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**A COMPUTABLE GENERAL EQUILIBRIUM ANALYSIS OF THE
EXPANSION OF THE CLOSER ECONOMIC RELATIONS
PREFERENTIAL TRADING AGREEMENT: ECONOMIC
IMPLICATIONS FOR NEW ZEALAND**

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ABSTRACT

In recent years, many nations have shifted their trade policy focus away from multilateral efforts to reduce trade barriers, and have instead moved towards regional preferential trading arrangements. New Zealand is one such nation. As well as pursuing trade liberalisation on a global basis via the World Trade Organisation and its predecessor the General Agreement on Tariffs and Trade, New Zealand entered a bilateral arrangement with Australia – the Closer Economic Relations (CER) trade agreement – and has recently looked to expand this agreement. Singapore, Chile and the United States have all been suggested as potential members of an expanded CER. This study provides a quantitative economic analysis of the expansion of the CER, focusing on the implications for New Zealand.

The GTAP computable general equilibrium model, using the GTAP version 4 database, is employed. After aggregating the database to seventeen sectors and fourteen regions, policy shocks representing the removal of tariffs between the potential members of the expanded CER preferential trading agreement are carried out. Four possible scenarios of potential members of the preferential trading arrangement are examined. Two liberalisation strategies are considered. First, tariffs are completely removed on all sectors except for six agricultural sectors. Second, tariffs are removed in all sectors, and export subsidies in the agricultural sectors are also eliminated.

The results show that an expanded CER agreement would increase global welfare by up to US\$432 million. These welfare gains accrue mainly to the United States and Singapore. New Zealand, Australia, and Chile all suffer non-trivial welfare losses. New Zealand's loss is attributable largely to a deterioration in its terms of trade, caused by falling export prices, particularly in the agricultural sectors. New Zealand also suffers decreased economic growth and a worsening trade balance. This clearly indicates that New Zealand should be careful when considering its future trade policy direction, and that it may need to re-evaluate its attitude towards regional trade agreements.

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LIST OF ABBREVIATIONS

GATT	General Agreement on Tariffs and Trade
WTO	World Trade Organisation
CER	Australia-New Zealand Closer Economic Relations Trade Agreement
PTA	Preferential Trading Arrangement
CEP	Closer Economic Partnership
P5	Pacific Five trade arrangement
CGE	Computable General Equilibrium model
GTAP	Global Trade Analysis Project
NAFTA	North American Free Trade Agreement
NZIER	New Zealand Institute of Economic Research
OECD	Organisation for Economic Co-operation and Development
NZAFTA	New Zealand-Australia Free Trade Agreement
EAL	Exclusive Australian Licence
TTTA	Trans-Tasman Travel Arrangement
APEC	Asia Pacific Economic Co-operation
NAPES	National Asia Pacific Economic and Scientific database
CUSFTA	Canada-United States Free Trade Agreement
EU	European Union
FTAA	Free Trade Area of the Americas
GDP	Gross Domestic Product
IMF	International Monetary Fund
ECA	Economic Complementation Agreement
MNC	Multi-national Corporations
ASEAN	Association of Southeast Asian Nations
AFTA	ASEAN Free Trade Area
SREZ	Sub-Regional Economic Zone
NIC	Newly Industrialising Country
FTA	Free Trade Agreement
CU	Customs Union
CET	Common External Tariff

PAFTA	Pacific Free Trade Area
MFN	Most-Favoured Nation
CRTA	Committee on Regional Trade Agreements
RTA	Regional Trade Agreement
NTP	Natural Trading Partner
EV	Equivalent Variation
ROW	Rest of the World
GET	General Equilibrium Trade
CEEC	Central and Eastern European Countries
CAP	Common Agricultural Policy
NTB	Non Tariff Barriers
GE	General Equilibrium
<i>f.o.b</i>	Free on Board
<i>c.i.f</i>	Cost, Insurance and Freight
HS	Harmonised System
UNCTAD	United Nations Conference on Trade and Development
TWT	Trade-Weighted Tariff
TRQ	Tariff Rate Quota
FAOSTAT	Food and Agriculture Organization of the United Nations database
NZTDB	New Zealand Trade Development Board

CHAPTER 1

INTRODUCTION

1.1 Introduction

In recent years, many nations have pursued the regional approach to trade. Dissatisfied with multilateral attempts to liberalise trade via the forums of the General Agreement on Tariffs and Trade (GATT) and its successor the World Trade Organisation (WTO), these nations have explored the use of regional or preferential trade agreements. Such trade arrangements range from informal discussions between governments to the deepest economic integration possible - complete economic union. As a small, open economy, New Zealand is highly dependent on international trade, both in terms of using imported intermediate goods, and finding markets for its exports. In 1983, New Zealand and Australia entered into the Australia-New Zealand Closer Economic Relations Trade Agreement (CER), a preferential trading arrangement (PTA), which initially aimed to create completely free trade between the two nations over a period of twelve years. After a series of reviews, this timetable was accelerated, and the member countries now enjoy duty-free access to each other's economy in virtually all goods and services trade.

Over the last two years, the New Zealand government has sought to expand the CER agreement beyond Australia, and has conducted ministerial level meetings with Chile, Singapore and the United States. In May 1999, the New Zealand Prime Minister at that time, Jenny Shipley, suggested that "there will be a genuine exploration of a free trade agreement. There is a very significant willingness to talk about frameworks and to start discussing how many countries" (The Dominion, 15th May 1999, p. 2). More recent free trade discussions have centred on the possibilities of creating a bilateral free trade agreement between New Zealand and Singapore – named the Closer Economic Partnership (CEP). Continuing the negotiations which were started by Jenny Shipley, the "[current] Prime Minister Helen Clark is pushing to conclude the CEP with Singapore and would like to extend it to Chile, the US and Australia" (Sunday Star

Times, 13th August 2000, p. C2). The CEP discussions have also rekindled interest in the formation of a 'Pacific Five' free trade area, as noted by current Finance Minister Dr Michael Cullen: "[the] CEP also held implications for the mooted P5 trade agreement, linking New Zealand, Australia, Singapore, Chile and the United States" (Manawatu Evening Standard, 9th September 2000, p. 5).

This research aims to provide an empirical angle to the proposals to expand membership of the CER agreement, with a focus on the economic implications of such a policy change for New Zealand. It is hoped that the results will be useful to policy makers in the current CER member governments, and to those in nations considering joining New Zealand and Australia in a trade agreement. Using a Computable General Equilibrium (CGE) model, the effects of reducing barriers to trade between potential members of such an agreement can be analysed. This research will use the Global Trade Analysis Project (GTAP) computer program to model the consequences of expanding the CER agreement to include:

- (i) Singapore;
- (ii) Chile and Singapore;
- (iii) Chile, Singapore and the United States

A further experiment will be conducted to analyse the likely outcomes of New Zealand and Singapore signing the bilateral CEP agreement.

The results of the GTAP simulations will indicate the static welfare effects of creating a preferential trade agreement in each of these possibilities - that is, whether or not the expansion of the CER agreement will be beneficial to those countries involved. The results will also provide indications of the macroeconomic effects of creating these preferential trading arrangements, and will show the sectors which are likely to benefit from such moves.

1.2 Objectives of the Research

This research aims to provide an empirical analysis of the recent proposals to expand the CER agreement to include one or more of Chile, Singapore and the United States. It reviews the theoretical underpinnings of preferential trading arrangements, in order to explain why nations desire barrier-free transactions with their trading partners. It examines the attitudes of Singapore, Chile and the United States towards regionalism, in order to determine whether they would be likely to participate in an expanded CER agreement. Bilateral trade statistics are used to indicate the relative strengths of each nation in terms of its exports and imports, showing where gains could be made from a preferential trading agreement. A survey of previous CGE models involving New Zealand, Australia, Singapore, Chile and the United States is provided, in order to demonstrate that this research fills a gap in the existing literature. It is hoped that the results of this research will be of value to policy makers in the countries involved in the proposals to expand the CER agreement, and in particular to those in New Zealand.

1.3 Methodology

The tool used to determine the welfare effects of expanding the CER agreement is a Computable General Equilibrium (CGE) model. CGE models provide a framework for linking many economic variables and for observing how a change in one of these variables will affect an entire economic system. These models recognise that “distortions in an economic system will generally have repercussions far beyond the sector in which these distortions occur, and where the distortions are wide-ranging, general equilibrium is perhaps the only method which is capable of capturing the relevant feedback and flow-through effects” (Scollay and Gilbert, 2000, p. 177). This is particularly important in international trade analysis, wherein changes in one market in one region can have significant effects on many other markets in other regions. Traditional partial equilibrium analysis will not capture fully the effects of a shock to a market other than in that market alone.

The specific CGE model used is the Global Trade Analysis Project (GTAP). GTAP is a relatively standard multi-commodity, multi-region trade model which can be shocked

from an initial baseline situation to show the effects of a policy change. The 45 regions and 50 commodity groupings in the GTAP version 4 database can be aggregated for ease of calculation and to identify desired markets, and the model is solved using the GEMPACK software (Harrison and Pearson, 1996). The shocks involved in this research are the complete removal of tariffs and agricultural export subsidies that are required in the formation of a preferential trading arrangement.

1.4 Organisation of this Research

The research presented herein is organised as follows. After these initial introductory comments in Chapter 1, Chapter 2 discusses the history of the CER, and provides a brief history of the Chilean, Singaporean, and United States economies in terms of their attitudes towards regionalism. Chapter 3 provides an overview of the initial bilateral trade levels between New Zealand, Australia, Singapore, Chile and the United States. Chapter 4 provides the theory underlying the formation of preferential trading arrangements. It includes various techniques that have been used to evaluate the possible welfare gains of proposed trade arrangements, an overview of the 'regionalism versus multilateralism' debate, and the role of the GATT/WTO in such preferential trading arrangements. Chapter 5 discusses the results of past CGE analyses in the area of the creation and expansion of PTAs, with a focus on studies of APEC liberalisation. Chapter 6 explains the methodology used in this research, focusing on the role of CGE models in trade analysis, the GTAP model and database, and the design of the experiments employed in this research. The strengths and limitations of CGE models and GTAP are also discussed. Chapter 7 provides the results of the GTAP experiments, and a discussion of these results, with a focus on the implications for New Zealand. Finally, Chapter 8 concludes the results, examines the policy implications of these results, discusses the limitations of the study, and suggests possibilities for further research.

CHAPTER 2

HISTORICAL PERSPECTIVES ON PREFERENTIAL TRADING ARRANGEMENTS AND CURRENT ATTITUDES TOWARDS REGIONALISM

2.1 Introduction

The aim of this chapter is to provide a historical overview of the economies and specific preferential trading arrangements that are relevant to this thesis, and to examine these nations' current attitudes towards regional trade agreements. The chapter is organised as follows: Section 2.2 examines the history, results and future prospects of the Closer Economic Relations (CER) trade agreement between New Zealand and Australia. Section 2.3 provides a brief overview of the United States economy and a review of the North American Free Trade Agreement (NAFTA) agreement between the United States, Mexico and Canada. Sections 2.4 and 2.5 look at the economies of Chile and Singapore respectively, focusing on their recent tendencies towards regionalism. Section 2.6 examines the recent proposals to expand the CER agreement to include one or more of the United States, Chile or Singapore.

2.2 The Australia-New Zealand Closer Economic Relations Trade Agreement

There can be little doubt that New Zealand's Closer Economic Relations (CER) Trade Agreement with Australia has had a major impact on economic and political relations between the two countries. Much media and academic attention has been paid to the path that the agreement has taken, and the results that it has obtained. This section provides a brief overview of the history, main features, and economic results of the CER.

2.2.1 Trans-Tasman trade agreements prior to the CER

A series of trans-Tasman trade arrangements existed prior to the signing of the CER agreement. In 1922, the first formal agreement was signed by New Zealand and Australia, which reduced tariff rates on 129 traded goods to a level equivalent to that of the preferential British rate. This tariff reduction to British levels was extended in 1933 to include *all* goods traded between New Zealand and Australia (New Zealand Institute of Economic Research [NZIER], 1985, p.17). The effects of the agreement on trans-Tasman trade are unclear. During the Second World War, the Australian and New Zealand Agreement was formulated and signed, although this may have been “no more than an act of wartime solidarity, since the spirit of the agreement failed to bring about any noticeable change in [post-war] trans-Tasman trade policy” (NZIER, 1985, p.17). Undoubtedly, one of the main drivers behind the push for freer trans-Tasman trade was the large increase in international trade that accompanied the substantial growth of the OECD countries in the 1950s and 1960s, and in 1960 the Australia/New Zealand Joint Consultative Committee on Trade was established in order to examine bilateral trade expansion possibilities (NZIER, 1985, p.17). In 1965, the New Zealand-Australia Free Trade Agreement (henceforth NZAFTA¹) was signed in Wellington. The NZAFTA was a pre-cursor to the CER, and “was a trans-Tasman agreement whereby tariffs on specific items were to be reduced, with as little disruption to either country’s domestic industry as possible” (NZIER, 1985, p.18). Again, it is unclear how much either country benefited directly from NZAFTA, and little progress was made in expanding the number of goods included in the tariff-free group. However, the seeds of a trans-Tasman free trade area had been sown, and although NZAFTA faded in the late 1970s, it would not be long until a new agreement was put into place².

2.2.2 The Australia-New Zealand Closer Economic Relations Trade Agreement

After a series of ministerial meetings, the Australia-New Zealand Closer Economic Relations Trade Agreement (ANZCERTA, or more commonly, CER) was signed by

¹ This agreement is often referred to as NAFTA. To avoid any confusion with the North American Free Trade Agreement, it is renamed here as NZAFTA.

² NZAFTA officially expired on 30th November 1981, but the broad concepts for the negotiation of a new free trade arrangement between Australia and New Zealand were officially discussed as early as 19th March 1978, after a meeting between the Hon. Brian Talboys and the Hon. Malcolm Fraser (New Zealand Ministry of External Relations and Trade, 1989, p. 5).

the two members' prime ministers on the 14th December 1982. The agreement came into force on 1st January 1983, and as stated in Article 1, its main objectives were;

- (i) to strengthen the broader relationship between Australia and New Zealand;
- (ii) to develop closer economic relations between the member states through a mutually beneficial expansion of free trade between Australia and New Zealand;
- (iii) to eliminate barriers to trade between Australia and New Zealand under an agreed timetable and with a minimum of disruption; and
- (iv) to develop trade between New Zealand and Australia under conditions of fair competition.

(Source: Australian Department of Foreign Affairs and Trade, 2000, available online at www.dfat.gov.au/geo/spacific/nz/anz_cer/anzcertal.pdf)

More specifically, the aim was to eliminate completely all trans-Tasman tariffs over a five-year period from 1st January 1983, and to remove quantitative restrictions by 1995. Importantly, the reduction of these barriers automatically included *all* traded items unless specifically stated otherwise³. *Ad valorem* tariffs under 30% were to be reduced by 5% per annum. The annual tariff reduction for those over 30% was calculated by dividing the initial tariff by six, and reducing by this amount each year. Thus all tariffs were eliminated over a five-year period (NZIER, 1985, pp. 19-20). The reduction in quantitative restrictions was accomplished by the issuing of Exclusive Australian Licences (EALs) to New Zealand manufacturers by the New Zealand Government, which allowed these New Zealand firms to nominate an exclusive Australian supplier. Other key features of the CER agreement were:

- the reduction in export incentives, excluding some agricultural and industrial support measures;
- specified rules of origin to determine which goods were entitled to qualify for tariff-free trade;
- the proposed harmonisation of standards, labeling, technical requirements and testing procedures which may have acted as barriers to trade;

³ For a list of those items excluded from the initial measures, see NZIER (1985, p. 23, Table 1.1). These goods included those thought to be especially vulnerable to competition, and those which enjoyed governmental industry support.

- the abolishment of preferential governmental purchasing. That is, each government were required to treat tenders from the partner country as if they were from their own;
- antidumping measures were allowed when goods were dumped in the partner's market at prices lower than their nominal value.

Source: (NZIER, 1985, pp. 20-23).

The measures in the 1983 CER agreement had a fairly impressive effect on trans-Tasman trade figures. The value of Australian imports from New Zealand increased by 114% over the 1983-88 period⁴, and New Zealand's share of Australia's total imports rose from 3.54% in 1983 to 4.41% in 1988. Similarly, New Zealand's imports from Australia increased by 54%, and Australia's share of New Zealand's total imports rose from 19.29% to 21.60% over the period (Lloyd, 1991, p. 14). However, there were still areas of concern from both member states, and these unresolved issues led to the 1988 Ministerial Review of the Agreement.

2.2.3 The 1988 Review of the CER agreement

As noted above, the original CER agreement achieved considerable liberalisation of trans-Tasman trade, and went a long way towards creating a complete free trade area between Australia and New Zealand. Encouraged by the visible successes of the 1983 agreement, and further prompted by perceived deficiencies in the agreement⁵, ministers from both members reviewed the CER. The result was a package of measures which aimed to accelerate, deepen and widen trans-Tasman trade, in order to remove virtually all the impediments to achieving a single market between the partners (New Zealand Ministry of External Relations and Trade, 1989, p. 7). This package included bringing forward the date for the removal of all tariffs and quantitative restrictions from 30th June 1995 to the 1st July 1990, including those sectors which

⁴ These are nominal figures, so it must be recognised that the higher values were partially due to inflation. However, trade in real terms also rose steadily over the five year period (Lloyd, 1991, p. 13)

⁵ The New Zealand Minister of Trade and Industry at the time, Hon David Caygill, mentioned five problems (Caygill, 1988, p. 1). These were the limited disciplines on export subsidies and no disciplines on domestic subsidies; unequal opportunities for New Zealand in competing for State government purchasing tenders in Australia; the lack of attention paid to investment in the agreement; the considerable protection still applied to certain agricultural sectors; and the differences in standards between the two partners.

were given special compensation in 1983, such as dairy products, sugar, etc. The second major goal of the 1988 Review was to abolish all anti-dumping procedures on trans-Tasman goods once complete free trade was achieved in July 1990. Thus “goods of Australia and New Zealand origin exported across the Tasman [would] be subject only to those disciplines imposed by Australia and New Zealand competition law” (Caygill, 1988, p. 2). The Protocol on Trade in Services aimed to further incorporate services into the framework of the CER, by ensuring that there would be no further government intervention in the services area, and by committing both members to a program of liberalisation in services⁶. Other areas that were addressed and signed by the Review covered:

- the harmonisation of business law, regulatory practices, customs policies, and quarantine administrative procedures;
- increased efforts to eliminate technical barriers to trade;
- equal opportunity for New Zealand in the government purchasing processes of Australian states;
- the removal of export bounties and domestic subsidies which have adverse effects on competition between the two members;
- the removal of export prohibitions for protective reasons.
- the commitment to discuss the possibilities for an agreement on investment to be reviewed in 1990.

(Source: New Zealand Ministry of External Relations and Trade, 1989, p. 7).

It is widely acknowledged that the 1988 Review of the CER was a major step forward in creating a complete free trade area between Australia and New Zealand. Holmes (1996, p. 13) suggests that the Review was the “high point of New Zealand/Australia trade and economic co-operation”, and Lloyd (1991, p. 13) suggests that the review “was another notable and praiseworthy achievement in bilateral trading relations”.

Since the 1988 Review, there have been a number of other CER extensions and further elements have accelerated the economic integration process between Australia and

⁶ Exceptions were permitted in parts of in certain services areas, mainly those subject to government regulation or monopoly, as long as they were specified by 1st January 1989. These included broadcasting, telecommunications, postal services, coastal shipping and international air carriers. These were to be reviewed in 1990.

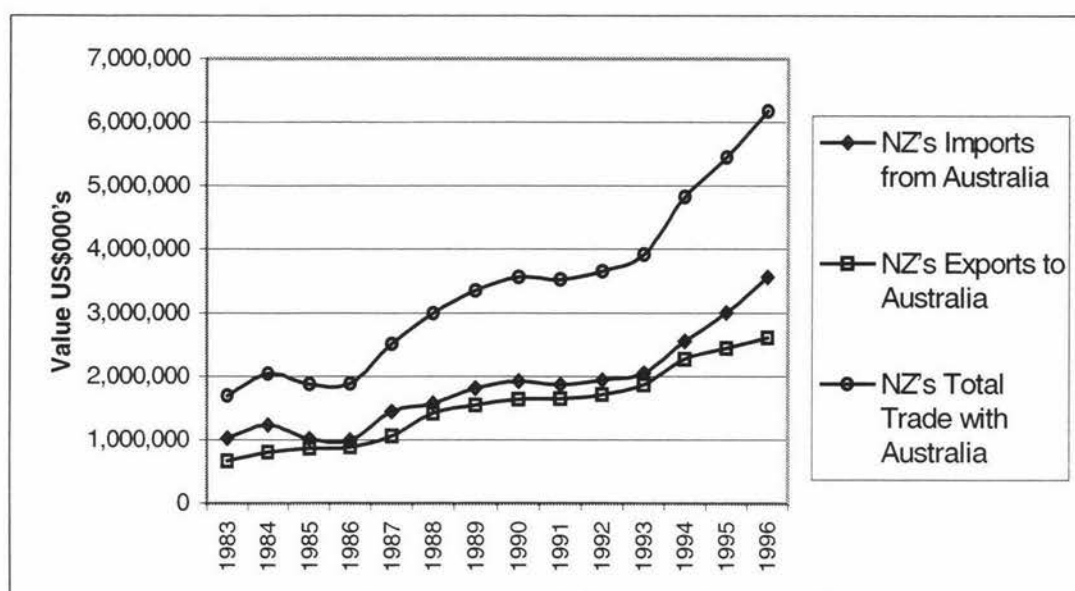
New Zealand. The long-standing Trans-Tasman Travel Arrangement (TTTA) allows free access by citizens of one member to travel to, work in and reside in the partner country. The reciprocal Health Agreement allows Australians and New Zealanders visiting each other's country to receive temporary medical care, providing it is 'immediately necessary'. In 1990, an Agreement on Standards, Accreditation and Quality was signed by both governments in order to reduce the impact of technical barriers to trade. In 1994, the CER members signed a reciprocal Social Security Agreement to ensure that the costs of providing income support for those who migrate across the Tasman are fairly distributed between New Zealand and Australia. The Australia-New Zealand Food Authority has been developed in order to "make it easier for food producers to trade their products across the Tasman as it will establish a harmonised set of standards for both countries [by 2000/2001]" (New Zealand Ministry of Foreign Affairs and Trade, 2000, p. 1). Another more recent 'third generation' CER development is the introduction of the Trans-Tasman Mutual Recognition Arrangement on 1st May 1998. Under this legislation, any goods that can be sold in one market are, in principle, able to be sold in the other country's market. Similarly, people registered to work in one country are able to practice the same occupation in the other (excluding medical practitioners).

