	-0.844	19.950	24.190	0.807	1.751	-6.618	-3.982
Rest of FTAA	0.032	0.311	-2.148	0.486	-0.093	-2.352	0.003	-0.151	-0.955	-0.918	-1.539	-32.116	2.941	46.517	81.257
EU15	0.029	0.270	-1.907	-1.759	-0.081	-1.982	0.004	-0.138	-0.863	-0.814	-1.318	1.318	-10.275	70.311	63.502
EU+10	0.025	0.263	-1.652	-18.523	-0.071	-1.783	0.003	-0.124	-0.751	-0.651	-1.112	1.033	0.310	107.115	150.135
Rest of Mercosur	0.038	0.266	-1.679	0.358	-0.075	-1.803	0.004	-0.126	-0.785	-0.806	-1.258	-3.448	2.685	33.858	26.500
ROW	0.033	0.285	-1.886	0.425	-0.103	-2.037	0.004	-0.135	-0.856	-0.800	-1.421	1.329	2.198	-17.323	-17.947

Table 13: Changes in New Zealand sectoral exports (percent)

	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
Agriculture	0.013	0.279	-1.420	0.165	-0.053	1.757	0.002	-0.031	-0.296	-0.488	-0.985	1.203	2.016	-27.179	-28.857
Resources	0.017	0.265	-3.349	0.830	3.085	-2.988	0.001	-0.244	-1.289	-13.076	-1.393	1.609	2.555	-40.839	-41.234
Meat products	0.030	-1.083	6.390	-1.606	-0.110	2.345	0.004	-0.217	0.820	-0.714	-1.581	-2.100	-17.352	-30.493	-31.530
Other food	0.041	-0.121	0.723	0.110	0.048	1.116	0.004	0.164	5.652	3.317	3.354	0.055	1.208	7.115	3.043
Dairy products	0.029	0.306	3.290	-1.615	0.010	3.066	0.003	0.128	1.016	4.550	5.890	-8.411	2.241	148.450	179.803
TCF	0.038	-0.597	1.668	0.584	-0.042	5.957	0.021	0.109	0.221	-2.407	-0.172	0.081	2.314	-41.506	-30.168
Wood and paper	0.027	-0.223	-1.911	0.472	-0.042	1.568	0.004	0.186	-0.399	-0.574	-0.329	1.331	1.975	-17.685	-23.684
Chemicals & metals	0.057	-0.333	1.463	0.418	-0.048	-0.071	0.004	0.432	-0.411	0.115	-0.226	0.900	1.692	-15.024	-23.448
Transport equip.	0.075	-0.990	0.888	0.321	0.002	-1.107	0.005	0.255	-0.407	0.411	0.124	0.670	1.433	-13.061	-20.312
Electronic & mach.	0.112	-0.765	-0.830	0.641	0.265	0.364	0.006	0.428	-0.408	-0.416	-0.358	1.187	1.849	-19.150	-31.572
Manuf. nec	0.053	-0.097	0.588	0.571	0.042	7.619	0.010	0.898	-0.765	1.317	0.934	1.124	2.096	-19.759	-30.104
Services	0.014	0.204	-1.293	0.403	-0.046	-1.382	0.002	-0.105	-0.591	-0.436	-0.768	0.934	1.386	-11.662	-17.378

Table 14: Changes in real unit returns (percent)

	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
Resources	0.019	0.130	-0.441	0.058	0.453	-0.292	0.003	-0.052	-0.323	-1.866	-0.219	0.182	0.421	-3.974	-4.266
Land	0.027	0.041	1.111	-0.503	-0.028	1.554	0.003	-0.023	0.331	0.698	0.687	-1.411	-1.388	17.680	22.577
Skilled labour	0.006	-0.033	0.133	-0.001	0.001	0.223	0.001	0.021	0.052	0.060	0.083	-0.013	-0.054	0.850	0.332
Unskilled labour	0.009	-0.035	0.301	-0.072	-0.003	0.415	0.001	0.020	0.102	0.146	0.170	-0.214	-0.275	2.911	3.230
Capital	0.007	-0.024	0.164	-0.022	0.010	0.281	0.001	0.020	0.072	0.069	0.132	-0.088	-0.055	1.965	1.751