These developments since the initial CER signing in 1983 have created one of the most comprehensive trade agreements in world trade. It must also be noted that there has been a significant freeing up of trade *vis-à-vis* non-member countries over the period since the CER was signed. This confirms the desire of both governments to ensure that the CER is an outward-looking agreement - thus both nations practice "open regionalism", as promoted by the Asia Pacific Economic Cooperation (APEC). Having discussed the development of the CER, it is useful to examine some trade data to show the effects of the agreement on the economies of Australia and New Zealand.

2.2.4 The effects of the CER on the Australian and New Zealand economies

Some simple trade statistics and graphs illustrate what a profound effect the CER agreement has had on trans-Tasman trade⁷. Using the NAPES database⁸, the growth of New Zealand's exports, imports and total trade can be seen in Figure 2.1 below.

Figure 2.1 New Zealand-Australia Exports, Imports and Total Trade: 1983-1996



Source: NAPES Database

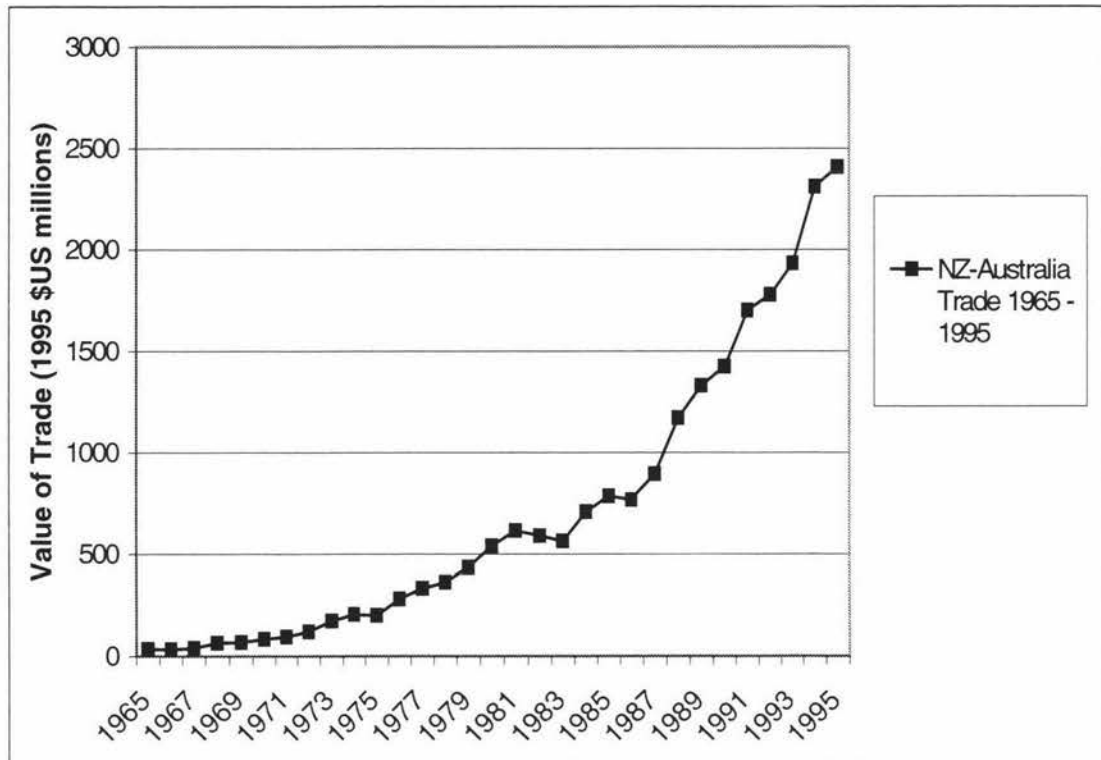
This graph clearly shows the initial growth spurt of New Zealand exports to Australia after the agreement was signed in 1983. A further rapid increase in exports occurred between 1988 and 1990, after the CER Review recommendations were implemented. Over the 1983-1996 period, overall export growth was 288%. Following a very similar trend are New Zealand's imports from Australia. Apart from a two-year period (1984-1986) where they dropped, imports have risen steadily since the CER was signed, showing an overall increase of 248%. Total trade between New Zealand and Australia increased by 264% over the 13 year period, and encouragingly, growth has been particularly strong in recent years (1993 onwards). It must be noted that the NAPES

⁷ The graphs and statistics are presented solely for New Zealand. Naturally, the Australian graphs and statistics would be virtually identical.

⁸ Further information on this database is available online at <http://napes.anu.edu.au>.

database from which the above data is sourced deals with nominal values only, so the effects of inflation must be taken into account. However, as shown in Figure 2.2, the growth in total trans-Tasman trade due to the CER is also clearly visible when using real (inflation – adjusted) values.

Figure 2.2 Trans-Tasman Trade in Real Terms: 1965 - 1995



Source: GTAP version 4 Database

The above graph shows that in real terms, trans-Tasman trade has increased drastically over the period since the CER agreement was implemented. In constant 1995 US\$ terms, trade between the CER partners has increased by 328.3% from 1983 to 1995. It also indicates that the 1988 Review had a significant effect on trade, as shown by the steepening of the curve at that date. This simple graphical analysis suggests that the CER agreement, and the more recent amendments to it, continues to promote trade expansion between the members.

2.3 The United States and The North American Free Trade Agreement

The recent trend towards regionalism that has been observed in the last two decades can undoubtedly be partly attributed to the change in attitude of the United States towards international trade. Having previously been a staunch promoter of multilateral liberalisation, “its decision now to travel the regional route... tilts the balance of forces at the margin away from multilateralism to regionalism” (Bhagwati, 1993, p. 29). The centrepiece of the United States’ new trading arrangements is the North American Free Trade Agreement (NAFTA) between the United States, Canada and Mexico. This section provides an overview of the background to the agreement, focusing on the United States’ attitude towards regionalism.

2.3.1 The United States and preferential trading arrangements

So much has been written about the United States’ economy that it is unnecessary to look at it in any great depth in this thesis. It is one of the richest countries in the world in per-capita income terms, and its economy’s strength lies in its size and diversity. Due to these factors, the United States is well insulated from global economic shocks, and it is a powerful negotiator in trade talks on the world stage. Indeed, the United States has been prominent for many years in promoting trade liberalisation. Perhaps the main reason why the United States has looked to expand its export markets via liberalisation is that its domestic economy has become saturated in terms of supplying consumers. In order to generate revenue, American firms need to penetrate markets which are not yet mature and saturated (Abbott, 1995, p. 15). These export markets are best accessed via trade liberalisation

Despite being a key member of the WTO and its predecessor GATT, the United States in recent times has moved away from multilateral trade negotiations, and has tended to seek bilateral solutions to trade issues. As suggested by Clement *et al* (1999, pp. 150-151), there are several reasons for this change in policy direction. First, as membership of the WTO increased, trade issues brought before it took ever longer to resolve. Seeking a quicker response in order to satisfy its industries, the United States turned to bilateral negotiations. Second, the United States is immensely powerful at the bargaining table as it is critically important to many world economies, which suggests

that it will prevail in bilateral negotiations more easily than if a multilateral approach was taken. Third, by acting bilaterally to resolve trade problems, the United States can ‘experiment’ with new solutions that are not used by the WTO, and these solutions may ultimately be brought to the WTO if they prove to be successful. Bilateral negotiations can also cover areas of trade that the WTO tends to avoid. Finally, bilateral approaches are a powerful force in shaping multilateral talks. For example, as the Uruguay Round of GATT (1986-1994) was struggling to make any headway, the United States had implemented a free trade agreement with Canada (in 1989), and subsequently expanded it to include Mexico (in 1994). Upon seeing these three nations ‘going it alone’, there was an “added incentive for other nations to struggle to complete GATT talks” (Clement *et al*, 1999, p. 151).

Prior to NAFTA, the United States had already taken some important steps towards creating freer trade with its major trading partners. Mexico and the United States agreed to three bilateral agreements in the 1980s in order to tighten economic relations between the two nations⁹ (Holmes and Falconer, 1992, p. 6). The United States also signed a free trade agreement with Israel, but the most significant policy initiative in North American trade prior to NAFTA was the 1987 signing and January 1989 implementation of the Canada-United States Free Trade Agreement (CUSFTA).

2.3.2 The Canada-United States Free Trade Agreement

The CUSFTA participants had many other objectives other than the removal of tariffs¹⁰, although the Canadians argued that the removal of any remaining barriers would improve Canada’s competitiveness via the gaining of scale economies. The United States sought free access to Canada’s investment markets, and desired entry into Canada’s services sector in areas in which it was particularly competitive (Lawrence, 1996, p. 63). The Canadians wanted protection from United States dumping and countervailing duties trade policies, and the United States wanted to see

⁹ These were the Understanding on Subsidies and Countervailing Measures (1985), the Framework Agreement on Trade and Investment Relations (1987), and a refined Understanding on Trade and Investment (1989). See Holmes and Falconer (1992, pp. 5-6) for further details.

¹⁰ Indeed, neither Canada nor the United States had particularly high tariffs prior to the CUSFTA. Lawrence (1996, pp. 63-4) notes that the average tariff rate on Canadian exports to the United States was just 1%, and that nearly 80% of Canadian exports entered the United States duty-free.

the abolition of Canadian industry subsidies (Lawrence, 1996, p. 63). Unlike more recent developments in the European Union (EU), the CUSFTA was not proposed as a stepping stone towards a common market or political union. Indeed, Lawrence (1996, p. 63) suggests that CUSFTA “provides a vivid example of the sometimes tortuous trade-offs that the partners made between achieving their goals and simultaneously retaining their sovereignty”. The agreement was certainly not as deep as those seen in the CER or EU. The CUSFTA eliminated tariffs and non-tariff barriers between the United States and Canada, but there were significant sectoral exceptions. The United States was granted preferential (rather than completely free) access to the Canadian investment market, and Canada was able to challenge more effectively United States trade rulings, although they were not exempt from such legislation (Lawrence, 1996, p. 64).

Whilst there were undoubtedly achievements and benefits from the CUSFTA¹¹, critics such as Waverman (1991, cited in Lawrence, 1996, p. 65) suggested that CUSFTA provided only partial liberalisation in goods trade, contrary to GATT Article XXIV¹², and that several important investment and services sectors were excluded. So whilst CUSFTA may not have been a huge success, it certainly prompted academic and policy debate regarding multilateral and regional liberalisation, and “laid the foundation for the trilateral NAFTA” (Lawrence, 1996, p. 66).

2.3.3 The specifics of the NAFTA arrangement

On the 11th June 1990, the United States President George Bush and President Carlos Salinas of Mexico initiated the discussions that would ultimately lead to the implementation of NAFTA. As discussed above, the United States had already entered a bilateral free trade agreement with Canada, and had increased economic co-operation with Mexico. Therefore “NAFTA was not the cause, but rather the consequence of a de facto deepening of long-standing border ties” between the United States and Canada and Mexico (Grugel, 1996, p. 141).

¹¹ Lipsey and Smith (1989) enthusiastically supported the CUSFTA, suggesting that Canada achieved more via the agreement than they could have done under multilateral GATT-type negotiations. They mention the benefits of increased access to United States markets, harmonisation of standards, changes in dispute settlement procedures, and the inclusion of most commercial services.

¹² See section 4.2.3 for further details on GATT Article XXIV.

As part of its broader economic reforms, “Mexico was reducing external restrictions along with its internal liberalization and privatization” (Lawrence, 1996, p. 67). Entering into a free trade agreement with the United States and Canada was a step towards making their reforms more permanent. Canada’s objectives in the negotiations were to safeguard and improve the effects of CUSFTA, and to open up new export markets in Mexico (Holmes and Falconer, 1992, pp. 6-7). The United States stood to gain from free trade with Mexico due to the fact that a stable and expanding Mexican economy would be important in terms of United States development on its Southern border (Holmes and Falconer, 1992, p. 7). The United States would be able to use relatively cheap Mexican labour in production, and in turn would be able to export capital-intensive goods to Mexico – a potential market of 90 million people. Thus each of the three NAFTA members had distinct gains to be made from the signing of a tripartite free trade agreement.

NAFTA was implemented on 1st January 1994, and was very different to the preferential trade agreements that had gone before it, in that it implemented virtually free trade between two highly developed countries (United States, Canada) *and* a developing country (Mexico). Over a proposed fifteen-year period, NAFTA aimed to remove all border barriers to trade, excluding a few key sectors. There was no special dispensation for Mexico as a developing nation. Some of the key objectives of NAFTA (the full text of which is available online at <http://www.dfait-maeci.gc.ca/nafta-alena/agree-e.asp>) as outlined in Part One of the agreement were to;

- eliminate barriers to trade¹³ in, and facilitate the cross border movement of, goods and services;
- promote conditions of fair competition in the free trade area;
- increase substantially investment opportunities in their territories;
- provide protection of intellectual property rights;
- create effective measures to resolute disputes; and
- establish a framework for further trilateral, regional and multilateral co-operation, whilst abiding by GATT rules.

Much like the CER agreement, any exceptions from the agreement were listed

¹³ NAFTA went beyond eliminating just tariffs and quotas, by also reducing numerous non-tariff barriers such as import licences and performance requirements.

explicitly. This 'negative list' approach implies that all new goods and services areas were to be subject to complete free trade. In liberalising trade in foreign investment, services and intellectual property rights, NAFTA went beyond the recommendations of the Uruguay Round of GATT. Lawrence thus classifies NAFTA as a genuine GATT-plus agreement. In other areas though, NAFTA remains economically 'shallow' relative to the EU or the CER – there are no aims to harmonise competition policy or to eliminate antidumping duties and subsidies (Lawrence, 1996, p. 72).

2.3.4 The future of NAFTA: accession possibilities

In December 1994, United States President Bill Clinton helped launch an agreement signed by 34 nations in the Americas to discuss the formation of a Free Trade Area of the Americas (FTAA), to be concluded by 2005. Furthermore, the three NAFTA members had already announced their commitment to the Bogor declaration for free trade in the Asia-Pacific (APEC) region by 2020. These two initiatives, in addition to further bilateral agreements between Mexico and other Latin American economies¹⁴, and other nearby preferential trade arrangements such as Mercosur¹⁵, indicate that NAFTA is unlikely to remain a trilateral arrangement for too much longer. Chile, in particular, has been pushing vigorously for accession to NAFTA since December 1994. The accession clause in NAFTA, however, is somewhat vague, with any nation eligible to join as long as they can negotiate terms that are acceptable for the three members (Lawrence, 1996, p. 76). Critics such as Panagariya (1996, p. 513) suggest that the "static welfare effects of the proposed FTAA will very likely be negative" on Latin American countries, but such opinions seem to be doing little to stem the enthusiasm of NAFTA's trade partners to partake in an extension of the agreement.

2.3.5 The results of NAFTA on the United States

NAFTA created a huge market of 380 million people producing an annual combined output of goods and services valued at nearly US\$8 trillion (United States Trade Representative, 1996, p. 1). The reduction of trade barriers immediately caused a large

¹⁴ These include Chile, Caricom, Colombia, Venezuela, Costa Rica and Bolivia.

¹⁵ Mercosur is a customs union which originally involved Argentina, Brazil, Paraguay and Uruguay. Chile and Bolivia joined at a later date, and it is expected that Peru and Venezuela will be the next applicants (Haar and Dandapani, 1999, p. 158).

expansion in trade between the member countries. In 1995, United States exports increased by 14% to Canada and increased by over 22% to Mexico (United States Trade Representative, 1996, p. 1). This pattern has continued over the five years since the agreement was signed: data obtained from the Embassy of Mexico in Canada (2000) suggests that intra-regional exports have grown at an annual rate of 11%, equivalent to a 71% increase between 1993 and 1998. This represents an increase of US\$210 billion from the 1993 figures. Intra-regional flows as a share of total trade have increased from 26% in 1993 to 31% at the end of 1998. Other impacts of NAFTA on the United States to the end of 1998 are as follows:

- The post-NAFTA period has seen an increase of US\$13 billion in GDP and an additional US\$5 billion in business investment in the United States.
- United States' exports to its NAFTA partners are the basis for more than two million jobs - an increase of up to 160,000 jobs since 1993.
- By late 1998, United States-Mexico bilateral trade had surpassed that of United States-Japan trade, making Mexico the United States' second largest trading partner.
- United States' imports from Mexico rose by 140% over the 1993-1998 period.
- United States' exports to Mexico have increased by 91% over the 1993-1998 period.
- Bilateral trade with Canada increased by 47% from 1993-1998.
- United States exports to Canada and Mexico in 1998 represented 35% of total exports, compared to 31% in 1993.
- Foreign direct investment by the United States in Canada has increased by 70% (1993-1997) and by 55% in Mexico (1993-1996).

Source: (Embassy of Mexico in Canada, 2000)

Further details for Canada and Mexico are also available from the above source. From these figures, the NAFTA seems to have had a very positive effect on the three countries involved.

2.4 The Chilean Economy

Over the past three decades, Chile has witnessed various periods of political and economic upheaval. The rapid and often traumatic change from being a heavily regulated, state-controlled economy to the liberalised, open economy that is witnessed now has been the subject of global attention. This section aims to highlight the various changes that have occurred in Chile since the 1950s and 1960s, and to illustrate why some commentators suggest that Chile is “an ideal model for other developing countries or nations in the process of modernizing their economies” (Valdés, 1995, p. 1). Chile’s more recent bilateral trading arrangements are also examined, along with their proposal to access NAFTA.

2.4.1 Postwar changes to the Chilean economy

The current state of the Chilean economy is virtually unrecognisable from its postwar status. In the 1950s and 1960s, Chile isolated itself economically from the rest of the world. Average tariff levels were over 100%, extensive non-tariff barriers were applied to both imports and exports and there were many restrictions on international capital mobility. Economic crises were frequent occurrences, growth was relatively low, inflation was rampant, the distribution of income was very unequal, and industrial and agricultural production was characterised by a high level of monopoly (Bosworth, Dornbusch and Lában, 1994, pp. 4-5). In 1970, the election of a Marxist president, Salvador Allende, led to tremendous social, political, and economic unrest. The Allende government set about nationalising banking, industry and mining, and taking over the majority of Chile’s international trade. The imposition of price freezes in the public sector, and tight price controls in the private sector, along with the approval of large nominal wage increases, led to sharp rises in real wages. On top of this, 1971 saw a rapid expansion of the money supply, resulting in the inevitable outcome: galloping inflation which reached an annual rate of 500% by 1973. Throw in the emergence of black markets due to the price ceilings creating excess demand, huge losses by nationalised industries, a public sector deficit of 25% of GDP and the depletion of its international reserves (Bosworth *et al*, 1994, p. 5), and it is easy to see that Chile was an economic mess.

In 1973, there was a military coup to oust the government, led by General Pinochet. The Pinochet regime immediately undertook radical steps to undo some of the damage caused by the Allende government. A detailed exposition of these reforms can be found in Martínez and Díaz (1996, pp. 47-67), but for our purposes, the following is a list of the major amendments to economic policy in Chile, 1974-1983:

- the re-privatisation of over 300 firms by the end of 1974;
- the reduction of the budget deficit from 25% of GDP to only 1% by 1975;
- the elimination of price controls and domestic subsidies;
- the adoption of a single exchange rate to replace the complex, multi-exchange rate system;
- the elimination of quantitative restrictions, and the reduction of tariffs to a uniform 10% by 1979; and
- the deregulation of capital markets.

These changes had huge effects on the Chilean economy, but the transition from a socialist to a laissez-faire economy did not run smoothly. Inflation surged again post-liberalisation to average 350% for the period 1974-1975, but then fell to 85% in 1977 (Bosworth *et al*, 1994, p. 5). The oil shocks of the early 1970s, combined with a collapse in the price of copper - on which Chile was highly dependent - caused a recession in 1975. Following this recession, the next six years (1976-1982) saw a strong cyclical recovery, with the major policy change seeing the exchange rate pegged to the United States dollar as an anti-inflation measure. This, however, reduced the cost of foreign borrowing, which combined with the newly deregulated capital markets, led to a massive influx of foreign funds (Bosworth *et al*, 1994, p. 8). This caused the Peso to be over-valued in real terms, and Chile's trade deficit grew to worrying proportions (12.9% of GDP in 1982). Many firms in Chile's tradables sector went bankrupt in the face of growing competition from imports, and doubts started to emerge as to the sustainability of the exchange rate, the trade deficit and the level of foreign borrowing. The result was another damaging recession in 1982, when output fell by 14%, and domestic demand fell by 24%¹⁶ (Bosworth *et al*, 1994, p. 8).

¹⁶ Additional factors in the recession were the deterioration in the terms of trade, the major increase in overseas interest rates, the fixed exchange rate, the lack of supervision and control in the newly-deregulated financial markets, and the placement of too much faith in market forces to produce instant adjustment to the recession (Bosworth *et al*, 1994, p. 8).

Thus the Chilean economy faced another uphill effort after the 1982 collapse, but the challenges of this recovery were perhaps more manageable than those of the previous decade. Inflation was at a comparatively low level of around 20%, and the public sector budget was in better health. The major issues were the reparation of the domestic financial system and how to resolve the problem of Chile's levels of foreign indebtedness. As noted by Bosworth *et al* (1994) and Martínez and Díaz (1996), policies to address these and other problems were:

- the large devaluations of the real exchange rate to prompt an export-led recovery;
- a tight fiscal policy to increase domestic savings;
- the rebuilding of the financial system, including a greater supervisory role for the central bank;
- a second round of privatisation, particularly of those firms that had been taken over by the state in the 1982 financial collapse; and
- the use of IMF and World Bank loans, and renegotiations of foreign debt levels.

The results of these policies were impressive. Economic growth averaged 6.2% per year in the 1983-1992 period, and Chile's trade balance was reversed from a deficit of 16% of GDP in 1981 to a surplus that averaged 4% of GDP from 1987-1992 (Bosworth *et al*, 1996, p. 9). Foreign debt was halved, and unemployment fell from 30% of the labour force in 1983 to less than 5% in 1992. The economic upheaval of the last three decades outlined above, whilst being a turbulent ride, has left the Chilean economy in excellent shape. Economic growth in the 1990-1997 period averaged 7.3%, although 1998 growth was only 3.4%. Exports have grown annually at a rate of 13% from 1993-1997, and imports have grown at an average of 17% over the same period (New Zealand Trade Development Board, 2000a, p. 1). This reflects the openness of the modern Chilean economy.