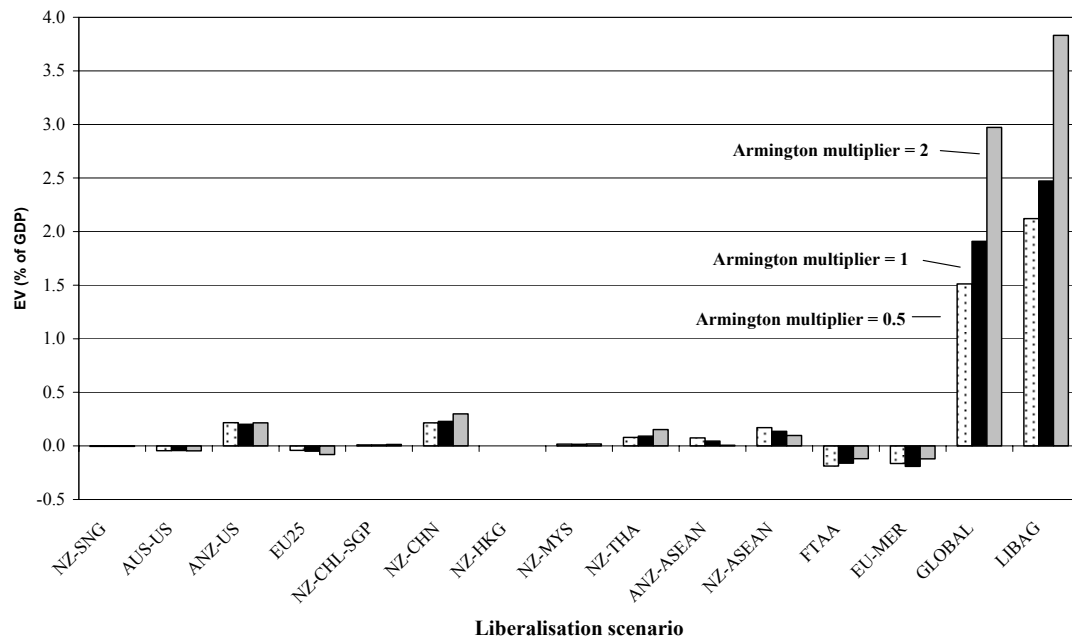
Table 15: Changes in real unit returns when TCF labour is immobile (percent)

	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
Resources	0.018	0.115	-0.411	0.057	0.454	-0.291	0.002	-0.050	-0.313	-1.895	-0.207	0.185	0.420	-4.275	-4.276
Land	0.027	0.031	1.131	-0.501	-0.028	1.536	0.003	-0.021	0.337	0.678	0.695	-1.412	-1.381	17.439	22.600
Skilled labour	0.006	-0.030	0.125	0.000	0.001	0.218	0.001	0.021	0.049	0.064	0.077	-0.005	-0.050	0.807	0.301
Unskilled labour	0.009	-0.034	0.300	-0.077	-0.003	0.432	0.001	0.020	0.104	0.171	0.180	-0.218	-0.296	3.264	3.532
TCF Labour	0.019	-0.125	0.303	0.226	-0.026	-0.655	-0.003	0.016	-0.064	-1.105	-0.430	0.038	0.909	-17.856	-12.966
Capital	0.007	-0.023	0.158	-0.021	0.010	0.275	0.001	0.020	0.070	0.071	0.127	-0.081	-0.051	1.907	1.724

Table 16: Changes in the TCF wage when TCF labour is imperfectly mobile (percent)

Elasticity of Transformation	Liberalisation scenario														
	(1) NZ-SNG	(2) AUS-US	(3) ANZ-US	(4) EU25	(5) NZ-CHL- SGP	(6) NZ-CHN	(7) NZ-HKG	(8) MZ-MYS	(9) NZ-THA	(10) ANZ- ASEAN	(11) NZ- ASEAN	(12) FTAA	(13) EU-MER	(14) GLOBAL	(15) LIBAG
0	0.019	-0.125	0.303	0.226	-0.026	-0.655	-0.003	0.016	-0.064	-1.105	-0.430	0.038	0.909	-17.856	-12.966
1	0.019	-0.125	0.303	0.226	-0.026	-0.655	-0.003	0.016	-0.064	-1.105	-0.430	0.038	0.909	-17.856	-12.966
2	0.014	-0.097	0.545	0.098	0.227	0.028	0.242	0.261	0.250	-0.328	0.061	0.230	0.629	-9.738	-5.928
3	0.013	-0.081	0.679	0.047	0.365	0.346	0.377	0.396	0.412	0.021	0.299	0.317	0.562	-5.973	-3.011
4	0.012	-0.071	0.757	0.019	0.445	0.526	0.455	0.474	0.506	0.215	0.434	0.365	0.533	-3.849	-1.419
5	0.011	-0.065	0.808	0.002	0.497	0.640	0.506	0.525	0.566	0.338	0.520	0.395	0.517	-2.489	-0.416
6	0.011	-0.060	0.844	-0.009	0.534	0.720	0.542	0.561	0.608	0.424	0.580	0.415	0.506	-1.545	0.273
7	0.010	-0.057	0.870	-0.018	0.560	0.778	0.568	0.587	0.639	0.486	0.624	0.430	0.500	-0.851	0.776
8	0.010	-0.054	0.890	-0.024	0.581	0.822	0.588	0.607	0.663	0.533	0.657	0.441	0.495	-0.321	1.159
9	0.010	-0.052	0.906	-0.029	0.597	0.858	0.604	0.623	0.682	0.571	0.684	0.450	0.491	0.099	1.461
∞	0.009	-0.035	0.301	-0.072	-0.003	0.415	0.001	0.020	0.102	0.146	0.170	-0.214	-0.275	2.911	3.230

Figure 1: Changes in New Zealand welfare for alternative Armington elasticity multipliers (equivalent variation, percent)



APPENDIX: Elasticities of substitution in the import specification

Sector	Elasticity of substitution between domestic and imported products	Elasticity of substitution between imports by place of origin
Agriculture	2.417	4.933
Resources	5.265	12.687
Meat products	4.151	8.348
Other food	1.902	3.902
Dairy products	3.650	7.300
TCF	3.776	7.584
Wood and paper	3.101	6.317
Chemicals & metals	3.153	6.389
Transport equip.	3.148	6.426
Electronic & mach.	4.189	8.407
Manuf. nec	3.750	7.500
Services	1.934	3.840

Source: GTAP 6 Database.