As mentioned earlier, the reforms in Chile attracted a great deal of attention from economists, policymakers and the media. This was perhaps because "Chile had become the first and most famous example of applying the rules of economic

orthodoxy to a developing country” (Valdés, 1995, p. 2)¹⁷. Despite remaining problems such as the inequality of income distribution and low level of real wages in the nation, the Chilean reforms are “often presented as the model for the programs of economic restructuring, market liberalization, and stabilization that are being urged on other countries within Latin America and in Eastern Europe” (Bosworth *et al*, 1994, p. 1). Complementing these reforms in recent years has been the movement of Chile towards regionalism, and the next section will examine some of Chile’s trade agreements.

2.4.2 Chile’s moves towards regionalism

As part of its continuing economic reforms, Chile has been an active participant in unilateral, bilateral and multilateral trade liberalisation. Unilaterally, Chile has vowed to reduce its uniform tariff by 1% per year from its current flat rate of 10% to reach a level of 6% in 2003 (Chilean Trade Commission, 1999, p. 2). Chile also adheres to the multilateral liberalisation goals of the WTO and its predecessor, GATT. The focus of this section, however, is Chile’s movement towards increased bilateral and regional preferential trading arrangements.

Potentially the most significant of Chile’s regional arrangements is its desired accession to NAFTA. It applied in 1994 for early accession into the free trade agreement, and despite not yet having been fully admitted, it has certainly progressed a long way towards its goal. In July 1997, Chile signed a bilateral free trade agreement with Canada, which aims to promote completely free trade by 2015¹⁸. Immediately upon implementation, 92% of Chile’s exports to Canada, and 76% of its imports from Canada became duty-free (Chilean Trade Commission, 1999, p. 1). The agreement also promotes the gradual abolition of antidumping duties and import protection measures, and provides protection for foreign investment. In November 1999, Trade Ministers from the two nations met and agreed to accelerate the tariff reductions on some goods

¹⁷ Valdés also emphasises the role of the Chicago School of economists, some of whom had been employed by General Pinochet to the main economic positions, in the liberalisation of the economy. This created further interest in academic circles, as the experiment “did not stem from any historical experience...,[rather from] ‘economic science’: *a science to be found mostly in their textbooks*” (Valdés, 1995, p. 2, emphasis added).

¹⁸ The full text of the agreement can be found online at www.infoexport.gc.ca/chile/menue.asp

that were still subject to protection – making trade in a number of products duty-free between two and seven years earlier than originally planned. The effects of the agreement can already be seen, as overall trade between the two nations increased by 16.5% from 1997 to 1998, and Canadian investment in Chile grew by 67.2% over the same period (Chilean Trade Commission, 1999, p. 2)

In another move that brought Chile closer to NAFTA membership, it signed a free trade agreement with Mexico in April 1998. It had previously signed (in 1992) an Economic Complementation Agreement (ECA) with Mexico, which aimed solely at goods trade liberalisation. The newer agreement, which came into effect in August 1999 covers trade in services, intellectual property rights, investment protection and dispute settlement procedures. During the period since the initial ECA was signed, trade between Mexico and Chile increased from US\$158 million to US\$1.3 billion in 1998 (Chilean Trade Commission, 1999, p. 3).

These two bilateral free trade agreements have already succeeded in reducing average effective tariff rates in Chile to 0.5% from Mexico and 1.7% from Canada (Chilean Trade Commission, 1999, p. 3). This is compared to a figure of 8.6% with the United States. It would appear that the logical progression of the two bilateral agreements would be to allow Chile to enter NAFTA.

In addition to the agreements outlined above, Chile is an associate member of the Mercosur customs union. This associate membership agreement hopes to completely remove trade barriers on 67% of Chile's exports and 62% of Chile's imports from Mercosur by 2005. Chile also agreed to work with the Mercosur countries to discuss plans with the EU to create a free trade area with the EU nations. Chile also has a number of bilateral agreements with Latin American countries, including Venezuela, Colombia, Ecuador, Bolivia, Argentina and Peru. Further demonstrating its desire to liberalise trade, preliminary discussions regarding the possibility of a free trade agreement with Korea were expected to be completed by mid-1999.

This section has shown that Chile has gone through a great deal of change since the 1950s. Its continuing efforts to enter regional and bilateral agreements suggest that it would be a willing negotiator in plans to expand the CER.

2.5 The Singaporean Economy

Much like the Chilean economy, Singapore has seen vast changes in its economic policy over the last few decades. From its early role as a colony of Great Britain, Singapore has altered its economic focus from being a 'vent for surplus' region to become one of the great Asian 'Tiger Economies'. It now has a distinctly outward-oriented policy focus, and is embracing regionalism as a further opportunity to expand. This section provides a brief overview of Singapore's recent economic history, and examines its current regional emphasis for economic policy.

2.5.1 The postwar Singaporean economy

After the devastation of World War II, Singapore had largely recovered by 1950. The free trade movement had been very powerful in Singapore since the early 1930s¹⁹ and exports grew strongly in the 1950s. Trade was heavily centred on just a few areas: food and primary commodities comprised almost 75% of total export value, mainly comprised of rubber and petroleum (Huff, 1994, p. 278). This continued to show Singapore as being a 'Staple Port' – an economy based on the export of natural resources. It was realised, however, that due to the sheer lack of geographical size of Singapore, reliance on these staples could not continue to be a long-term strategy for economic growth. Only 5-10% of GDP was produced in the manufacturing sector, and during the 1950s there was increased pressure on Singapore, both from domestic and global sources, to move towards a program of industrialisation (Tremewan, 1994, pp. 30-31). In the mid-1950s, plans were drawn up for import-substituting industrialisation, and this was allied with the decolonisation of Singapore. Between 1956 and 1957, the output of Singapore's manufacturing industries rose by over 50%. By 1959, a solid foundation for industrialisation had been built, and this created the base for subsequent export-led growth in manufacturing (Huff, 1994, p. 286).

Between 1960 and 1990, international trade was the engine of growth that saw the Singaporean economy expand rapidly. The earlier dependence on trade in staples

¹⁹ Huff (1994, p. 274) notes that "exporters and shippers were champions of free trade because Singapore required unhindered access to cheap imports to attract primary commodity exports to the port".

diminished, and economic diversification occurred in the form of increased manufacturing and the development of financial and business services. A new set of entrepreneurs from both government-owned enterprises and, perhaps more importantly, multi-national corporations (MNCs) played a significant role in the growth process. Real GDP increased elevenfold over the three decades, and GDP growth was over 7% in 23 of the 31 years from 1960 to 1990 (Huff, 1994, p. 301). Policy emphasis shifted from domestic industrialisation to the promotion of exports of Singapore's manufactures, and this was accompanied by a program of improvement in the economic infrastructure of the nation. Of these manufactures, electronics and electrical goods became increasingly important in the 1970s and 1980s²⁰, fuelled by the location of many MNCs in Singapore and a government emphasis on increased technical education and industrial training (Huff, 1994, p. 329). Although low wages for Singaporean workers aided exporters in achieving a comparative advantage in many manufactures, the government was keen to move away from a dependence on cheap labour towards higher value-added, human capital-intensive activities. This rapid technological transformation was to be the 'second industrial revolution' in Singapore.

Whilst Singapore's export-oriented growth was naturally a free market policy, the role of the Government in the nation's economic development should not be understated. Interventionism was a vital ingredient in the recipe for Singapore's success, but rather than directly influencing market forces, "the genius of Singapore's interventionist government – and so ultimately its quality – was to recognize the importance of vigorous policies to take advantage of international trade *but avoid interference with it*" (Huff, 1994, p. 360, emphasis added).

A further important development in the history of Singapore's economic growth was its expansion of the financial services sector, starting in the late 1960s. Ideally situated to act as a funding link between Asia, the Pacific nations and the Middle East, Singapore became a funding centre, and by the 1990s was the fourth-largest foreign exchange market in the world (Huff, 1994, p. 342). Singapore used their highly

²⁰ Singapore specialised in assembling semi-conductors for the United States and Europe in the 1970s, and then the focus shifted to the production of computer disk drives in the late 1980s, when it accounted for at least half of total world production in these components (Huff, 1994, p. 322).

developed financial sector to their advantage and initiated a plan to invest industrial and financial capital in neighbouring developing Asian nations. This investment was aimed at obtaining skilled labour and technology from these developing countries, in order to upgrade its own economy (Tremewan, 1994, p. 39) and was also part of Singapore's wider desire to promote a regional emphasis for its trade.

2.5.2 Singapore's recent emphasis on regionalism

As explained above, "[a]fter having undergone a period of rapid industrialisation on the basis of labour-intensive manufacturing for export, the emphasis is now turning to Singapore's potential to service the industrialisation of other countries in the Asian region" (Rodan, 1993, p. 223). This reflects Singapore's outward-oriented policy wishes, and recognises the fact that "Singapore's full economic potential simply cannot be realised within its limited borders" (Rodan, 1993, p. 226). The nation lacks sizeable domestic markets for the consumption of its manufactured goods, and must therefore rely on external markets. When this fact is added to the relative lack of land and labour resources in the nation, it is easy to see why Singapore must look to foreign economies to further expand economically.

The emergence in the 1970s and 1980s of Singapore as a home for MNCs was an important factor behind the change in focus towards regionalism: "Growing regional markets had started to assume more importance, so that production was no longer exclusively for traditional markets" (Rodan, 1993, p. 230). Singapore started looking at its Asian neighbours, and realising that they too were undergoing industrialisation, saw the opportunity for achieving regional (as opposed to national) economies of scale. For example, these nations had more abundant labour forces which Singaporean manufacturing firms could utilise by geographically repositioning themselves.

The commitment of Singapore to maintaining an outward-oriented policy focus is underlined by their support for the goal of the Association of Southeast Asian Nations (ASEAN) to achieve an ASEAN Free Trade Area (AFTA) by 2008. This is undoubtedly a natural reaction to the changing nature of global trade with respect to the creation of the EU and the proposed FTAA.

An interesting example of Singapore's regional interests is the imaginative Singapore-Johor-Batam Growth Triangle. Started in 1989, this initiative links Singapore, the state of Johor in Malaysia, and Batam and the rest of the Riau Islands of Indonesia²¹. The aim is for each area to exploit the other areas' resources for the collective benefit. It recognises that acting individually, none of the three areas has a sufficiently wide range of resources to maximise their potential. Under this so-called 'Growth Triangle' arrangement, "Batam and Johor could provide land, gas, water and labour for industrial development in these states while Singapore could provide the management expertise" (Rodan, 1993, p. 237). By rejecting the idea of borders providing a natural economic division between nations, the Growth Triangle uses only joint division of labour as an economic rationalisation for regionalism. Whilst the creation of the Growth Triangle was subject to political problems²², it has prompted a series of other similar Sub-Regional Economic Zones (SREZs) in Asia²³.

Singapore is currently negotiating a free trade agreement with Mexico, with formal talks starting on July 1st 2000 (Singapore Ministry of Trade and Industry, 2000, p. 1), and has long expressed a desire to join NAFTA since the Seattle summit of APEC in 1993 (Bergsten, 1994, p.24). It is also exploring the possibility of negotiating a bilateral free trade agreement with Canada (Canadian Department of Foreign Affairs and International Trade, 2000b). These proposals, and those outlined above clearly suggest that Singapore will be proactive in its pursuit of economic growth via regional preferential trading agreements.

²¹ The Growth Triangle was extended in 1996 to include West Sumatra (Indonesia), and Malacca, Negri Sembilan and South Pahang (Malaysia).

²² These included the possibility of Singapore benefiting disproportionately; the thought that Riau and Johor were similar in terms of resource endowments; ethnicity concerns arising from Malaysia and Indonesia regarding the Triangle causing a perceived increase in power of Southeast Asian Chinese business groups; and the loss of national sovereignty " (Rodan, 1993, pp. 243-234).

²³ These SREZs include; The Greater South China economic zone (Hong Kong, Macau, Taiwan and some Chinese coastal provinces); the Tumen River Project (East Russia, China, Mongolia, South and North Korea); the Yellow Sea economic zone (Japan, South Korea and Northern China); and the Japan Sea economic zone (Japan, East Russia, Northeast China, South and North Korea). These SREZs all have different aims, but are all examples of the transcending of national borders in economic co-operation (Savage, Kong, and Neville, 1998, p. 105).

2.6 Recent Plans to Expand the CER Agreement

The CER agreement is now well established, has been reviewed and changed frequently since its inception, and is currently entering a new phase. Satisfied with the format and results of the CER, the governments of New Zealand and Australia are now directing their attentions to expanding the CER. As early as 1996, senior economic officials met to discuss the possibility of creating linkages between the ASEAN nations and the CER partners²⁴ (Tantraporn, 1996, p. 51). The advantages of such a move would be to increase market sizes, leading to economies of scale; to increase intra-industry trade between complementary economies; to create a more favourable climate for investment; to increase efficiency and optimality in resource allocation, via competition; and to give both regions increased bargaining power on the world stage (Tantraporn, 1996, p. 51). Whilst this is one possible expansion of the CER's trade ties, more recent moves have explored the expansion of the CER agreement to include one or more of Chile, Singapore, and the United States.

The then Prime Minister of New Zealand, Jenny Shipley, visited Chile in May 1999, and discussed the possibility of a bilateral free trade agreement with Chile, and also "received positive soundings... over the possibility of extending a free trade agreement to include Australia and Singapore" (The Dominion, 15th May 1999, p. 2). The Singaporean Prime Minister, Goh Chok Tong is understood to be sympathetic to the idea, and "though New Zealand also wants the United States to be part of any free trade agreement, the four country option [New Zealand-Australia-Chile-Singapore] is far more realistic and viable" (The Dominion, 15th May 1999).

Another PTA option that has been proposed in the light of slow progress in multilateral liberalisation by the WTO is the creation of a so-called 'Pacific-5' (Summers, cited in Hufbauer, 1999, p. 5). This would involve Australia, New Zealand, Chile, Singapore, and the United States. In September 1999, the then New Zealand Trade Minister, Lockwood Smith, contacted United States officials in Washington, and lobbied for the US to endorse a free trade agreement with New Zealand, Australia, Chile and

²⁴ It must be remembered that ASEAN is not a free trade area, but rather a forum to promote economic co-operation in the South East Asian nations. The feasibility of an AFTA-CER free trade agreement has been discussed, with ministers from the ASEAN and CER nations meeting in Singapore in October 1999 and agreeing to establish a task-force to look into the possibility of creating such an area by 2010.

Singapore. This endorsement, if given, would be a significant step on the road towards the creation of a Pacific-5 arrangement.

Perhaps the first step towards the expansion of the CER is the bilateral trade agreement between New Zealand and Singapore which is currently being discussed at a parliamentary level. This so-called Closer Economic Partnership (CEP) would remove the few remaining tariffs on trade between the two nations²⁵. Despite the fact that 98% of merchandise trade between the countries is already duty-free (Sunday Star Times, 13th August 2000, p. C2), the CEP may provide significant strategic benefits to the participants. Supporters of the trade pact, such as the current Finance Minister, Dr Michael Cullen, believe that the “CEP could be a catalyst for similar agreements with other ASEAN economies and eventually with key APEC economies including the United States...[It] also held implications for the mooted P5 trade agreement, linking New Zealand, Australia, Singapore, Chile and the United States” (Manawatu Evening Standard, 9th September 2000, p. 5). These views are echoed by commentators such as Nigel Mitchell, the global manager of the New Zealand Dairy Board, who has suggested that “while tariffs [with Singapore] were negligible and the agreement would have no immediate impact, it would provide greater security in the long term... Singapore’s beauty was as a base to do business with the rest of Asia” (Mitchell, in Sunday Star Times, 24th September 2000, p. E7).

With current Prime Minister Helen Clark pushing to conclude the CEP, and hoping to extend it to Chile, the United States and Australia (Sunday Star Times, 13th August 2000, p. C2), the expansion of the CER agreement seems to be highly likely in the near future. This research aims to provide an empirical analysis of such expansion possibilities.

²⁵ Tariffs are still present in Singapore in industries such as telecommunications, health, engineering and architectural services, motor vehicles, petroleum products, and alcoholic beverages.

CHAPTER 3

INITIAL LEVELS OF TRADE BETWEEN NEW ZEALAND, AUSTRALIA, CHILE, SINGAPORE AND THE UNITED STATES

3.1 Introduction

Prior to examining the results of creating possible preferential trading arrangements (PTAs) involving New Zealand, Australia, Chile, Mexico and the United States, it is useful to discuss the initial (pre-shock) levels of trade between these nations. This chapter provides some general information about each economy and highlights the main import and export trade flows between the aforementioned countries. This information helps to identify the key sectors that may benefit from the formation of a PTA. All trade and tariff data, unless otherwise stated, is taken from the GTAP version 4 database²⁶ and is measured in constant 1995 United States dollars.

3.2 New Zealand

New Zealand is a small, very open economy, and has followed free market principles since undergoing major structural reforms in the mid-1980s. It has sizeable manufacturing and service sectors complementing a highly efficient agricultural sector. The economy is strongly trade-oriented, with exports of goods and services totalling 27.5% of GDP in the year to 30 June 1997 (New Zealand Treasury, 2000, p. 1). Historically, New Zealand has exported a large amount of goods to the United Kingdom, especially primary products and agricultural produce. The relative importance of the United Kingdom as an export destination has reduced over recent

²⁶ See Chapter 6 for more details on the GTAP version 4 database. The figures in this chapter are taken from the results obtained by aggregating the database into the 17 commodity groupings and 14 regional areas, as outlined in Appendix B.

decades, with New Zealand developing strong trade linkages with Asia and North America. As a member of GATT and its successor, the WTO, New Zealand has followed a program of trade liberalisation that has seen its tariffs, quotas and export subsidies all but eradicated, with only a few exceptions²⁷. As a result, the New Zealand economy is one of the most open economies in the world.

3.2.1 New Zealand's exports

New Zealand's top export destinations are Australia, Japan, the United States, the United Kingdom and Korea. Of interest for this study is the fact that Singapore is its thirteenth largest export market. Singapore is also New Zealand's eighth fastest growing export destination, with the United States being the fourteenth fastest (New Zealand Trade Development Board [NZTDB], 2000b, pp. 9 – 10). Table 3.1 below shows New Zealand's five largest export sectors²⁸ to Australia, Chile, Singapore and the United States, with export values in 1995 US\$ millions in parentheses.

Table 3.1 New Zealand's Major Exports

	Australia	Chile	Singapore	United States
1	Services (881.4)	Dairy (27.3)	Services (32.3)	Meat Products (410.3)
2	Wood and Paper (532.4)	Natural Resources (7.6)	Dairy (27.5)	Food Products (248.1)
3	Other Manufactures (412.7)	Services (6.6)	Meats (26.1)	Services (250.9)
4	Chemicals (331.8)	Other Manufactures (4.6)	Other Manufactures (25.2)	Chemicals (161.3)
5	Clothing (288.3)	Crops (1.7)	Chemicals (15.2)	Other Manufactures (116.5)

²⁷ Some forms of protection still exist in certain industries such as meat products, beverages, forestry and wood products, and transport equipment. These however are not applicable to all nations, and many of these tariffs are zero for New Zealand's trading partners with whom they have trade agreements. See the APEC Tariff Database for more details at www.apectariff.org

²⁸ These sectors are aggregated from the fifty commodity groupings in the GTAP version 4 Database. See Appendix B for more details on the industries in each sector.

This table clearly shows that New Zealand's main exports to the countries with which it may create an extended CER preferential trading arrangement (PTA) are services, manufactured goods, chemicals and dairy products. Significant gains to New Zealand exporters might be expected if tariffs in the United States were decreased, particularly those in the agricultural sectors where protection levels are still relatively high. Chile has a flat 10% tariff for all of its imports, and thus New Zealand could also gain in all sectors, but particularly in the dairy industry, if tariffs were lowered or eliminated there as a result of a PTA. Access for New Zealand exports to Singapore is virtually duty free already, except for a few remaining import taxes on alcoholic beverages, tobacco, cars and motorcycles, and petroleum products. This suggests that the creation of a PTA involving New Zealand and Singapore would result in few economic gains, with wine exporters perhaps being the main benefactors. Trade with Australia is of course already free of any import restrictions as a result of the CER agreement.

3.2.2 New Zealand's imports

New Zealand is heavily reliant on imported goods in order to satisfy consumer demand for goods and services in which it has a comparative disadvantage, and also requires a wide variety of imported intermediate goods for domestic production. This leaves New Zealand susceptible to world price shocks, as it is a price-taker in most markets, being unable to affect the world price due to its size. The large volume of imports into New Zealand, relative to its exports, has led to a persistent current account deficit of up to NZ\$8.5 billion, or around 8.3% of gross domestic product (GDP) in 1998 (The New Zealand Herald Online, 23rd September 2000, p. 1)²⁹. New Zealand's largest sources of imports are Australia, the European Union, the United States, Japan and North East Asia. Table 3.2 below shows New Zealand's five largest imports from Australia, Chile, Singapore and the United States in 1995 US\$ millions.

²⁹ The latest figures available suggest that the current account deficit is at NZ\$7.5 billion, or around 7.1% of GDP, with the figures improving slightly due to increased export revenues caused by a weaker New Zealand dollar (The New Zealand Herald Online, 23rd September 2000, p. 1)

Table 3.2 New Zealand's Major Imports

	Australia	Chile	Singapore	United States
1	Services (748.9)	Food Products (7.5)	Services (211.5)	Other Manufactures (705.2)
2	Other Manufactures (590.3)	Services (3.8)	Other Manufactures (199.5)	Services (638.5)
3	Chemicals (586.3)	Metals and Metal Products (3.3)	Minerals and Petroleum Products (26.1)	Chemicals (387.1)
4	Motor Vehicles and Transport Equipment (397.7)	Vegetables, Fruits and Nuts (1.9)	Chemicals (23.2)	Motor Vehicles and Transport Equipment (237.1)
5	Metals and Metal Products (354.1)	Chemicals (1.5)	Food Products (13.9)	Wood and Paper (83.4)

This table shows that New Zealand's major imports from the countries covered in this research are services, transport equipment, manufactured goods, and chemicals.

3.3 Australia

Australia has a very broad-based economy, with the key domestic sectors including mining, agriculture and manufacturing. Services also play a vital role in Australia's economy, and the majority of these services are generated in Sydney, which is attempting to establish itself as the commercial hub of the Asia-Pacific region (NZTDB, 2000c, p.3). Australia has a fairly low level of trade protection in general, and has had virtually free trade with New Zealand since 1983 via the CER agreement. Some trade barriers with the rest of the world continue to exist in sectors such as dairy, clothing, wood and paper, chemicals, transport equipment and metal products.

3.3.1 Australia's exports

Australia's main export destinations are Japan, the United States, Korea, New Zealand, and the United Kingdom. Despite the strong growth in trans-Tasman trade since the

introduction of the CER agreement, only 6% of Australia's exports in 1998/9 were destined for New Zealand, compared with nearly 17% heading to Japan (NZTDB, 2000c, p. 4). Australia's main export sectors are natural resources (especially coal), services, metals (especially gold, iron ore and aluminium), manufactured goods and chemicals. Table 3.3 below indicates Australia's top five exports to New Zealand, Chile, Singapore and the United States in 1995 US\$ millions.

Table 3.3 Australia's Major Exports

	New Zealand	Chile	Singapore	United States
1	Services (748.1)	Natural Resources (51.3)	Services (454.7)	Services (1505.8)
2	Other Manufactures (567.8)	Other Manufactures (30.5)	Other Manufactures (435.3)	Chemicals (833.0)
3	Chemicals (548.2)	Metals and Metal Products (15.2)	Metals and Metal Products (264.3)	Meats (446.2)
4	Motor Vehicles and Transport Equipment (385.1)	Services (7.0)	Chemicals (228.3)	Other Manufactures (404.4)
5	Metals (338.7)	Chemicals (3.5)	Crops (121.5)	Metals and Metal Products (301.5)

This table shows that Australia's main exports to the countries relevant to this research are services, chemicals and manufactured goods. Australia already has virtually duty-free access to both New Zealand and Singapore and thus may not gain vastly from the creation of a PTA encompassing both of them. If a PTA with the United States is established, then it may make some gains in the metals, chemicals and meats sectors, although tariffs in the United States are also relatively low in those sectors. If Chile were included in a PTA with Australia, the reduction of the 10% flat tariff would create benefits to Australian exporters, especially in the natural resources industries, despite the relatively small volumes exported there.

3.3.2 Australia's imports

Despite the high cost of transporting goods from overseas, Australia is heavily reliant on imports in many key sectors. Its top five imports in general are manufactured goods, services, motor vehicles and transport equipment, chemicals and clothing. At a more disaggregated level, its largest imports are passenger motor cars (7% of total 1997/8 imports), computers and machinery (5%), petroleum and crude oil (4%), telecommunications equipment (4%) and medical and pharmaceutical equipment (3%) (NZTDB, 2000c, p. 4). Its major sources of imports are the United States (21% of total imports 1998/9), Japan (14%), the United Kingdom (6%), China (6%), Germany (6%), and New Zealand (4%) (NZTDB, 2000c, p. 4). Table 3.4 shows Australia's top five imports in 1995 US\$ millions from the countries examined in this research.

Table 3.4 Australia's Major Imports

	New Zealand	Chile	Singapore	United States
1	Services (881.4)	Minerals and Petroleum Products (25)	Other Manufactures (1364.4)	Other Manufactures (5504.7)
2	Wood and Paper (559.3)	Food Products (19.6)	Services (1109.6)	Services (3191.8)
3	Other Manufactures (427.4)	Services (14.4)	Chemicals (237.7)	Chemicals (1907.5)
4	Chemicals (349.6)	Chemicals (5.2)	Minerals and Petroleum Products (192.6)	Motor Vehicles and Transport Equipment (1736.9)
5	Clothing (305.1)	Natural Resources (4.5)	Motor Vehicles and Transport Equipment (189)	Wood and Paper (594.1)

The table shows that manufactured goods and services, especially from the United States dominate Australia's imports from the nations with which it may consider forming a PTA. Since the tariff on manufactured goods (when aggregated in the GTAP database) imported from the United States is 7%, there may moderate gains to be made by the United States in those industries if a PTA with Australia is implemented.

3.4 Chile

As discussed in detail in Chapter 2, Chile's economy has undergone major structural changes in the post-war period. Whilst the alteration from being a heavily-regulated, largely state-controlled economy to its present situation as an outward-looking, liberalised, open economy has often been difficult, commentators such as Valdés (1995, p. 1) portray Chile as "an ideal model for other developing countries or nations in the process of modernizing their economies". Its economy is maturing in terms of the variety of its domestic and export industries, and economic growth has averaged over 7% for the last decade (NZTDB, 2000a, p. 4). Chile has low levels of trade barriers compared to many developing nations, and has a flat tariff on all imports of 10%, which it has pledged to reduce by 1% per annum until 2003. Chile has also increasingly adopted a regional view to trade, currently has trade treaties with over a dozen nations, and has actively sought accession to NAFTA since 1994.

3.4.1 Chile's exports

Much of Chile's economic success in recent years has resulted from its policies to encourage export-led growth. Exports have grown at an average rate of 13% per annum between 1993 and 1997 and its main export destinations are the United States, Japan, Argentina, Europe and North East Asia (NZTDB, 2000a, p. 6). Reflecting its strong natural resources sector and excellent agricultural climate, the main commodities exported by Chile are copper (40% of total exports), fruit (9%), minerals (8%), and cellulose/paper (6%) (NZTDB, 2000a, p. 6). Chile's top five exports to Australia, New Zealand, Singapore and the United States are shown in Table 3.5 below, with all values being in 1995 US\$ millions.

Table 3.5 Chile's Major Exports

	New Zealand	Australia	Singapore	United States
1	Food Products (7.0)	Metals and Metal Products (24.3)	Metals and Metal Products (57.0)	Metals and Metal Products (419.6)
2	Services (3.8)	Food Products (18.5)	Services (28.2)	Vegetables, Fruits and Nuts (352.9)
3	Metals and Metal Products (3.2)	Services (14.4)	Food Products (13.1)	Natural Resources (239.4)
4	Vegetables, Fruits and Nuts (1.5)	Chemicals (4.7)	Vegetables, Fruits and Nuts (4.1)	Services (222.9)
5	Chemicals (1.3)	Natural Resources (4.1)	Other Manufactures (3.1)	Wood and Paper (222.4)

Chile's exports of copper show up strongly in this table, being categorised under the GTAP aggregation of 'Metals and Metal Products', and fresh fruit also appears strongly under 'Vegetables, Fruits and Nuts'. Gains could thus be made in these key industries if a PTA were formed with New Zealand, Australia, Singapore and the United States.

3.4.2 Chile's imports

As part of Chile's continued emphasis on open trade and regionalism, its imports have grown rapidly, averaging over 17% per annum from 1993 to 1997 (NZTDB, 2000a, p. 6). Dominated by imports from the United States, Japan and Brazil, Chile's main imported commodities consist of consumer goods, capital equipment and machinery, petroleum and other processed chemicals (NZTDB, 2000a, p. 6). The fact that Chile and New Zealand compete in many industries, such as agriculture and forestry, suggests that many of New Zealand's exports may not find direct markets in Chile, although there may be opportunities for New Zealand to provide supporting goods and services in these sectors (NZTDB, 2000a, p. 4). Chile's main imports from New Zealand, Australia, Singapore and the United States are shown in Table 3.6 below, with values in 1995 US\$ millions.

Table 3.6 Chile's Major Imports

	New Zealand	Australia	Singapore	United States
1	Dairy (28.9)	Natural Resources (62.7)	Other Manufactures (54.5)	Other Manufactures (1435.3)
2	Natural Resources (9.4)	Other Manufactures (31.5)	Services (28.3)	Services (793.6)
3	Services (6.6)	Metals and Metal Products (16.2)	Motor Vehicles and Transport Equipment (9.1)	Chemicals (613.2)
4	Other Manufactures (7.4)	Services (7.0)	Chemicals (3.0)	Motor Vehicles and Transport Equipment (596.8)
5	Crops (1.8)	Chemicals (3.7)	Metals and Metal Products (2.0)	Wood and Paper (162.7)

The table shows how important the United States is as a source of imports for Chile, and the other countries in this research are the sources of a wide variety of goods and services. The table also shows that manufactured goods make up a large proportion of total imports, accounting for over 25% of import payments.

3.5 Singapore

Singapore is geographically tiny nation, with a population of 4.1 million living in an area the size of New Zealand's Lake Taupo, but it has a highly developed economy with the highest per capita GDP of all the ASEAN nations (NZTDB, 2000d, p. 3). As discussed further in Chapter 2, the 1950s saw Singapore move away from being a staple port towards a long-term program of industrialisation with a goal of export-led growth. The introduction of multi-national corporations, along with low domestic wage levels and a government which was focused on promoting export trade saw further increases in international trade. This is mainly because Singapore's domestic market was too small for the economy to perform to its full potential. Singapore's recent economic development has been centred on expanding its financial and business services, which now account for 28% of its GDP (NZTDB, 2000d, p. 3).

3.5.1 Singapore's exports

Singapore's exports are heavily focused on high value-added electrical equipment, produced by their highly skilled and well-educated workforce, and services also play a large role in total exports. Its major export destinations are the United States, Europe, Malaysia, Hong Kong and Japan (NZTDB, 2000d, p. 4). Singapore's major export commodities include data processing machines, refined petroleum products, office parts, telecommunications equipment, electrical circuit apparatus, and radio receivers (NZTDB, 2000d, p. 3). Table 3.7 below shows Singapore's five major exports to New Zealand, Australia, Chile, and the United States, in 1995 US\$ millions.

Table 3.7 Singapore's Major Exports

	New Zealand	Australia	Chile	United States
1	Services (211.5)	Other Manufactures (1300.7)	Other Manufactures (52.8)	Other Manufactures (17113.9)
2	Other Manufactures (191.6)	Services (1109.6)	Services (28.3)	Services (4029.9)
3	Minerals and Petroleum Products (39.9)	Chemicals (220.7)	Motor Vehicles and Transport Equipment (8.9)	Chemicals (651.7)
4	Chemicals (21.7)	Motor Vehicles and Transport Equipment (185.7)	Chemicals (2.8)	Clothing (436.4)
5	Food Products (13.3)	Minerals and Petroleum Products (181.3)	Metals and Metal Products (1.9)	Wood and Paper (196.9)

This table shows just how important the United States is as an export destination, with values dwarfing the other countries that are examined in this research. If Singapore joined with the United States in a PTA, its exporters could make some substantial gains if tariffs were eliminated, especially in the chemicals and clothing sectors, which are subject to tariffs of 4.7% and 15.4% respectively when entering the United States. It will also gain in lesser amounts from Chile reducing its 10% flat tariff, and there could be gains in the manufacturing, chemicals, and transport sectors if Australia were to reduce its tariffs on Singaporean products.

3.5.2 Singapore's imports

Singapore is one of the world's most open economies, with tariffs being removed unilaterally on all goods and services, except for petroleum products, some alcoholic beverages, motor vehicles and tobacco products (NZTDB, 2000d, p. 5). Thus most imports into Singapore enter duty free, and in New Zealand's case, the only dutiable exports to Singapore of any significance are wines. The lack of tariffs would suggest that there would be relatively small economic gains to a country forming a PTA with Singapore, as New Zealand are currently attempting with its proposed Closer Economic Partnership (CEP). There may however be important strategic benefits in terms of such an agreement, as it may provide scope for further economic linkages with other ASEAN nations. Singapore's main sources of imports are Japan, Malaysia, the United States and the EU and their major import commodities are services, crude petroleum, and electrical and industrial machinery, including valves, telecommunications equipment, electrical circuitry components and aircraft (NZTDB, 2000d, p. 4). Table 3.8 below shows Singapore's top five imports from New Zealand, Australia, Chile and the United States.

Table 3.8 Singapore's Major Imports

	New Zealand	Australia	Chile	United States
1	Services (32.3)	Services (454.7)	Metals and Metal Products (58.4)	Other Manufactures (10377.0)
2	Dairy (29.4)	Other Manufactures (453.7)	Services (28.2)	Services (3730.2)
3	Meat Products (28.4)	Metals and Metal Products (275.1)	Food Products (13.6)	Chemicals (1702.1)
4	Food Products (27.1)	Chemicals (243.9)	Vegetables, Fruits and Nuts (5.4)	Motor Vehicles and Transport Equipment (1345.8)
5	Other Manufactures (26.1)	Crops (127.6)	Other Manufactures (3.2)	Metals and Metal Products (484.1)

Again, this table illustrates the sheer amount of trade between Singapore and the United States, and the United States could certainly benefit from a PTA with Singapore if tariffs on motor vehicles (31%) and motorcycles (12%) were reduced.

The other sources of imports in the table may not experience such economic gains, as the vast majority of their commodities enter Singapore duty-free.

3.6 The United States

The United States is certainly the world's most powerful trading nation, and its actions have a great bearing on the state of the world economy. Due to its sheer economic size, it is well insulated from all but the most disruptive economic shocks. It has a very diverse, technologically advanced economy, with a highly educated and skilled workforce, a variety of natural resources, a strong agricultural sector, and a well developed industrial base (NZTDB, 2000e, p. 8). It abides by free market principles in general, and large, multi-national firms play an important role (in terms of lobbying and campaign contributions) to the formation of economic policy (NZTDB, 2000e, p. 8). Despite these market-oriented policies, the United States continues to have relatively high levels of protection in some key industries, such as meat products, dairy, crops, clothing, beverages and tobacco and minerals. If these were reduced in the formation of a PTA, any nations exporting to the United States in these sectors would expect to make significant gains.

3.6.1 The United States' exports

The United States' per capita GDP is the largest of the industrialised nations (NZTDB, 2000e, p. 7), and a large portion of this output is destined for foreign shores. Its main export destinations are Canada (with whom it already has a free trade agreement, NAFTA), Western Europe, Japan, and Mexico (the third NAFTA member). In broad terms these exports are capital goods (43% of total exports), industrial supplies (23%), consumer goods (11%), automotive goods (11%), and food, feed, and beverages (5.1%) (NZTDB, 2000e, p. 8). Table 3.9 below indicates the United States' main exports to New Zealand, Australia, Chile and Singapore, in 1995 US\$ millions.

Table 3.9 The United States' Major Exports

	New Zealand	Australia	Chile	Singapore
1	Other Manufactures (677.9)	Other Manufactures (5299.0)	Other Manufactures (1378.8)	Other Manufactures (10037.5)
2	Services (638.5)	Services (3191.8)	Services (793.6)	Services (3730.2)
3	Chemicals (360.7)	Chemicals (360.7)	Motor Vehicles and Transport Equipment (577.4)	Chemicals (1599.9)
4	Motor Vehicles and Transport Equipment (229.2)	Motor Vehicles and Transport Equipment (1686.3)	Chemicals (574.4)	Motor Vehicles and Transport Equipment (1303.8)
5	Wood and Paper (79.9)	Wood and Paper (568.1)	Wood and Paper (155.8)	Metals and Metal Products (4643.0)

The table shows a very common pattern for United States' exports, dominated by manufactured goods, services, chemicals, transport, and wood and paper products. It would make gains if it formed a PTA with New Zealand, as New Zealand has tariffs of around 5% on imported manufactured goods from the United States, and of around 7.5% on wood and paper. If Australia were included in the PTA, the United States' exporters would make gains in the sectors producing manufactured goods (7% tariff), chemicals (6.7% tariff), motor vehicles and transport equipment (10% tariff), and wood and paper (5% tariff). It would also benefit from Chile's reducing its flat 10% tariff in all sectors, and may make some large gains if Singapore were to reduce its tariffs on its transport sector.

3.6.2 The United States' imports

The United States' major sources of imports are Canada, Mexico, Japan, Western Europe and China. At a very aggregated level, its imports consist of capital goods (29% of total imports), industrial supplies (25%), consumer goods (22%), automotive goods (16%) and food, feeds and beverages (4%) (NZTDB, 2000e, p. 9). At a slightly more disaggregated level, Table 3.10 displays the United States' top five imports from New Zealand, Australia, Chile, and Singapore in 1995 US\$ millions.

Table 3.10 The United States' Major Imports

	New Zealand	Australia	Chile	Singapore
1	Meat Products (463.1)	Services (1505.8)	Vegetables, Fruits and Nuts (466.0)	Other Manufactures (17906.7)
2	Food Products (257.7)	Chemicals (947.8)	Metals and Metal Products (431.6)	Services (4029.9)
3	Services (250.9)	Meat Products (505.0)	Natural Resources (260.3)	Chemicals (726.1)
4	Chemicals (171.8)	Other Manufactures (419.1)	Wood and Paper (232.9)	Clothing (461.8)
5	Other Manufactures (120.4)	Metals and Metal Products (316.5)	Services (223.0)	Wood and Paper (206.1)

If a PTA was formed between the United States and the other countries examined in this thesis, this table shows that there may be significant gains to be made to New Zealand if the United States reduced its tariffs on meats and dairy products, and on chemicals. Australia could also experience large benefits in the chemicals industry, and Singapore could benefit if the United States decreased protection in the clothing and chemicals industry. Due to the already low levels of tariffs on Chilean goods entering the United States, Chile's exporters may not make significant economic gains from such a PTA.

CHAPTER 4

THE THEORY OF PREFERENTIAL TRADING ARRANGEMENTS

4.1 Introduction

It has long been recognised that completely free trade is the most beneficial regime under which countries should trade with each other. Adam Smith in his 1776 masterpiece, *An Inquiry into the Nature and Causes of the Wealth of Nations*, attacked the mercantilist notion of increasing national wealth by accumulating precious metals, via an improvement of the Balance of Merchandise Trade. If this amelioration was achieved using export subsidies and heavy import restrictions, Smith suggested that this was a zero-sum game. Smith suggested that import protection that created a monopoly for the domestic industry was utterly inefficient: “If the produce of domestick can be brought there as cheap as that of foreign industry, the regulation is evidently useless. If it cannot, it must generally be hurtful” (Smith, 1776, WNIV ii.11). Using his ‘Absolute Advantage’ framework, Smith went on to show that “[I]n every country it always is and must be the interest of the great body of people to buy whatever they want of those who sells it cheapest” (Smith, 1776, WNIV iii.c10).

In recent postwar times, the General Agreement on Tariffs and Trade (GATT), and its successor, the World Trade Organization (WTO) have continued Smith’s work. The multilateral liberalisation program which it promotes, and to which over 130 governments subscribe, has been, on the whole relatively successful. Tariff barriers have fallen dramatically over recent decades, and world trade figures continue to increase. The ultimate goal of liberalisation is to achieve a world completely without trade restrictions as “in a competitive global economy, completely free trade will maximize welfare” (Lawrence, 1996, p. 22). The path towards this nirvana, however, has not been smooth. As demonstrated by the Uruguay Round of the GATT, which took place over the 1986-1993 period, negotiation on multilateral trade liberalisation is

fraught with political difficulties, and a consensus on the most suitable method of progression towards the 'First Best' situation of complete free trade is virtually impossible to achieve. Due to problems with multilateralism, many nations have been focusing their trade policy attentions towards regional, rather than global, integration. This shift of attitude towards regionalism has spawned a great deal of academic interest, and is a constantly evolving area of research. The recent proliferation of preferential trade arrangements (PTAs) are examples of economies applying the 'General Theory of Second Best', as first generalised by Lipsey and Lancaster (1956) and Meade (1955). This theory suggests that "reducing some [trade] distortions while others remain in place does not necessarily increase welfare" (Lawrence, 1996, pp. 22-23). Thus whilst global free trade is the ultimate goal of the WTO, it must first deal with the expansion of regional trading regimes, and specifically with the emergence of PTAs that have appeared in the last decade.

This chapter examines some of the vast amount of literature that has been written on the theory of PTAs. The literature review is presented as follows: Section 4.2 provides a general discussion of PTAs, including definitions of the common types of trade agreements, the history of regionalism, and the role of the GATT/WTO in regards to PTAs. Section 4.3 examines the major specific theories of PTAs that have emerged following Viner's seminal work 'The Customs Union Issue' in 1950. These theories include trade diversion and creation, the McMillan criteria for permitting PTAs, the Gravity model and the Natural Trading Partners theory, and the political economy of PTAs.

4.2 A General Overview of Preferential Trade Arrangements

4.2.1 Definitional issues

Prior to presenting a general overview of PTAs, it is necessary to define the terms which commonly appear in the literature on this subject area. The majority of trading agreements involve a reduction in trade barriers between the member nations, but there are various possibilities that can present themselves. It must be noted, however, that the lines of separation between the five different arrangements outlined below are, in

reality, somewhat blurred. Agreements often change and develop, and rarely fit neatly into one specific category of trade arrangement.

In ascending order of integration, the first definition is that of a Preferential Trading Arrangement (PTA). This very general type of agreement “is any trading agreement which permits the importation of goods from countries signatory to the preference at lower rates of duty than are imposed on imports from third [non-signatory] countries³⁰” (Krueger, 1995, p. 5). Such PTAs can be partial either in terms of the amount of tariff reduction or in terms of the commodities included in the agreement. An example of a PTA would be any of the Economic Complementations Agreements (ECAs) signed by Chile over the last decade, which are focused on a specified range of goods, and which have not reduced tariffs to zero between the members. It is important to note that in this research, the phrase PTA will be used as a general term to denote any of the definitions that follow below.

A second possibility is a Free Trade Agreement (FTA). This is simply an economically deeper PTA whereby “tariff rates among members are zero, although external tariffs [to non-members] may be at different rates for different members of the arrangement” (Krueger, 1995, p. 5). Again, some sectors may be specified as being exempt from duty-free trade. Examples of such agreements are the CER trade arrangement between Australia and New Zealand, and the NAFTA pact signed by the United States, Canada and Mexico. In both of these cases, the transition from a protected trade situation to a FTA included a period of the members entering a PTA where the level of protection between the signatory nations was gradually reduced³¹.

³⁰ Non-member nations obviously have an incentive to try to access an entire PTA via exporting to the PTA member with the lowest tariff. “In order to avoid such trade diversion, *rules of origin* are used to distinguish products which originate within the [PTA] (which should benefit from low or zero tariffs or other benefits) from products which originate in third countries (which are subject to the higher tariff applicable to non-members)” (Woolcock, 1996, p. 197). In order to satisfy rules of origin criteria, commodities must either undergo a change in tariff heading, undergo a substantial transformation, or have a high degree of value added to it in a country. For a fuller discussion of rules of origin, the reader is directed to Woolcock (1996), Lawrence (1996, ch. 8), and Anderson and Blackhurst (1993, ch. 15).

³¹ In this research, the GTAP experiments reflect the fact that negotiating countries are unlikely to move immediately into a PTA. Thus in the first instance, a PTA is modelled whereby tariffs are reduced in all sectors apart from the agricultural areas. After this transitional phase, the second experiment in each scenario is 100% liberalisation in all sectors.

The next definition on the sliding scale of integration is that of a Customs Union (CU). Following the logical progression from a PTA, via a FTA, “a CU is an FTA with a common external tariff (CET) by partner countries” (De Melo, Panagariya, and Rodrik, 1993, p. 160). In other words, a CU is just a FTA where all members use the *same* tariff rates to non-members. An example would be the CU between Turkey and the European Union (EU), whereby despite not being an official member of the EU, Turkey is now subject to its CET and most of its trade and competition laws.

A further extension of a CU is the Common Market, “in which not only movement of goods and services, but also of factors of production, is relatively free among member countries” (Krueger, 1995, p.6). This implies that labour and capital are free to shift between signatories without penalty. Increased factor mobility allows firms in one member nation to invest in another member without restriction, in order to seek maximum returns. Workers may also seek employment elsewhere in the Common Market without the cost of acquiring visas and other permits. This free factor mobility applies in the CER agreement, although it must be noted that the CER nations do not have a CET.

The deepest form of economic integration³² is Economic Union, “in which all producers and consumers within the arrangement are governed by the same rules, in the sense that participants in one geographic part of the market may not be prevented from operating in another part of the market (Krueger, 1995, p. 6). This form of PTA could involve the harmonisation of environmental and quarantine regulations, social policy equivalence, and any other form of common statutory documentation. The most obvious example of this would be the European Common Market prior to its political unification. Once again, the CER has progressed along the path towards becoming an economic union, with legislation such as the 1990 Agreement on Standards, Accreditation and Quality which aimed to reduce the impact of technical barriers to trade, and the 1994 reciprocal Social Security Agreement (see Section 2.2.3 for further details).

³² Baldwin (1997, pp. 867-869) distinguishes between PTAs that are ‘deep’ and those that are ‘shallow’. Deep integration includes not only the reduction of trade barriers, but also involves policy harmonisation, agreements on health and safety issues, etc. Shallow PTAs on the other hand, aim only to reduce trade barriers. Using these criteria, the only truly deep PTAs are the Australia-New Zealand CER and those in Europe.

One final definition must be considered, and it is that of a Political Union. This is an extension of the Economic Union, and involves individual nations agreeing to forego some degree of national sovereignty in order to be governed by a supra-national authority. For example, the use of the common European currency (named the 'Euro') in the EU has led to the formation of a European Central Bank, which controls the circulation of Euros. This removes the ability of each EU member to completely control its domestic monetary policy. Political Union is the deepest, and perhaps the most contentious, form of integration possible between nations. It is not easy to achieve³³, as has been seen by the prolonged negotiations in the EU.

The definitions outlined above are often used interchangeably in the literature, so readers must be careful to note exactly what form of trading arrangement is being examined, and what stage of its development the arrangement has reached. One common feature of the majority of PTAs is the regional proximity of members, although this is neither a necessary or sufficient condition for forming such an arrangement³⁴. Many commentators have thus labelled the shift in economic focus away from multilateralism as 'Regionalism'. This generic term reflects the tendency for nations searching for potential partners in a PTA to look on their doorsteps at their closest neighbours³⁵.

4.2.2 A brief history of regionalism

The recent expansion in the number of PTAs observed globally may have given many readers the impression that this is a new phenomenon. This, however, is not the case. Moves away from the multilateral approach to the reduction of trade barriers towards more localised trade negotiations, or regionalism, have a long history.

³³ Perhaps the best example of a Political Union is the United States, whereby each state, whilst maintaining its own laws and practices, is subject to overall control from the national government.

³⁴ Indeed, one of the United States' first bilateral PTAs was with Israel.

³⁵ Bhagwati (1993, p. 22, emphasis added) confirms the tendency for regionalism and PTAs to be used as synonyms when he suggests that "[t]he question of regionalism, *defined broadly as preferential trade agreements* among a subset of nations, is a longstanding one".

The 'First Regionalism', as Bhagwati names it, stemmed from the formation of the European Community in 1958. Despite the fact that the EC proposal did not comply in full with the GATT legislation, the United States helped push the proposal through to gain GATT approval. Whilst the United States had long been suspicious of PTAs, it saw that there could be possible political benefits that would accrue to them from the creation of a trade bloc in Europe (Bhagwati, 1993, p. 28). Naturally, with the world's largest trading nation backing the concept of regionalism, a proliferation of PTA proposals appeared, including an early suggestion for a NAFTA³⁶, and even a Pacific Free Trade Area (PAFTA).

Involvement in PTA discussions was not solely limited to developed nations, however, and many developing countries - with the goal of accelerating industrialisation via the economies of scale to be gained from larger commodity markets - proposed PTAs amongst themselves in the 1960s. Ultimately, bureaucratic inefficiency caused the downfall of such proposals, and the first wave of regionalism had virtually disappeared by the end of the decade, the EC notwithstanding (Bhagwati, 1993, p. 28).

Multilateral trade negotiations via the GATT forum became very much the vogue in the 1970s and early 1980s, and trade barriers were reduced substantially during this period. This successful period of multilateralism then encountered a number of problems, which led to Bhagwati's 'Second Regionalism'.

Since the end of the Tokyo Round of the GATT negotiations in 1979, increasingly complex trade issues such as intellectual property rights have stalled the GATT/WTO's ability to curb rising protectionist measures (Schultz, 1996, p. 30). Nations have become frustrated with the slow progress made in multilateral trade negotiations, and have sought an alternative. This frustration, along with the conversion of the United States from being the staunchest defender of multilateralism into an aggressive follower of regionalism, has led to the recent trend towards PTAs. The introduction and subsequent success of PTAs involving major industrialised nations, such as the NAFTA, the Australia-New Zealand CER, and the EU, have created an impression that such arrangements are here to stay (Schultz, 1996, p. 30;

³⁶ In this case, NAFTA was the acronym for the North *Atlantic* Free Trade Area, inclusive of the United Kingdom, as opposed to the current NAFTA involving the United States, Canada and Mexico.

Bhagwati, 1993, p. 31). A further important reason behind the shift away from multilateralism towards regionalism is the possibility that world trade may be polarising into three main centres, namely the EU, North America, and East Asia (Chatterjee, 1999, p. 2). In view of this, many nations wish to form strategic alliances with one or more of the major trading partners in these blocs in order to avoid being 'left in the cold' in future trade negotiations.

Only history will tell if this second wave of regionalism is destined to head in the same direction as the 'First Regionalism'. What is clear is that the new batch of PTAs appears to be more permanent in nature than those of the 1960s. This creates a variety of issues for organisations such as the WTO, as suggested by Page (1996, p. 76):

[W]orld-wide multilateral organisations will face a new type of member, which is neither a traditional country nor simply a very large country. They will also need to operate in a different type of international economic system: with a smaller number of larger actors; potentially, a different spread of country or national interests in different areas; and possible conflicts within as well as between negotiating parties.

With this warning in mind, it is now appropriate to examine the role of the GATT and its successor the WTO³⁷ in dealing with PTAs, and to discuss whether or not changes to legislation need to be effected in order to deal with the current shift in focus in international trade negotiations.

4.2.3 The General Agreement on Tariffs and Trade and preferential trading arrangements

The General Agreement on Tariffs and Trade (GATT) was signed in Geneva in 1947 by 23 nations, who agreed that there was a need for mutual reductions in tariffs, in

³⁷ Note that the following discussion uses the phrase 'the GATT' instead of its successor 'the WTO'. This is simply because the legislation is named the GATT, and because much of the literature on the subject was written prior to the formation of the WTO.

order to reverse the move towards protectionism that occurred in the 1930s. Södersten and Reed (1994, p. 351) suggest that GATT had three main objectives:

- (i) To provide a framework for the conduct of trade relations;
- (ii) To provide a framework for, and to actively promote, the progressive elimination of trade barriers; and
- (iii) To provide a set of rules - a code of conduct - to prevent unilateral action by nations.

The over-riding principle of the GATT legislation is that multilateral trade negotiations must be non-discriminatory in nature. This is outlined in the Most-Favoured Nation (MFN) clause in Article 1 of the GATT³⁸. The unconditional MFN rule states that “no contracting party can treat the trade of any other country... more favourably than any other GATT contracting party: any concession which is given to any country must be passed on immediately and unconditionally to all contracting parties” (Snape, 1999, p. 276). Thus if any member of the GATT grants preferential trade access to a trading partner, it must also provide such access to all other GATT members. Therein lies a problem: PTAs by definition aim to give preferential treatment to other signatories of the arrangement - they are *discriminatory* by definition. Since PTAs or regional arrangements had long been a feature of international trade, the GATT recognised this and thus created a MFN exception clause: Article XXIV.

Article XXIV (paragraph 5) of the GATT states that “the provisions of this Arrangement shall not prevent... the formation of a customs union or of a free-trade area or the adoption of an interim agreement necessary for the formation of a customs union or of a free-trade area”. There are, however, some qualifications to this statement. Departures from the MFN obligation are permitted only if the FTA or CU meets three conditions (Snape, 1993, p. 34; GATT Article XXIV, paragraph 5):

- (i) Tariffs and other restrictions are eliminated on ‘substantially all’ trade between the members of the arrangement;
- (ii) The general incidence of duties and regulations affecting third parties (i.e. non-CU or FTA members) is no higher after the CU or FTA is formed than it was beforehand; and

³⁸ The full text of the GATT is available online at <http://www.ciesin.org/TG/PI/TRADE/gatt.html>

- (iii) The agreement contains a time plan for the its complete formation within a reasonable length of time - exceeding ten years only in exceptional circumstances.

As will be discussed below, these conditions are somewhat ambiguous in their interpretation, so much so that the majority of PTAs could be said to break the rules laid out in Article XXIV. Indeed, Schultz (1996, p. 37) notes that up to 1993, around 70 PTAs had been reviewed by the GATT, and only four were declared fully compatible with Article XXIV. To compound the ambiguity surrounding the Article XXIV provisions, however, no agreement has ever been declared as being incompatible with the GATT rules! Due to such issues arising, and to the recent trend towards the creation of more PTAs, various economic commentators (Sampson, 1996; Schultz, 1996; LeClair, 1997; Lawrence, 1996; McMillan, 1993) have suggested that Article XXIV of the GATT requires either extension or complete overhaul.

4.2.4 Is a reform of the GATT Article XXIV required?

The exception clause of Article XXIV that permits PTAs is open to relatively wide interpretation. Bhagwati (1993, p. 27) suggests that ambiguities in the Article could be exploited on two fronts. First, the requirement that protection be eliminated in 'substantially all areas' of trade between signatories is not clear-cut. Who defines exactly how 'substantial' these reductions are? Bhagwati (1993, p. 27) proposes that "skilful lawyers and representatives of governments could work wonders with the concept of 'substantially all trade'", and that even if a cut-off point was put into place - for example that 75% of initial trade barriers must be eliminated - it would be unclear as to whether this meant a 75% cut across all sectors, or a complete elimination in 75% of sectors. Lawrence (1996, p. 97) adds that the requirement to eliminate 'substantially all' trade barriers is not backed by trade theory: "Does such a rule make sense? Pure trade theory would say, not necessarily, because it is quite possible that partially removing some internal barriers could be better than completely removing all of them".

A second source of ambiguity is the provision for interim arrangements, where the reduction of trade barriers may not yet be down to 100%. "Evidently, if they were

stretched out over very long periods, [GATT would be] *de facto* sanctioning ‘less than 100 percent’ preferential arrangements” (Bhagwati, 1993, p. 27). Whilst these interim arrangements are not supposed to exceed ten years in duration, the ‘exceptional cases’ in which this period may be extended are not specified.

The issue of how to improve the GATT Article XXIV has prompted a wide range of ideas. Lawrence (1996, p. 103) suggests that there is a wider problem at stake, namely the fact that GATT enforcement in general has been too weak. He wonders how tighter constraints on PTAs will be enforced if the current lax regulations on them cannot be adhered to. Thus he proposes that reforms are required to make GATT enforcement more effective and credible. Schultz (1996, p. 35) recommends that Article XXIV should be extended to make it possible to reject new PTAs on the basis of non-liberal accession rules (i.e. if they do not allow for non-member nations to enter the arrangement in the future) and to provide for compensation of non-member nations that are adversely affected by the PTA. Bhagwati advises that in order to minimise the negative trade diversion effects of a PTA, the GATT should rule out FTAs with differing external tariffs, allow only CUs, and “write into Article XXIV the requirement that the *lowest* tariff of any union member on an item *before* the union must be part of the CET of the union”³⁹ (Bhagwati, 1993, p. 36, author’s emphasis). Finally, Sampson (1996, p. 91) suggests that reductions in ‘substantially all trade’ be changed to simply read ‘all’, and that the Article should spell out definitively which border measures could be considered as barriers to trade.

It would certainly appear that whilst the GATT/WTO must continue to push for multilateral reforms in international trade, it must also consider the fact that nations are increasingly turning towards regionalism as a method of improving welfare. Unless the GATT/WTO leaders review and alter their legislation, they are perhaps in danger of being left behind current trends. Some steps have already been taken by the WTO to address more completely the issues raised above: “In February 1996, the WTO General

³⁹ LeClair (1997, p. 90) argues that Bhagwati’s proposals are unlikely to be accepted for two main reasons. First, he suggests that the EU would “show no interest in adopting a tariff structure that might be driven by the trade policies of new entrants to the Union [who may have significantly lower tariffs than in place in the CET of the EU]”. Secondly, he notes that this idea may result in the elimination of the increasingly common PTAs between developed and developing nations, as the often heavily-protected developing nations is unlikely to wish to adopt the lower tariff rates of its industrialised partner.

Council established the CRTA [the Committee on Regional Trade Agreements], to centralise in a single body the effort of the various working parties devoted to examining individual RTAs, and to provide a forum to discuss the systemic implications of RTAs for the multilateral trading system and the relationship between them” (WTO, 1999). This is an encouraging sign that the WTO is no longer able to ignore the importance of regionalism in world trade.

4.3 The Theory of Preferential Trade Arrangements

There has been a vast amount of academic study conducted on the general area of PTAs, initiated by the seminal works on CUs by Viner (1950), Meade (1956) and Lipsey (1957, 1960). To date, there has been little consensus on many issues. This section examines the major theories of PTAs, and discusses the most important areas of debate.

4.3.1 The motivations behind the formation of preferential trade arrangements

The last two decades have seen a great number of nations engage in trade negotiations designed to create PTAs. As outlined in the introduction to this chapter, it is widely accepted that global free trade is the optimal situation. This knowledge, however, has not stemmed the flow of policy formation that is currently focusing on regional, rather than multilateral trade barrier reductions. Thus we must consider the following question: If completely free, non-discriminatory global trade is the ultimate goal of trade negotiations, why have so many countries formed PTAs over the last twenty years?

Two major motivations for such arrangements can be identified. First, with the GATT/WTO membership continually expanding⁴⁰, multilateral agreement on trade issues is becoming increasingly difficult. The Uruguay Round of GATT negotiations lasted over seven years (1986-1994), compared with six for the Tokyo Round (1973-

⁴⁰ As of September 2000, there were 138 members of the WTO, with the state of Albania becoming the latest member. The initial GATT legislation was signed by just 23 nations.

1979) and three for the Kennedy Round (1964-1967). Whilst this longer time period also reflects the more ambitious nature of the Uruguay Round in tackling issues such as non-tariff barriers, intellectual property rights, trade in services, and the thorny area of agricultural trade, it also suggests that reaching an agreement that was mutually acceptable to all the WTO members was very time-consuming. Frustration with the perceived slow progress of multilateral liberalisation has led nations to examine other alternatives in trade barrier reduction. For many WTO members, the most viable and attractive alternative was to turn their attention to regional agreements in the form of PTAs. This is very much the case for New Zealand: “the general lack of will to revitalise the tariffs issue via APEC and the WTO is also forcing free-traders such as New Zealand to take the precaution of stitching together such bilateral and trilateral agreements among themselves” (New Zealand Herald Online, 13th November 2000).

The second “main driving force for regionalism today is the conversion of the United States, hitherto an abstaining party, to Article XXIV” (Bhagwati, 1993, p. 29). The world’s largest trading nation had previously been a keen follower of multilateral trade liberalisation, but in recent times has first accepted, and then embraced participation in PTAs⁴¹. Such a shift in paradigm by the United States has had a huge influence on other nations: “its decision now to travel the regional route... tilts the balance of forces at the margin away from multilateralism to regionalism” (Bhagwati, 1993, p. 29).

Some further motivations for regional integration are put forward by Schultz (1996, pp. 21-22). The majority of these of course apply equally to multilateral trade barrier reduction, but as explained above, many nations have turned to regionalism as an alternative to such negotiations. First, the increased intra-PTA competition resulting from a PTA should lead to efficiency and productivity gains, and thus increased income in the long run. Secondly, the net impact of lowering barriers to trade in a regional forum is expected to be positive, despite the possibility of trade diversion (discussed further on). Thirdly there may be other policy motives behind forming a PTA, such as a goal to co-ordinate macroeconomic policy reforms, or to attract foreign direct investment. Fourthly, political concerns are often cited in the push for regional integration. By being a member of a PTA, especially if one of the other partners is an

⁴¹ For a more detailed discussion of the United States’ change of policy attention, see Bhagwati (1993, pp. 29-31).

important trading nation, a country may gain more weight in trade negotiations. For example, with the aid of the United States, Mexico will certainly have more negotiating power now that it is a member of NAFTA, than when it was acting alone. A final consideration is the fact that by promoting intra-regional trade, transaction costs may be reduced, particularly in terms of transportation costs. The dissemination and absorption of knowledge is also more effective when effected in a regional situation.

The reasons given above may explain why regionalism has been accepted by many nations as an attractive option in terms of improving their economic conditions. The majority of these nations, however, still pledge their allegiance to the WTO's ultimate goal of complete global free trade. This creates an apparent conflict - nations *admire* the theory of multilateral liberalisation with non-discrimination, but *act* in a discriminatory, regional manner. Thus the main questions that must be addressed when considering the formation of PTAs are twofold:

- (i) How can it be determined if a PTA is beneficial to world welfare?
- (ii) Does regionalism compete with or complement multilateral liberalisation?

These questions are addressed in the following two sections.

4.3.2 The static welfare effects of preferential trading arrangements

As Bowen, Hollander and Viaene (1998) note, it may seem "*a priori* that [PTAs] are a good thing because they represent a move toward freer trade. However, the common feature of these agreements is the discriminatory treatment which favours members relative to non-members" (Bowen *et al*, 1998, p. 504). This was first recognised by Jacob Viner's seminal work 'The Customs Union Issue' (1950), which was later criticised and expanded upon by Meade (1956) and Lipsey (1957, 1960). In its simplest form, Viner's theory recognised that there were two effects that occurred after the formation of a PTA⁴². First, trade is liberalised amongst members. If production in the economy of one member of the PTA is replaced by imports of that same good from a more efficient producer in the PTA, then 'trade creation' is said to occur. In other words, this occurs with the "replacing of relatively high-cost production with lower-

⁴² Note that Viner's analysis was focused on CUs, but it also applies to PTAs in general.

cost imports from the partner country [within the PTA]" (Södersten and Reed, 1994, p. 324). This improves welfare in the world, as resources are used more efficiently than before the PTA was formed.

The second effect occurs because nations in a PTA will replace imports of a good from a non-member with those from a PTA partner due to the absence of import duties, even though the non-member may be a more efficient producer. This 'trade diversion' can be defined as occurring when "a country switches its source of imports from a more efficiently-producing [non-member] country to a less efficiently-producing country because of the [PTA]" (Södersten and Reed, 1994, p. 325). This action results in lower world welfare because it entails a less efficient allocation of resources in the world as a whole. The relative strengths of the two opposing effects determine whether the PTA will be beneficial or detrimental to world welfare. If the PTA is a *net* creator of trade, it can be said, in this simple Vinerian analysis, that the PTA improves world welfare. If the trade diversion effects outweigh the trade creation effects, then the PTA is welfare reducing. Thus "if one wishes to predict the welfare effects of a [PTA] it is necessary to predict the relative strengths of the forces causing trade creation and trade diversion" (Lipsey, 1960, p. 498). A simple graphical exposition of Vinerian trade diversion and creation can be found in Appendix A. It must always be remembered that even if the PTA results in a net welfare gain, "it is still an exercise in the theory of second-best, as it is only universal free trade that offers the first-best Pareto optimum" (Chatterjee, Rae and Shakur, 2000, p. 7).

It might be natural to conclude that in order to improve world welfare, the GATT/WTO should allow all PTAs that are trade creating, and reject all PTAs that are trade diverting. The issue, however, is not that simple, and post-Vinerian literature examines the various reasons why Viner's conclusions may not hold. These studies focus on the following restrictive or unrealistic assumptions made by Viner: that the home country was small relative to the partner country and the non-member and thus could not affect the terms of trade; that there were constant costs of production in the home country; and that commodities were consumed in fixed proportions before and after the formation of the PTA.

4.3.3 Problems with the Vinerian model

Viner's basic analysis was a groundbreaking formalisation of PTA theory, and provided a useful analytical foundation for further studies in the area. The Vinerian model, however, has been criticised and expanded upon by many authors since its conception. The general conclusion reached by these commentators is that it is too simplistic: "[T]he conventional trade creation and trade diversion are not the entire story in deciding on the welfare outcome for an *individual* member of a PTA. Even if trade creation effects are larger than trade diversion effects so that the [PTA] as a whole benefits, an individual member could lose" (Bhagwati and Panagariya, 1996, p. 7, authors' emphasis).

One explanation of why this may occur is that due to the redistribution of tariff revenues following the formation of a PTA, a nation may suffer adverse income distribution effects. After trade barriers are removed on a PTA partner, but not on the rest of the world, the terms of trade within the PTA are altered, shifting in favour of the partner. This causes a redistribution of tariff revenue, and the "unfavourable effect on a member country is obviously determined by the degree of preferential access it gives to the partner in relation to the preferential access it receives from the latter: the greater the margin of preference the country gives, the more it stands to lose" (Bhagwati and Panagariya, 1996, p. 7). For a more in-depth look at the terms of trade effect, see Krauss (1972, pp. 421-423).

A further problem with Viner's original analysis is that he assumed fixed proportions in consumption - that is he ruled out substitution between commodities as a result of price changes. He looked only at the *shifts* in the location of production as the cause of welfare changes. Krauss suggests that this, along with the assumption of constant costs of production (see below for further comments), "fail[s] to describe the 'real world', [and thus] the applicability of Viner's conclusions is severely limited" (Krauss, 1972, p. 414). This assumption also resulted in Viner's conclusion that a trade diverting PTA necessarily lowers welfare. By relaxing the fixed proportions assumption, Lipsey (1960, pp. 501-504) shows that this is not necessarily the case.

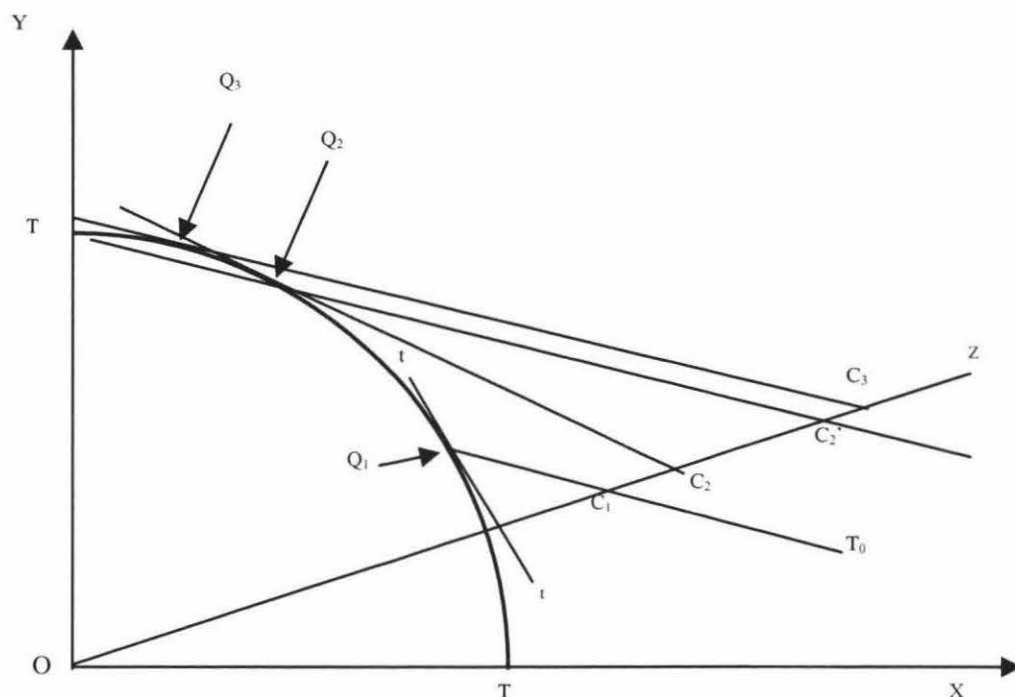
Referring to the work that he originally documented in 1957, Lipsey notes that there are two opposing effects in a trade-diverting PTA. First the home country switches its

import source from the non-member to the partner country. This reflects a move from importing from a low-cost supplier to a high-cost supplier, so “it now becomes necessary to export a larger quantity of goods in order to obtain a given quantity of import” (Lipsey, 1960, p. 502). This lowers the welfare of the home country. The second effect occurs when the removal of the tariff after the PTA is formed causes the elimination of the domestic and international price divergence. This equates the “marginal rate of substitution between the goods in *consumption* with their marginal rate of transformation in *production*, assumed to be initially distorted by a non-preferential tariff” (Krauss, 1972, p. 415, emphasis added). This gain in efficiency improves welfare for the home country. Therefore, the “final welfare effect of the trade diverting [PTA] must be the net effect of these two opposing tendencies; the first working to reduce welfare and the second to raise it”⁴³ (Lipsey, 1960, pp. 502-503). If the welfare gain is greater than the welfare loss, then obviously the trade-diverting PTA is not a welfare-reducing entity - contrary to Viner’s conclusion.

The second assumption that can be relaxed in order to show that Viner’s conclusions about trade-diverting PTAs being necessarily welfare-reducing is that of constant production costs in the home country. As shown by Melvin (1969) and Bhagwati (1971), “allowing variability of production costs in the home country results in a welfare gain that can exceed the welfare loss due to the diversion of trade; hence, a net gain can accrue to the home nation as the result of a trade-diverting [PTA]” (Krauss, 1972, p. 415). The concept is perhaps best shown diagrammatically, as in Figure 4.1 overleaf:

⁴³ Lipsey suggests that these opposing effects should be named the ‘inter-country substitution’ effect and the ‘inter-commodity substitution’ effect. “Inter-country substitution would be Viner’s trade creation and trade diversion, when one country is substituted for another as the source of supply for some commodity. Inter-commodity substitution occurs when one commodity is substituted, at least at the margin, for some other commodity as a result of a relative price shift” (Lipsey, 1960, p. 504).

Figure 4.1 The Welfare Gain from a Trade-Diverting PTA with Non-Constant Costs of Production in the Home Country



(Source: Krauss, 1972, p. 416)

Following the explanation of Krauss (1972, pp. 415-417), the line TT represents the production possibilities frontier in the home country, and OZ is the income expansion line. The initial terms of trade is shown by the slope of line T_0 , which determines the free trade production and consumption points, Q_3 and C_3 respectively. Now assume that the home country imposes a non-discriminatory tariff on the imported good X, which increases the price of X to the slope of line tt . This causes production to now be Q_1 and consumption to be C_1 . If the home country then forms a trade-diverting PTA with the partner, whose internal price ratio is equal to the slope of Q_2C_2 , production in the home country moves to Q_2 and consumption to C_2 . The latter shift represents an increase in welfare compared with the pre-PTA level C_1 . The shift from C_1 to C_2 can be separated into two effects:

- (i) The *production gain* from the PTA (moving from Q_1 to Q_2) is measured by the distance C_1 to C_2' ; and
- (ii) The *trade diversion loss* represented by the distance C_2' to C_2 .

If the production gain is larger than the trade diversion loss, then even though the PTA may be a net trade-diverter, there will be a net welfare gain from forming such an agreement - this is the distance C_1 to C_3 in Figure 4.1 above.

This analysis of the relaxation of the constant costs, fixed proportions and small country assumptions has shown that the basic Vinerian analysis is flawed. For a fuller exploration of these issues, the reader is directed to Meade (1956), Lipsey (1960), Kruass (1972), and Bhagwati and Panagariya (1996). With these criticisms in mind, it is clear that the static welfare analysis of PTAs is often insufficient to make firm conclusions. In response to this, Bhagwati (1991) developed the 'Dynamic Time-Path' analysis of PTAs, as explained in the next section.

4.3.4 The dynamic time-path analysis of preferential trading arrangements

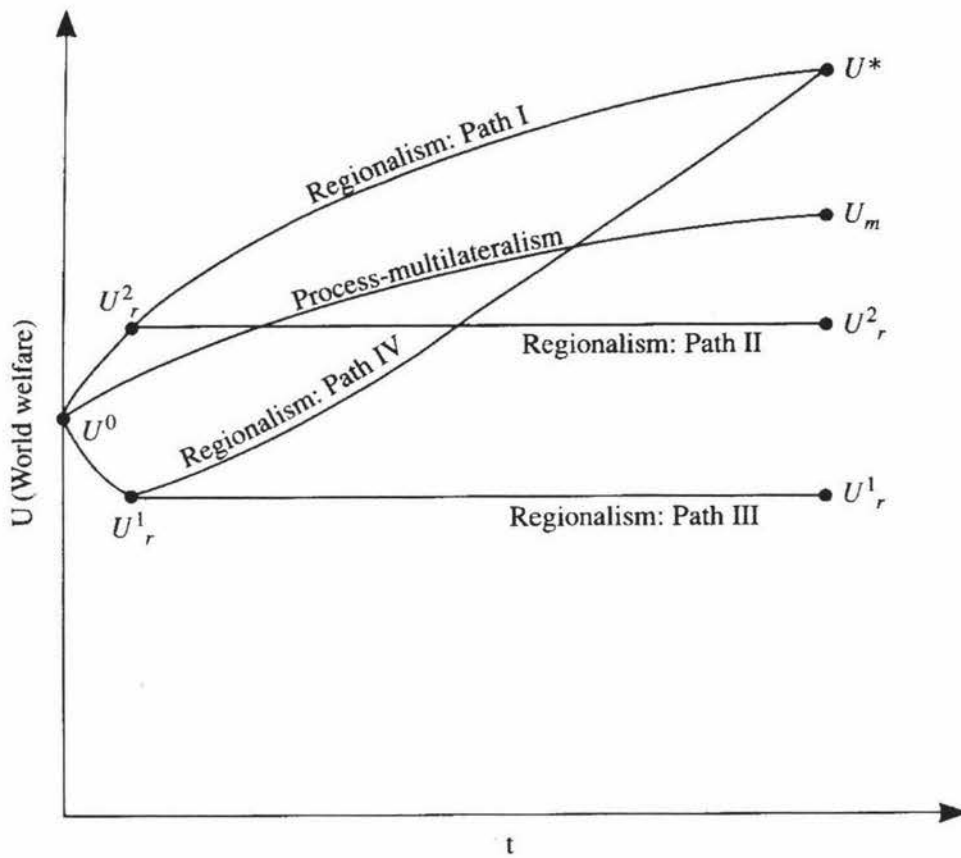
The static welfare analysis described above aims to answer the question of whether a PTA is 'good' or 'bad' in welfare terms. The dynamic time-path analysis, instead aims to answer the following question: 'Is the effect of a PTA to accelerate the continued reduction of barriers towards global free trade?' There are two possible answers. First PTAs could be seen as 'Building Blocks' towards world-wide barrier reduction. This is because PTAs can continually expand and admit more and more members, and as membership increases, the possibility of world-wide free trade becomes more likely⁴⁴. Alternatively, existing PTAs could refuse further accession, leading to an increasingly fragmented world economy whereby multilateral liberalisation is extremely difficult - in this case PTAs act as a 'Stumbling Block' on the road to global free trade. Bhagwati and Panagariya (1996) thus move away from static analysis to examine the *dynamic* effects of PTAs, and attempt to answer the question 'Are PTAs stumbling blocks or building blocks towards world-wide free trade for all?'⁴⁵

⁴⁴ As Meade states, "the best principle for the [multilateral] reduction of trade barriers is an all-embracing agreement, *covering all countries*" (Meade, 1956, p. 114, emphasis added). This re-emphasises the fact that if a PTA continues to expand, it could theoretically encompass every trading nation - resulting in global free trade.

⁴⁵ Baldwin (1997, p. 886) suggests that neither of these terms is appropriate for regionalism or PTAs. He explains that "most regional deals will weaken the key opponents of free trade (import competitors) while simultaneously strengthening its key proponents (exporters)...[thus] regionalism is half of the trade liberalisation 'wheel' that has been rolling towards global free trade since 1958 [when the Treaty of Rome was signed]".

Using Figure 4.2 below, Bhagwati and Panagariya examine two possible scenarios, first when the time-path of PTAs and WTO-style multilateral trade negotiations do not influence each other, and secondly (and more realistically) when both occur simultaneously and thus are interdependent.

Figure 4.2 Alternative Time-Paths Under Multilateralism and Under PTAs



(Source: Bhagwati and Panagariya, 1996, p. 43)

Figure 4.2 shows how world welfare changes over time, under various time-paths. Following Bhagwati and Panagariya (1996, pp. 43-45), for the ‘Regionalism’ (or PTA) paths, a vertical movement up the curve represents an expansion in membership. For the ‘Process Multilateralism’ path, such a movement represents non-discriminatory trade barrier reduction amongst WTO members (used as a proxy for the whole economic world). If regionalism and multilateralism are assumed to be independent of each other, then the PTA time-path neither accelerates nor decelerates the course of

multilateralism. If the PTA is stagnant - that is, it is not expanding its membership - then a net trade-creating PTA will cause an increase in world welfare from U^0 to U_r^2 (shown by time-path Regionalism II). A net trade-diverting PTA will cause world welfare to fall to U_r^1 , as shown by time-path Regionalism III. If membership is not expanding, then the world will become fragmented, and PTAs thus become a 'stumbling block' to world free trade. If these PTAs, however, continue to expand their membership, and consequently merge, then the optimal goal of reaching U^* may be possible. Regionalism Path I shows this occurring when the initial PTA is a net trade-creator, and Regionalism Path IV shows it when the initial PTA is a net trade-diverter. In these latter two scenarios, regionalism is a 'building block' towards global free trade. The WTO-style multilateral trade negotiations, as shown by the 'Process-Multilateral' time-path, may also reach U^* . The free-rider problem⁴⁶, however, may cause this route to fall short of U^* , and instead drop to U_m .

Conclusions are less easy to form when considering the case where nations may embrace both regionalism and multilateral liberalisation strategies. In this situation, "the [multilateralism] time-path becomes a function of whether the PTA time-path is travelled simultaneously" (Bhagwati and Panagariya, 1996, p. 44). For a variety of different theories regarding game theoretic and political economic approaches to this issue, the reader is directed to Baldwin (1993), Krishna (1998), and Levy (1994). Also see section 4.3.7 below.

4.3.5 The McMillan criteria

So how can it be determined whether or not a PTA is detrimental or beneficial to world welfare, given that the simple Vinerian framework is not a sufficient measure? McMillan (1993) has considered this issue, and his suggestion for determining if a PTA is harmful is simple. A PTA will generally make the member nations (as a whole) better off in welfare terms, via trade creation. Thus the important question is whether or not external, non-member nations are harmed by the PTA. McMillan, building on the work of Kemp and Wan (1976), suggests that if the PTA results in no lowering of trade between members and outside countries, then "the agreement makes its member

⁴⁶ The term 'Free Riders' in this context refers to nations benefiting from multilateral liberalisation who do very little to accelerate the process themselves.

countries better off without making the outsider countries worse off; and the member countries have an incentive to continue extending the integration by adding new members” (McMillan, 1993, p. 306). In other words, if the formation of a PTA can lead to a Pareto improvement, and the accession of further nations results in more improvements, then PTAs must be building blocks towards global free trade. Thus McMillan suggests that the desirability of PTAs can then be judged on an empirical basis, by looking at GDP and trade data of non-members, rather than on a purely theoretical or normative judgement. The McMillan criteria, as it came to be known, could therefore be used by the GATT/WTO to evaluate the desirability of PTAs after they have been implemented.

McMillan’s proposal, whilst intuitively appealing, has been attacked by other authors. Roessler (1993) suggests that it is altogether too simple, and notes that “most [PTAs] have their origins mainly in political considerations... [so to] propose that regional agreements be examined in the GATT solely in the light of economic efficiency considerations is thus to ignore the fact that most [PTAs] are not concluded solely for these reasons” (Roessler, 1993, pp. 312-313). He believes that transforming the McMillan criteria into a GATT rule of conduct capable of influencing the behaviour of governments could not be effected easily due to such political considerations, and concludes by suggesting that to effectively control PTAs, GATT would “require the creation of a review body that could act independently of the initiative of individual contracting parties” (Roessler, 1993, p. 323). The creation of the CRTA in the WTO (see 4.2.4) may be a move towards creating such an entity.

A further criticism in a similar vein is made by Wei and Frankel (1995), who suggest that the McMillan criterion is too harsh. They show, using a simple model involving three continental trade blocs⁴⁷, that in order to satisfy McMillan’s proposal, “member countries of trade blocs have to undertake dramatic trade liberalization against non-member countries. Such sweeping liberalization may be hard to achieve, for political economy reasons” (Wei and Frankel, 1995, p. 27). They conclude that if members of a

⁴⁷ These three blocs could represent Europe, North America and East Asia, in a tri-polar concentration of world trade, as suggested by Chatterjee (1999, p. 2).

PTA practice ‘Open Regionalism’⁴⁸, only “a relatively modest degree of external liberalization [less than 4%] is required for continental trade blocs to be welfare improving” (Wei and Frankel, 1995, p. 19).

So the McMillan criteria, whilst useful in principle as a rule to be used by the GATT/WTO in assessing the desirability of PTAs, suffers from ignoring political considerations and the possibility of open regionalism. A further explanation of the characteristics of a PTA that may result in an increase in world welfare is provided by the ‘Natural Trading Partners’ hypothesis.

4.3.6 The ‘Natural Trading Partners’ hypothesis

In the search for features of a potential PTA that are more likely to result in it being beneficial to world welfare, various authors (Wonnacott and Lutz, 1989; Summers, 1991; and Krugman, 1991) suggest that a welfare-enhancing arrangement is more probable if the members are ‘natural trading partners’ (NTPs). In this literature, nations considering the formation of a PTA are deemed to be NTPs if they are already major trading partners, and if they are geographically close⁴⁹. The explanation behind the former criterion is that if nations are already trading bilaterally in large volumes, a PTA will enhance this trade, rather than diverting it. The geographic proximity criterion is based on the fact that transport costs are liable to be lower between close nations, whereas if the nations are distant, then transportation costs could lead to economic inefficiency.

There have been a variety of applications of the NTP model that have been considered in the literature since its initial appearance. Whilst these are outside the scope of this research, interested readers are directed to Krugman (1991); Frankel, Stein, and Wei (1996); and Wei and Frankel (1995).

⁴⁸ Open regionalism is defined as the lowering of external barriers by members of a PTA to non-members as well as non-members, though possibly to a lesser degree (Wei and Frankel, 1995, p. 6). For a fuller discussion on the topic, and New Zealand’s adherence to the open regionalism concept, see Chatterjee (1999).

⁴⁹ Wonnacott and Lutz (1989) also suggest that levels of economic development and the degree of complementarity between the economies were also important. It is generally recognised that competing economies will gain more from a PTA than do complementary economies (Södersten and Reed, 1994, p. 342). Panagariya (1997, p. 473), however, notes that these criteria have largely been ignored in the subsequent literature.

If the NTP theory is to be accepted, then the analysis of the proposed PTAs considered in this research may seem to be futile. For example, a PTA between the CER nations and the United States would involve relatively high transportation costs due to the vast geographic distance between the two regions, which the theory suggests would result in a welfare-reducing agreement. Equally, New Zealand does not have a huge amount of trade with Chile, so a PTA involving the two nations would be detrimental to world welfare if the NTP hypothesis holds true.

It has been shown, however, that the NTP theory is not valid, and thus that PTAs may be welfare-enhancing even if the partner nations are not geographically proximate or do not already conduct a great deal of trade. Panagariya (1997, pp. 476) uses an increasing costs of production model to demonstrate that in complete contrast to the NTP hypothesis, “the larger the volume of imports coming from the partner... the greater the loss to [the home country] from its own preferential liberalisation”. This is mainly due to the large loss of tariff revenue that would occur if the home country previously imported a great deal of a commodity from its partner. Panagariya’s conclusion suggests that a proposed PTA between two nations that do not conduct a great deal of bilateral trade would be more beneficial than one involving two countries that already have a substantial amount of trade. Panagariya also argues that low transport costs are not a valid criterion for promoting regional trade. He suggests that “only if transport costs eliminate entirely international trade between distant countries can they serve as a basis for promoting regional PTAs” (Panagariya, 1997, p. 485). If trade is not eliminated, then such costs are just like any other cost of production, and thus “do not give a presumption in favour of regional PTAs being welfare superior to PTAs between distant partners” (Panagariya, 1997, p. 485).

A further criticism of the NTP hypothesis stems from Polak (1996). He examines the gravity model of international trade, which aims to explain trade between nations as being a function of their Gross Domestic Products and the distance between them⁵⁰. Whilst acknowledging that the model has had a degree of empirical success in explaining trade patterns⁵¹, Polak suggests that the model “lacks the theoretical

⁵⁰ The gravity model suggests that trade volumes will be positively related to the partners’ national incomes, and negatively related to the geographical distance between them.

⁵¹ For a New Zealand application of the gravity model, see Townsend and Ratnayake (1997).

foundations for such far-reaching conclusions [those made by Frankel, Stein and Wei, 1996]. Instead their findings should have led the authors to re-examine the gravity model itself' (Polak, 1996, p. 540). This point, and those conclusions made above by Panagariya suggest that the perceived necessity for potential PTA members to be geographically close and to have a large amount of trade between them, simply does not hold true.

So far the analysis of PTAs in this chapter has focused mainly on the economic aspects of such agreements. It would be naïve to suggest that political considerations do not play an extremely significant role in the formation of PTAs. Thus the next section examines the literature on the political economy of PTAs.

4.3.7 The political economy of preferential trading arrangements

As noted by Krugman (1993, p. 28), proposals for the creation of PTAs cannot be viewed solely in economic terms:

International trading regimes are essentially devices of political economy; they are intended at least as much to protect nations from their own interest groups as they are to protect nations from each other. Any discussion of the international trading system necessarily thus involves an attempt to discuss not what policy ought to be, but what it actually will be under various rules of the game.

The same author attempts to model trade policy by recognising that the influence of producers on governments plays a vital role in policy formation. For example, Krugman (1993, p. 65) suggests that the campaign contributions of firms - that may enable policy makers to become re-elected - are more important than the interests of its consumers when governments make decisions. Thus he uses a social welfare function that is weighted in favour of producer interests in order to determine the welfare maximising tariff rate. Using simple algebra, Krugman comes up with the following result for the optimal tariff:

$$\frac{t}{1+t} = \frac{\pi}{\varepsilon\mu} \quad (4.1)$$

where $t = ad\ valorem$ tariff level

$\pi =$ premium placed on producer interests

$\varepsilon =$ elasticity of import demand

$\mu =$ ratio of imports to domestic production

This suggests, not surprisingly, that tariffs will be high in industries whose producers command a heavy weighting in the government's welfare function (i.e. those who make the largest campaign contributions)⁵². Grossman and Helpman (1995) also consider the government's responses to both political pressures from industries and to the plight of the average voter⁵³, and reach a similar conclusion: that "political viability may require a sufficient number of industries that would experience enhanced protection as compared with the number facing reduced protection" (Grossman and Helpman, 1995, p. 680).

Krishna (1998, pp. 227-252) also emphasises the role of producers in trade policy negotiations, and provides a simple political economy framework in which "[t]rade policy is driven by the gains or the losses of domestic firms under the different trade arrangements being considered" (Krishna, 1998, p. 229). By lobbying the government, domestic firms can persuade policy makers to implement a trade policy when the expected gains are greater than losses after the change, and conversely to reject the negotiations when these firms as a whole become worse off. Using a Cournot-Nash style game theoretic framework, Krishna (1998, p. 229) reaches the conclusion that "[bilateral] preferential agreements that are 'trade-diverting' are more likely to be supported by the partner countries". The explanation of this result is that if trade is diverted from the rest of the world after the bilateral PTA is formed, it is more likely that producers in the two PTA partner nations will gain from the agreement. If no trade is diverted, then the PTA will be a zero-sum game, as some firms in each country will

⁵² The results also suggest that tariffs will be high in industries which have a low elasticity of demand for imports, as there will be lower distortionary costs of protection, or in industries which have a low import-domestic production ratio (Krugman, 1993, p. 68).

⁵³ Note though that, in contrast to Krugman, Grossman and Helpman do not use a social welfare function and instead use a game theoretic approach to trade negotiations.

gain from accessing the partner's industry from the PTA, and an equal amount will lose - the overall result being that the bilateral PTA would be less likely to be supported. An extension of this result is that if the PTA is strongly supported by producers, then it will be more difficult for the government to attempt multilateral GATT-style liberalisation. If producers are earning attractive profits due to the preferences granted by the PTA and the increased access to external markets from multilateral liberalisation do not generate sufficient rents to compensate for the loss of these PTA preferences, then the PTA will be preferred to multilateralism⁵⁴. Thus "multilateral liberalization that is initially feasible could be rendered [politically] infeasible by preferential trading arrangements. The larger the trade diversion resulting from the preferential arrangement, the more likely this will be the case" (Krishna, 1998, pp. 244-245). This suggests that PTAs are indeed a stumbling block to global free trade. This view is also supported by Krueger (1995, p. 22), who notes that "once trade diversion [resulting from a PTA] has taken place, the newly-established firms producing for the partner's market will constitute additional opposition to any moves away from preferential arrangements and toward globally freer trade"

Bagwell and Staiger (1997) view the effect on multilateral liberalisation of forming a PTA in two distinct phases. Using game theory, they show that during the transition between the proposal and implementation stages of a PTA, tension arises between members and non-members regarding multilateralism⁵⁵. This is because prior to the full implementation of the agreement (at which time there is a unilateral deviation from the previously agreed upon multilateral policies of all nations), trade flows between members and non-members will remain more or less unchanged, but there will be an expectation of lower flows in the future (Bagwell and Staiger, 1997, p. 293). This expectation will create a disincentive to maintain future multilateral co-operation in barrier reductions. Thus in the initial phase of PTA formation, multilateral liberalisation is hindered - again PTAs act as a stumbling block. This problem does not, however, continue in the longer term, and once the full impact of the PTA is felt, "greater multilateral co-operation can re-emerge once the new trading patterns are

⁵⁴ This is assuming that producers are important in political terms to the policy maker.

⁵⁵ Bagwell and Staiger (1997, p. 297), and Krugman (1993, p. 72), both suggest that trade policy negotiations resemble the famous 'Prisoners' Dilemma' game. All nations know that any symmetric step towards globally freer trade will monotonically result in welfare improvements, but in Nash equilibrium, tariffs are imposed, leading to lower levels of welfare.

more firmly established. This is due to the fact that the balance between actual current trading conditions, and future expected patterns can be restored once the PTA is established, allowing greater certainty about multilateral liberalisation” (Bagwell and Staiger, 1997, p. 293). For another interesting angle on the possibility of regionalism causing breakdowns in the quest for global free trade, with the focus on the risk of retaliation between PTAs, see Perroni and Whalley (1996).

CHAPTER 5

COMPUTABLE GENERAL EQUILIBRIUM APPLICATIONS OF TRADE LIBERALISATION

5.1 Introduction

The analysis of trade policy, and in particular, the study of trade liberalisation has become a vibrant research area over the last decade. Prompted by the ever-increasing number of regional arrangements present in world trade, a number of researchers have analysed the effects of creating or expanding PTAs. The tools which have been used in most of these analyses are Computable General Equilibrium (CGE) models, of which a wide variety exist. A simple definition of a CGE model is provided by Scollay and Gilbert (2000, p. 177): “CGE models are in essence numerical models based on general equilibrium theory, which are implemented in the form of a computer program”. In this research, the computer program used is the Global Trade Analysis Project (GTAP). This is discussed further in Chapter 6.

The reasoning behind the use of CGE models in trade analysis is well explained by Tan, Park and Toh (1999, p. 453):

CGE modeling has been widely recognized as a useful methodology to measure the impact of regional economic integration. As the impact of regional economic integration depends on complex microeconomic relations, intersectoral and intercountry linkages, CGE is preferable to traditional econometric and partial equilibrium analysis, which have difficulty in capturing the variety of microeconomic relations and complicated feedback effects.

The theory underpinning CGE models and an explanation of the GTAP model used in

this research can be found in the Methodology chapter which follows this chapter, along with a discussion of the limitations of such models. This chapter provides a brief overview of some of the uses of CGE models in trade liberalisation scenarios, in order to show that the technique employed in this research on the expansion of the Australia-New Zealand Closer Economic Relations trade arrangement is a common and accepted method of analysis. The chapter is set out as follows: Section 5.2 examines some of the techniques used in, and results of, CGE studies of APEC liberalisation; Section 5.3 discusses the use of CGE models in other trade liberalisation scenarios, including the accession of Chile to NAFTA, the expansion of the EU, and the study of a possible ASEAN PTA.

5.2 The Use of Computable General Equilibrium Models in the Study of Asia-Pacific Trade Liberalisation

The Bogor, Indonesia, meeting of the Asia-Pacific Economic Co-operation (APEC) leaders in November 1994 saw a declaration signed by the member nations, with one of the goals being free trade and investment in the APEC region by 2010 for industrialised economies, and 2020 for developing economies. In effect, the Bogor declaration proposed the creation of a PTA for all APEC member nations. “Since that announcement, considerable effort has been expended by a large number of researchers on quantifying the likely effects of such a move” (Scollay and Gilbert, 2000, p. 175). A summary of ten of these research reports on the effects of APEC liberalisation is presented below in Table 5.1.

The analyses produce some common results, as surveyed by Scollay and Gilbert (2000). They note that the overall world welfare gains in CGE studies of APEC liberalisation lie in the region between US\$54 billion to US\$519 billion, with APEC members benefiting from between US\$60 billion to US\$80 billion (Scollay and Gilbert, 2000, pp. 179-181). The reasons for these differing results are largely due to the model structure used and the experimental design considered (discussed by Scollay

and Gilbert, 2000, p. 181). Those models which are dynamic or recursively dynamic⁵⁶ tend to result in larger welfare gains, as do those which consider liberalisation from a future projected equilibrium, and those in which some sectors are imperfectly competitive. This is because such models allow for capital accumulation, increased capital mobility, technological progress and population growth. As a result of these alterations, dynamic or recursively dynamic models exhibit greater gains, via induced productivity increases after liberalisation, than those shown in static models. In regards to experimental design, studies that eliminate both tariffs and non-tariff barriers, and production and export subsidies, or those that assume reductions in transaction costs from liberalisation, also tend to result in larger welfare gains.

A number of clear distributional effects common to the majority of APEC liberalisation studies are noted by Scollay and Gilbert (2000, pp. 182-183):

- (i) All APEC members improve their welfare from an APEC PTA.
- (ii) The largest nations experience the most significant gains from liberalisation in absolute dollar terms; in particular the United States, Japan and China.
- (iii) When expressed as a percentage of GDP, the welfare gains are likely to be largest for the South East Asian developing nations such as the Philippines, Thailand and Malaysia.
- (iv) The main benefactor (in proportional terms) amongst the developed nations of APEC from complete liberalisation is New Zealand, especially when agriculture is liberalised.
- (v) The possible problem of the rest of the world 'free-riding' - that is, benefiting from APEC's unconditional MFN liberalisation without reciprocating - is negligible in most models.

⁵⁶ Dynamic models, as opposed to static models, explicitly include a time dimension, by modelling inter-temporal behavioural optimisation by economic agents. Recursive dynamic models do not consider this inter-temporal behaviour, but solve the model sequentially by updating the capital stock, population size and technology in an economy (Scollay and Gilbert, 2000, p. 177).

Table 5.1 A Summary of Selected CGE Models of APEC Liberalisation

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
<p>Scollay and Gilbert. (2000). <i>Measuring the Gains from APEC Trade Liberalisation: An Overview of CGE Assessments</i></p>	<ul style="list-style-type: none"> ▪ MRTS model⁵⁷ ▪ Static, perfectly competitive ▪ 15 aggregate regions ▪ 15 aggregate commodities ▪ Doubled Armington elasticities 	<ul style="list-style-type: none"> ▪ GTAP version 4 database ▪ 1995 US\$ ▪ Modified to be post-Uruguay Round, post-NAFTA and post-AFTA 	<p>Experiments:</p> <ol style="list-style-type: none"> 1. Broad-based APEC liberalisation: the removal of all import tariffs and export subsidies. 2. APEC Food System: the removal of all tariffs, export subsidies and production subsidies. <p>Scenarios:</p> <ul style="list-style-type: none"> ▪ MFN liberalisation by APEC members with/without reciprocation by non-members ▪ APEC free trade area or preferential agreement ▪ MFN liberalisation on a global basis 	<ul style="list-style-type: none"> ▪ For broad-based liberalisation, APEC welfare gains, using Equivalent Variation [EV], range between 1995 US\$55 billion to US\$118 billion. ▪ Gains to NZ between US\$1.48 billion and US\$4.19 billion. ▪ NZ gains the most as a proportion of its GDP. ▪ Agricultural liberalisation accounts for over 50% of total welfare gains for most APEC members. ▪ Minimal ‘free-rider’ effects from unconditional MFN liberalisation.

⁵⁷ For more details on this modified GTAP model, see Rutherford (1998) online at <http://nash.colorado.edu/tomruth/gtapingams/html/gtapgams.html>

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
Feridhanusetyawan. (1997). <i>Changing Trade Patterns and the Impact of Trade Liberalization in Asia Pacific.</i>	<ul style="list-style-type: none"> ▪ GTAP model ▪ 10 aggregate regions ▪ 3 aggregate sectors ▪ Static model 	<ul style="list-style-type: none"> ▪ GTAP version 2 database ▪ 1992 US\$ ▪ Unmodified 	Experiment: Partial liberalisation of tariffs and subsidies in all sectors – various scenarios.	<ul style="list-style-type: none"> ▪ The more progressive the liberalisation in APEC, the larger the welfare gains in EV terms. ▪ Welfare gains are between 1992 US\$26 billion and US\$51 billion. ▪ The results for Australia and NZ combined range between a loss of US\$876 million and a gain of US\$748 million, depending on the exact liberalisation scenario.

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
Adams. (1998). <i>Long-run Effects of APEC Trade Liberalisation.</i>	<ul style="list-style-type: none"> ▪ GTAP model ▪ 14 aggregate regions ▪ 12 aggregate sectors ▪ Capital is mobile, making the experiments long-run simulations 	<ul style="list-style-type: none"> ▪ GTAP version 3 database ▪ 1992 US\$ ▪ Modified to be post –NAFTA 	<p>Experiment:</p> <p>Complete removal of all <i>ad valorem</i> tariffs on intra-APEC trade. All other tariffs are maintained with the ROW.</p>	<ul style="list-style-type: none"> ▪ Small, open APEC regions benefit most in GDP terms, but all APEC economies gain in the long-run. ▪ NZ gains 2.6% of its real GDP, its exchange rate improves by 3.2%, and its terms-of-trade increases by 4.7%. ▪ NZ gains most in the agricultural sectors.

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
Ballard and Cheong. (1997). <i>The Effects of Economic Integration in the Pacific Rim: A Computational General Equilibrium Analysis</i>	<ul style="list-style-type: none"> ▪ GTAP model ▪ 2 versions: <ol style="list-style-type: none"> 1. Perfect competition 2. Imperfect Competition ▪ 9 aggregate regions ▪ 5 aggregated sectors ▪ Static 	<ul style="list-style-type: none"> ▪ GTAP version 3 database ▪ 1992 US\$ ▪ Unmodified 	Experiment: 100% removal of tariff and non-tariff barriers. Scenarios: <ol style="list-style-type: none"> 1. APEC FTA (all members) 2. Pacific FTA (APEC members, excluding United States and Japan) 3. East Asia FTA (Pacific FTA without Australia and NZ) 4. Global FTA (all regions remove barriers) 	<ul style="list-style-type: none"> ▪ The newly industrialised Asian nations gained the most as a % of GDP from an APEC FTA. ▪ Under perfect competition, Australia and NZ combined gain between 0.15% and 0.83% of GDP from scenarios 1, 2, 4. They lose marginally from an East Asian FTA. ▪ Under imperfect competition, the welfare gains are significantly larger. ▪ The larger the FTA, the larger the gains.

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
<p>Lee, Roland-Holst, and van der Mensbrugge. (1997). <i>APEC Trade Liberalization and Structural Adjustments: Policy Assessments.</i></p>	<ul style="list-style-type: none"> ▪ Model based on OECD's LINKAGE model⁵⁸. ▪ 20 aggregate regions ▪ 27 aggregate sectors ▪ Model calibrated to Social Accounting Matrices of each region ▪ Perfect competition, constant RTS. ▪ Dynamic model, as capital stocks and productivity can change 	<ul style="list-style-type: none"> ▪ GTAP version 3 database ▪ 1992 US\$ ▪ Unmodified, but solved forward up to 2020 	<p>Experiments:</p> <ol style="list-style-type: none"> 1. 100% APEC liberalisation, barriers to non-members retained. Developed countries remove barriers by 2010, developing countries by 2020. Linear barrier reductions over these periods. 2. Non-discriminatory MFN APEC liberalisation 	<ul style="list-style-type: none"> ▪ Under experiment 1, developed countries would gain by US\$57 billion, and developing countries by \$188 billion by 2020, compared to the baseline data. ▪ Australasia's GDP growth rate would increase from 3.2% to 4.0%. ▪ Intra-APEC trade increases considerably. ▪ Under experiment 2, developed countries would gain by \$67 billion, and developing nations by \$232 billion. Non-APEC members also gain significantly. ▪ Australasia substantially increases output of processed food and other agricultural goods.

⁵⁸ For a more detailed explanation of this model, see van der Mensbrugge (1997).

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
Dee, Geister and Watts. (1996). <i>The Impact of APEC's Free Trade Commitment</i>	<ul style="list-style-type: none"> ▪ IC95 hybrid model, incorporating elements of the Salter model⁵⁹, the GTAP model, and 2 others⁶⁰. ▪ 3 aggregate sectors ▪ 14 aggregate regions ▪ Monopolistic competition in the resources, food processing and manufacturing sectors. ▪ Dynamic model due to some capital accumulation and mobility. 	<ul style="list-style-type: none"> ▪ GTAP version 3 database ▪ 1992 US\$ ▪ Updated to incorporate post-NAFTA, post-Uruguay round data 	<ul style="list-style-type: none"> ▪ 100% liberalisation on a non-discriminatory MFN basis. 	<ul style="list-style-type: none"> ▪ ALL APEC nations gain. ▪ NZ's real GDP increases by 5.6%. ▪ NZ's production in the agriculture and resources sectors increases by 13.2% and 36.9% respectively. ▪ Total gains are US\$303 billion per annum for the APEC members. ▪ Agriculture accounts for 60% of the gains from APEC liberalisation. ▪ If agriculture is excluded, there is US\$10 billion of annual 'free rider' gains to the EU.

⁵⁹ See Jomini, McDougall, Watts and Dee (1994) for further details.

⁶⁰ See Francois, McDonald and Nordstrom (1995), and Brown, Deardorff and Stern (1995) for further explanation.

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
<p>Mai, Woffenden, Hanslow and Brown. (1996). <i>General Equilibrium Analysis of APEC Trade Liberalisation: Implications for New Zealand</i></p>	<ul style="list-style-type: none"> ▪ MEGABARE model ▪ Features of product differentiation and demand behaviour of agents are inherited from GTAP. ▪ Includes population and capital growth, and so is dynamic. ▪ 15 aggregate regions ▪ 19 aggregate sectors ▪ Some APEC nations included in ROW aggregation⁶¹ 	<ul style="list-style-type: none"> ▪ GTAP version 2 database ▪ 1992 US\$ ▪ Baseline model modified to incorporate Uruguay Round information 	<p>Experiments:</p> <ol style="list-style-type: none"> 1. MFN APEC liberalisation: removal of tariff equivalents, and domestic and export subsidies. 2. Discriminatory APEC liberalisation: protection against non-members remains. 3. Global liberalisation: all barriers reduced to zero in all regions. <p>The experiments are projected forward to 2020 and compared to the baseline scenario.</p>	<ul style="list-style-type: none"> ▪ All APEC nations gain. ▪ In all experiments, NZ increases output significantly in the agriculture and food products sectors, especially in milk and livestock products. ▪ NZ's GNP increases by 0.4% from the baseline case under an APEC FTA. ▪ NZ's exports increase by 5.8-7% compared to the baseline. ▪ NZ's terms of trade improves by 3.6-7.8% under an APEC FTA, compared to the baseline. ▪ NZ gains more from a discriminatory APEC FTA than from a MFN APEC liberalisation program. ▪ Under the MFN scenario, there is very little 'free-riding' by non-APEC members.

⁶¹ Due to a lack of input-output data, APEC members Brunei, Mexico, Papua New Guinea and Mexico are included in the Rest of the World aggregation.

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
<p>Walmsley. (1998). <i>Long-Run Simulations with GTAP: Illustrative Results from APEC Trade Liberalisation</i></p>	<ul style="list-style-type: none"> ▪ Static, long-run GTAP model ▪ Modified GTAP theory to allow endogenised capital stocks ▪ New closure features ▪ 11 aggregate regions ▪ 8 aggregate commodities 	<ul style="list-style-type: none"> ▪ GTAP version 3 database ▪ 1992 US\$ ▪ Baseline model updated to be post-NAFTA 	<p>Experiment: 100% tariff reduction within APEC only (discriminatory FTA).</p> <p>Short-run and long-run scenarios are considered for a number of differently modified databases.</p>	<ul style="list-style-type: none"> ▪ All APEC nations gain except the United States and Canada. ▪ The ROW is made worse off through trade diversion. ▪ NZ's real GDP increases by 1.15% -1.35% compared to the baseline model. ▪ Long-run gains are significantly larger than those in the short-run – mainly due to capital accumulation.

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
Young and Huff. (1997). <i>Free Trade in the Pacific Rim: On What Basis?</i>	<ul style="list-style-type: none"> ▪ GTAP Model ▪ Static, standard closure, perfect competition ▪ 10 aggregate regions ▪ 3 aggregate sectors ▪ Some APEC nations included in ROW aggregation⁶² 	<ul style="list-style-type: none"> ▪ GTAP version 2 database ▪ 1992 US\$ ▪ Modified, post-NAFTA 	Complete removal of tariff equivalents in the APEC regions. Export subsidies and taxes unaltered. Scenarios: <ol style="list-style-type: none"> 1. APEC preferential FTA: tariffs removed between APEC members only. 2. APEC FTA on a MFN basis – ROW does not reciprocate. 3. APEC FTA on a MFN basis – ROW fully reciprocates. ROW tariffs to the ROW remain. 	<ul style="list-style-type: none"> ▪ Not all APEC nations gain from liberalisation. NZ's welfare decreases under these experiments. ▪ Reciprocation from ROW leads to increased welfare gains for APEC nations.

⁶² Due to a lack of input-output data, APEC members Brunei, Mexico, Papua New Guinea and Mexico are included in the Rest of the World aggregation.

Study	CGE Model and Structure	Data Source	Liberalisation Experiments	Key Results
<p>Kim, Cheong and Han. (2000). <i>The Effects of APEC Trade Liberalisation Measured Through CGE Model.</i></p>	<ul style="list-style-type: none"> ▪ Static, perfectly competitive, prices determined endogenously ▪ 12 aggregate regions ▪ 7 aggregate commodities ▪ Behavioural parameters from the SALTER model⁶³ 	<ul style="list-style-type: none"> ▪ GTAP version 3 database ▪ 1992 US\$ ▪ Unmodified 	<p>Experiments: 100% removal of tariffs and export subsidies, and the incorporation of trade facilitation measures. This is accomplished in a number of stages up to the year 2020.</p> <p>Scenarios:</p> <ol style="list-style-type: none"> 1. APEC preferential FTA: tariffs removed between APEC members only. Discrimination against non-APEC regions maintained. 2. Open Regionalism: APEC FTA on a MFN basis – ROW does not reciprocate. 3. Global Liberalisation: APEC FTA on a MFN basis – ROW fully reciprocates. 	<ul style="list-style-type: none"> ▪ All APEC nations experience increased GDP. A combined Australasia region experiences GDP growth of 0.87 – 0.95%. ▪ OECD members of APEC collect lower increases than non-OECD nations. ▪ The wider the liberalisation scenario, the larger the welfare gains to all regions. ▪ The preferential APEC FTA leads to non-APEC regions experiencing welfare losses. ▪ APEC nations realise similar gains under both unilateral and global liberalisation scenarios. ▪ The expansion in exports from APEC regions is substantial when trade is liberalised.

⁶³ For more details, see Jomini, Zeitsch, McDougall, Welsh, Brown, Hambley and Kelly (1991).

One further result from the studies summarised in Table 5.1 that is particularly important to the nations involved in this research is that the liberalisation of the agricultural sectors of APEC is responsible for 50-70% of the total welfare gains experienced by APEC members. Since the agricultural sectors in most of the countries considered in this research are of vital importance in terms of their contribution to international trade, this is a significant statistic. Many of the studies also show that in many APEC members, the return to land (which is used as a very rough proxy for rural interests) after liberalisation actually decreases (Scollay and Gilbert, 2000, p. 190). This explains why agricultural industries are politically sensitive when trade negotiations are occurring. It is because of this reasoning that one of the experiments considered in this research is the expansion of the CER by reducing tariff equivalents in all sectors *excluding* the agricultural sectors - the sheer political difficulties faced when trying to reduce barriers in agriculture may prevent complete liberalisation therein. The APEC nations discussed this issue at the Bogor leaders meeting. Their conclusion was that agricultural sectors should be treated in a similar fashion to other sectors, with the goal of reducing both tariffs and non-tariff barriers.

Table 5.1 shows that many of the APEC liberalisation simulations use one of the four versions of the GTAP database⁶⁴. This research also uses the most recent GTAP version 4 database, which is then updated to reflect the fact that the tariffs in the database are from 1995. This process is discussed in depth in the Methodology chapter and Appendix C. A variety of models have been used in previous research to shock this database but a common model used to run liberalisation simulations is the standard GTAP model (Hertel, 1997), or a modification of it, implemented using the GEMPACK software (see Harrison and Pearson, 1996). This is also the technique used in this research. Details of the GTAP CGE model can be found in Chapter 6.

⁶⁴ See McDougall, Elbehri and Truong (1998) for an in-depth discussion of this database, or refer to the Chapter 6 of this research for a briefer discussion.

5.3 The Use of Computable General Equilibrium Models in other Trade Liberalisation Scenarios

As well as CGE analyses of APEC liberalisation, there has also been research into other PTAs involving the United States, Chile, Singapore and the EU. As explained in depth in Chapter 2, the North American Free Trade Agreement (NAFTA) was initiated in 1994, after a lengthy period of discussion between the United States, Canada and Mexico. Prior to its implementation, the possibility of such an arrangement attracted a great deal of attention from quantitative researchers, many of whom used CGE models in order to determine its likely effects. Since these analyses are now somewhat outdated, only a brief mention will be made of these studies.

Brown, Deardorff and Stern (1992) use a large scale CGE model to evaluate the comparative statics of creating NAFTA in terms of welfare, factor prices, and the allocation of resources and production. Using both perfectly competitive and monopolistically competitive industries, five regions, and employing standard utility and profit maximising behaviour by agents, they conduct various experiments. The results (Brown *et al*, 1992, p. 29) suggested that the NAFTA countries would all experience increased welfare, that the wage gap between the United States and Mexico would narrow (thus decreasing the incentive for illegal immigration), that economies of scale would be gained by all three members, that capital would flow from the United States into Mexico, and that the rest of the world would be made only slightly worse off due to trade diversion.

Cox and Harris (1992) use the General Equilibrium Trade (GET) model to perform a CGE analysis of the likely effects of NAFTA on the Canadian economy, and compare these results with those generated by simulating a 'hub and spoke' arrangement whereby the United States has two separate bilateral agreements with Canada and Mexico. They conclude that the NAFTA would be a superior option for Canada, mainly due to significant efficiency gains prompted by increased price competition from Mexican industries.

Sobarzo (1992) uses a relatively conventional CGE model which is modified to include imperfect competition and economies of scale, and assesses the possible

effects on the Mexican economy of the NAFTA. He concludes that compared to Walrasian (i.e. perfectly competitive) CGE models, the gains from such an agreement are quite large. Depending on the specifics of the three experiments used, Sobarzo suggests that Mexico gains up to 8% of its GDP, employment increases by up to 5.8%, its balance of trade improves by up to 18%, and welfare improves by around 2% (Sobarzo, 1992, p. 99). He also shows that Mexican firms experience significant economies of scale, and use factors of production much more efficiently as a result of liberalisation.

Perhaps of more interest in regard to the experiments that are carried out in this research is the recent paper by Brown, Deardorff and Stern (2000) which analyses the accession of Chile into NAFTA. They use the Michigan CGE model⁶⁵, which considers utility and profit maximisation, monopolistic competition for all industries except agriculture, full employment and initially balanced trade, and use a 1990 database. Three experiments are carried out: removing tariffs only, removing tariffs and NTBs, and finally removing tariffs and capital restrictions. They show that Chile's accession into NAFTA would have only small effects on the GNP of the NAFTA countries and Chile. They acknowledge, however, that there may be significant spillover effects in terms of technological advances, learning-by-doing, etc. A further result is that the returns to capital and labour increase in Chile, and are not adversely affected in the United States. They conclude that the "consequences [of expanding NAFTA] appear to be uniformly welfare-improving for nearly all countries involved and all factors of production, and the adjustment costs will be small" (Brown *et al*, 2000, p. 171). So it can be seen that the use of CGE analyses has been common in studying both the initial formation, and subsequent proposed expansion, of the NAFTA. For a further survey of CGE studies of NAFTA, the reader is directed to Francois and Shiells (1994).

Much research has also been carried out using CGE models to analyse the creation and expansion of the European Union (EU). Now that the EU is firmly established as a trading bloc, recent attention has turned to quantifying the likely effects of expanding

⁶⁵ Further details on this CGE model, see Deardorff (2000), available online at <http://www.spp.umich.edu/rsie/model/analytics.html>

its membership to include several Central and Eastern European countries (CEEC)⁶⁶. Hertel, Brockmeier and Swaminathan (1997) use a monopolistically competitive version of the GTAP model (including the effects of scale economies) with the GTAP version 3 database to analyse the effects of this EU enlargement, focusing on the agricultural sectors of the economies involved. The GTAP database is updated to reflect the changes in the EU that have occurred since the database was published (i.e. the integration of Austria, Finland and Sweden into the EU), and the effects of the Uruguay Round of the GATT/WTO. They aggregate the database to ten sectors and nine regions, and four experiments (all with various treatments of the agricultural sectors) are carried out. Their results suggest that crop and livestock production in the CEEC nations would increase substantially, accompanied by a shift of capital and labour from the manufacturing and services sectors into these areas. Overall welfare is expected to increase by about 3.4 billion ECU (US\$4.4 billion at the 1997 exchange rate) in the CEEC nations, in addition to which can be added the technological transfer gains from increased imports of capital goods (Hertel *et al*, 1997, pp. 382-383).

In a similar vein of research, Frandsen, Jansen and Vanzetti (2000) also look at expanding 'Fortress Europe' to include the CEEC nations. They use the GTAP version 4 database, and introduce a Common Agricultural Policy (CAP) adjusted GTAP model to examine the results of the proposed EU expansion. The database is aggregated to 16 regions and 19 sectors, of which 10 are primarily agricultural goods. A baseline projection of the database is carried out for the 1995-2005 period, and against this baseline are measured the effects of expanding the EU to include the CEEC nations. This experiment abolishes all tariffs, NTB tariff equivalents and export subsidies between the EU and the CEEC countries, and affords the CEEC nations the same external levels of protection as the EU. They conclude that there would be significant gains to the CEEC nations of around 4% of GDP from their accession to the EU, and that non-members of the EU would not suffer significant losses from the feared trade diversion effects of such a move. For some further CGE analyses of European integration, see Gasiorek, Smith and Venables (1992), Ryan (1992) and Haaland and Norman (1992).

⁶⁶ These CEEC nations include Hungary, Poland, Slovenia, the Czech and Slovak republics, Bulgaria, Cyprus and Romania (Frandsen, Jensen and Vanzetti, 2000, p. 311). They were invited in 1997 by existing EU members to initiate membership discussions.

Regionalisation is also occurring in the Asian region, and as various PTA proposals are suggested, researchers have used CGE analysis to examine the possible gains that could result from creating such arrangements. Whilst studies in this area are not as prevalent as those in APEC, the EU and NAFTA, one recent interesting example is the research by Tan, Park and Toh (1999). They examine the effects of five proposed ASEAN free trade agreements on the ASEAN nations, and use a modification of the perfectly competitive GTAP model to include positive externalities from trade and the Almost Ideal Demand System for the specification of import demand. Their model is thus a dynamic one, as opposed to the standard static GTAP model. Their results suggest that the ASEAN nations will all benefit from the creation of a PTA, and - significantly for the research to be carried out in this thesis - that Singapore does not gain as substantially as the other ASEAN nations. This is due to their already low levels of protection relative to their ASEAN neighbours (Tan *et al*, 1999, p. 460).

The studies of trade liberalisation outlined above demonstrate that the use of CGE models is a well-recognised and commonly used technique in the analysis of the creation and subsequent expansion of PTAs. The GTAP version 4 database (sometimes updated) is used in many of these simulations, and variants of the standard GTAP model are often employed to simulate trade policy shocks.

CHAPTER 6

METHODOLOGY AND EXPERIMENTAL DESIGN

6.1 Introduction

The method used in this research to analyse the effects of expanding the CER preferential trade agreement is an applied Computable General Equilibrium (CGE) model. The aim of this chapter is to document some of the basic theory behind CGE models, to explain why such models are used in trade policy analysis, and to examine the specific CGE model used here – the Global Trade Analysis Project (GTAP). The GTAP version 4 database is also discussed, and the trade liberalisation experiments carried out in this research are documented.

6.2 General Equilibrium Theory: A Simple, Single-Region Case

General Equilibrium (GE) models are commonly used tools in economic analysis, and in contrast to partial equilibrium techniques, GE models are able to capture many features of interdependent markets. The effects of shocks to one single market are usually felt in many other, related markets, and “general equilibrium is perhaps the only method capable of capturing the relevant feedback and flow-through effects” (Scollay and Gilbert, 2000, p. 177). This section examines the theory underpinning GE models, in order to provide a basis for discussing why such models are so useful in trade policy analysis.

In short, a GE model of an economy considers markets for N commodities, with all consumers and producers acting optimally. Consumers maximise their utility, subject to their budget constraints, and producers maximise their profits. In equilibrium, demand equals supply in each market. Once this equilibrium is reached, there are no forces acting to cause any changes. External shocks introduce distortions to various markets, or eliminate existing distortions, and these shocks result in altered equilibrium

situations. By comparing the initial equilibrium with the new equilibrium generated by shocking the model, the effects of policy changes can be identified.

More formally, and following Shoven and Whalley (1992, pp. 9-12) the structure of a simple GE model for a single economy is as follows⁶⁷:

The Demand Side of the Economy

There are M commodities, $\mu = 1, 2, \dots, M$ each with a non-negative price $p_\mu > 0$. Let $\mathbf{p} = p_1, \dots, p_M$ be the vector of market prices, and let A_μ denote the economy-wide endowment of commodity μ owned by consumers. The market demand function for each of the M goods is denoted by $\xi_\mu(\mathbf{p})$. These demand functions are non-negative, continuous and homogenous of degree zero⁶⁸ in \mathbf{p} . As a result of this homogeneity,

prices can be normalised such that $\sum_{\mu=1}^M p_\mu = 1$. A further key assumption of GE theory

is that market demands satisfy Walras' Law, that is, the value of market demands equal

the value of the economy's endowments: $\sum_{\mu=1}^M p_\mu \xi_\mu(\mathbf{p}) = \sum_{\mu=1}^M p_\mu a_\mu$. In other words, there

are no excess market demands: $\sum_{\mu=1}^M p_\mu [\xi_\mu(\mathbf{p}) - a_\mu] = 0$. This condition must hold for

any set of prices, either in equilibrium, or not. If Walras' Law does not hold, then it is highly likely that the model has been mis-specified, as it will violate the sum of individual budget constraints.

The Supply Side of the Economy

The economy is represented by K constant returns to scale methods of production. Each method is described by coefficients $g_{\mu f}$ representing the use of good μ in activity f when the activity is operated at unit intensity. The sign on these coefficients denotes whether good μ is an input (negative sign) or an output (positive sign). Let $X = X_1, \dots, X_k$ denote levels of intensity of operation associated with each activity. Production is

⁶⁷ For a more detailed formal explanation of a GE model with international trade, taxes and tariffs, see Shoven and Whalley (1992, pp. 21-28). The model explained here is a simple, closed, one-region model.

⁶⁸ This implies that the result of doubling all prices is to double all incomes. This in turn means that there will be no change in the quantities demanded of all goods.

also assumed to be bounded – that is, there is a finite limit to how much output can be produced from a given set of inputs.

Equilibrium

A general equilibrium for this economy exists when there exists a set of prices p_μ^* and production levels X_f^* such that:

- (i) Demand equals supply in every market;

$$\xi_\mu(\mathbf{p}^*) = \sum_{f=1}^M g_{\mu f} X_f^* + A_\mu \quad \text{for all } \mu = 1, \dots, M \quad (6.1)$$

This condition must hold in order to ensure that there are no shortages or surpluses – every market clears.

- (ii) No production activity makes positive profits, and those in use break even;

$$\sum_{\mu=1}^M p_\mu^* g_{\mu f} \leq 0 \quad (= 0 \text{ if } X_f^* > 0) \quad \text{for all } f = 1, \dots, K \quad (6.2)$$

This represents a state of Pareto efficiency in the economy. This occurs when consumers and producers use “society’s initial resources and technological possibilities efficiently in the sense that there is no alternative way to organise the production and distribution of goods that makes some consumer better off without making some other consumer worse off” (Mas-Colell, Whinston and Green, 1995, p. 313). It represents the most economically efficient position available to society⁶⁹.

The above analysis represents the general equilibrium conditions for a simple, single economy case. Since trade liberalisation, however, features multiple commodities and multiple regions, it is important to document a general equilibrium with these features.

⁶⁹ Note that an economically optimal allocation is not necessarily the most desirable *social* allocation – a Pareto optimal distribution of resources may well not be equitable.

6.3 General Equilibrium Theory: A Multi-Commodity, Multi-Region Case

Following the work of Takayama and Judge (1971, pp. 26-30), consider a perfectly competitive world consisting of n regions, with each region denoted by i or j such that $i, j = 1, 2, \dots, n$. In each region i there are L_i consumers, and the representative individual's utility function is as follows:

$$U_{li} = U_{li}(y_{li}) \quad \text{for all consumers and regions} \quad (6.3)$$

In this equation, y_{li} is the consumption bundle vector of the representative consumer in nation i . If there are M commodities available, this commodity bundle is represented by

$$y_{li} = (y_{li}^1, y_{li}^2, \dots, y_{li}^M) \quad \text{where commodities are denoted by } \mu = 1, 2, \dots, M \quad (6.4)$$

Each consumer's income is denoted by I_{li} and this income is gained by selling and trading initial endowments of each good μ . Each individual's endowments are shown by

$$a_l = (a_l^1, a_l^2, \dots, a_l^M) \geq 0 \quad (6.5)$$

so that at least one of his/her endowments must be positive. It is assumed that each consumer aims to maximise their utility subject to their budget constraint.

In each region there are H_i producers, so $h = 1, 2, \dots, H_i$, and the maximum feasible production set of each producer is written as X_{hi} where

$$X_{hi} = \{x_{hi} | g_{hi}(x_{hi}) \geq 0\} \quad (6.6)$$

given that x_{hi} is each firm's production bundle vector, and g_{hi} is each firm's technological and institutional transformation function. The commodities produced by each producer are sold in the market at the prices in the following price vector⁷⁰.

$$p_i = (p_i^1, p_i^2, \dots, p_i^M) \quad (6.7)$$

Each producer's profits are defined as

$$\pi_h \equiv p_1 x_h^1 + p_2 x_h^2 + \dots + p_M x_h^M \quad (6.8)$$

It is assumed that producers aim to maximise their profits subject to their technological and institutional feasibility limits.

To introduce trade into this model, let the volume of exports of good μ from region i to region j be written as x_{ij}^μ which is measured in common units for all commodities, to allow summation.

The general equilibrium for this multi-region, multi-commodity model is attained when the following conditions are satisfied:

- (i) All commodity prices in all regions are homogenous and efficiently determined such that the price in the importing region must be equal to the price in the exporting region plus transportation costs.
- (ii) There is no excess demand for any commodity in any region:

$$\sum_i (\bar{y}_{ii}^\mu - a_{ii}^\mu) - \sum_{hi} \bar{x}_{hi}^\mu + \sum_j \bar{x}_{ij}^\mu - \sum_j \bar{x}_{ji}^\mu \leq 0 \quad (6.9)$$

where $\bar{y}, \bar{a}, \bar{x}$ represent the equilibrium or optimal solutions for each variable.

⁷⁰ This model does not include the effects of tariffs and quotas on prices. For more information on these areas, see Takayama and Judge (1971, pp. 258-274).

This formula shows that for any product, the total consumption plus exports must be equal to or smaller than the sum of total domestic production, total initial endowments and total imports.

- (iii) Consumers in region i choose the consumption bundle y_{li} in order to maximise their utility $U_i(y_{li})$ subject to their budget constraint $\sum_i^M p_\mu y_{li}^\mu \leq 1$
- (iv) Producers produce the production bundle \bar{x}_{hi} in order to maximise their profits $\sum_i p_\mu x_{hi}^\mu$ as long as $x_{hi} \in X_{hi}$ (i.e. the profit-maximising production level must be feasible).
- (v) The Balance of Payments in each region is exactly balanced:

$$\sum_\mu \bar{p}_i^\mu \sum_j \bar{x}_{ij}^\mu + \sum_{hi} \sum_u \bar{p}_0^u x_{hi0}^u = \sum_\mu \bar{p}_i^\mu \sum_j \bar{x}_{ji}^\mu \quad \text{for all } i \quad (6.10)$$

This equation indicates that the value of exports from region i to region j , plus the transportation costs of these exports, must equal the value of imports from region j to region i .

6.4 Computable General Equilibrium Models

Having briefly documented the theory on which CGE models are based, it is now appropriate to examine why such models are ideal for trade policy analysis. Policymakers are often faced with making decisions that will have implications for income distribution and the inter-sectoral allocation of resources. CGE models can provide a numerical basis to aid such decision making: they can “help policymakers by making explicit the implications of alternative courses of action within a framework broadly consistent with that currently accepted by many microeconomic theorists” (Shoven and Whalley, 1992, p. 3). In other words, CGE models “attempt to blend theory and policy so as both to improve the analytic foundations of policy evaluation work and to bring the theoretical work that already exists in the literature more fully

into the policy debate” (Fretz, Srinivasan, and Whalley, 1986, p. 4). This is particularly appropriate in terms of trade policy, and even more so in terms of analysing the effects of trade barrier reductions, as Shoven and Whalley (1992, p. 2) explain:

[T]he complexities of the issues handled in trade negotiations in the General Agreement on Tariffs and Trade (GATT), such as simultaneous tariff reductions in several countries or codes to limit the use of non-tariff barriers, cannot be analyzed in ways useful to policy makers other than through numerical techniques. Models involving 30 or more sectors and industries are commonly employed, providing substantial detail for policy makers concerned with feedback effects of policy initiatives directed at specific products or industries.

Whilst the use of partial equilibrium techniques is a possibility for analysing trade policy, and specifically for studying trade liberalisation, “such an approach obviously cannot incorporate terms of trade effects and assess their income distributional consequences across countries” (Fretz *et al*, 1986, p. 4).

The use of CGE models in trade analysis commonly involves multi-regional, multi-sectoral frameworks. Under utility and profit-maximising behavioural assumptions, the models are initially assumed to be in a state of general equilibrium. In order to examine the effects of a change in trade policy, “experiments are conducted by *shocking* the initial equilibrium, introducing distortions or removing existing ones, and observing the new equilibrium that results” (Scollay and Gilbert, 2000, p. 177, authors’ emphasis). One reason why CGE models are so valuable in trade analysis is that more than one variable can be shocked in each experiment. This “removes the need to work in small dimensions, and much more detail and complexity can be incorporated than in simple analytic models” (Shoven and Whalley, 1992, p. 2).

The points noted above should demonstrate why CGE models are so suitable for the analysis of trade policy changes. It must be realised, however, that there are various criticisms of such models, as outlined in Shoven and Whalley (1992, pp. 4-6) and Fretz *et al* (1986, pp. 23-29). A major issue is that of parameter specification. Where

possible, parameters in CGE models are based on objective, econometric estimates from previous research and statistics. If such estimates are not available for use, then a great deal of subjective judgement may be required in building and using CGE models, particularly concerning the specification of parameters such as elasticities, and the necessity for sometimes contentious assumptions⁷¹. In reference to trade models, the modeling of non-tariff barriers is one example of an area where economists have yet to reach a consensus. Such barriers are usually expressed as their ad valorem tariff equivalent and Fretz *et al* (1986, p. 25) suggest that “modeling them in ad valorem equivalent form... is clearly not appropriate in many circumstances... [such as] in situations of market imperfection, uncertainty, etc”.

A broader issue to consider when using CGE models is that they are often not validated in any meaningful statistical sense. CGE models consider complex, inter-related economic relationships, but these specifications, and the parameters on which they are based are often left statistically untested. This contrasts directly with the models used by econometricians, which are commonly simple in economic structure, but statistically complex (Shoven and Whalley, 1992, p. 6). Thus the use of CGE models may be a little discomfoting to strict followers of the econometric discipline, but as ever in economics, it is necessary to consider the trade-off between economic reality and statistical robustness. In the specific CGE model used in this research, the Global Trade Analysis Project (GTAP), this issue has been addressed by Liu, Arndt and Hertel (2000). They note that “CGE models are frequently criticized for resting on weak empirical foundations...[and this] criticism focuses on the use of apparently arbitrary values for behavioural parameters as well as a lack of model validation” (Liu *et al*, 2000, p. 2). To address these criticisms in GTAP, the authors use historical data to estimate the key parameters in the GTAP model, and compare these to the actual GTAP values⁷². This ‘back-casting’ technique indicates that the key GTAP parameters (especially the Armington elasticities) are relatively similar to the historical time-path

⁷¹ In particular, there is debate over the use of Armington elasticities in deciding whether to treat goods as homogenous or heterogenous. If Armington elasticities are employed, as in the GTAP model, the model assumes that products are qualitatively different (heterogenous) across countries, such that they enter demand functions as close, but not perfect substitutes. This rules out extremes of specialisation, and can cause strong terms of trade effects that are crucial to the results generated (Fretz *et al*, 1986, pp. 24-25).

⁷² For further details on the exact process used in the comparison of the GTAP and historical time-path parameter values, see Liu *et al* (2000).

values. Whilst this is encouraging for this research, the authors suggest that “much remains to be done in assembling historical databases and using these to estimate appropriate parameter values” (Liu *et al*, 2000, p. 19).

These shortcomings of CGE models demonstrate that care must be taken when interpreting results produced by research involving such techniques. This caveat, however, is not designed to detract from the importance of CGE tools in their role of providing numerical assessments for trade policy makers, as “there are no clearly superior alternative models available” (Shoven and Whalley, 1992, p. 5).

6.5 The Global Trade Analysis Project

6.5.1 Introduction to GTAP

The CGE model used in this research is the Global Trade Analysis Project (GTAP). Developed by Thomas Hertel at Purdue University, and established in 1992, GTAP was aimed at “lowering the cost of entry for those seeking to conduct quantitative analysis of international economic issues in an economy-wide framework” (Hertel, 1997, p. 1). Hertel recognised that a greater number of numerical applications of trade theory were required to analyse the ever-integrating world economy. Whilst appreciating that sector-by-sector examinations were a valuable tool for studying the policy implications of the GATT, Hertel stated that “by its very nature, the GATT affects all sectors and most regions of the world, so there is no way to avoid employing a database that is exhaustive in its coverage of commodities and countries... GTAP aims to facilitate such multi-country, economy-wide analyses” (Hertel, 1997, p. 2).

The recently developed version 4 of the GTAP database comprises of a complete set of economic accounts and detailed inter-industry linkages for 45 countries and regions, and for a total of 50 sectors. This database is discussed in more detail below. Through the aggregation of both countries and sectors, GTAP allows researchers to manipulate the database according to specific theoretical models in order to isolate the effects of a policy change on a particular region or commodity grouping. From an initial situation of benchmarked equilibrium, the database is shocked, and an array of economic

variables can be analysed in terms of the deviation from their initial levels to evaluate the impacts of a policy change.

6.5.2 The theoretical GTAP model

The theory underpinning the GTAP model is very similar to that of most CGE models, and is based upon two different sets of equations (Brockmeier, 2000, p. 4):

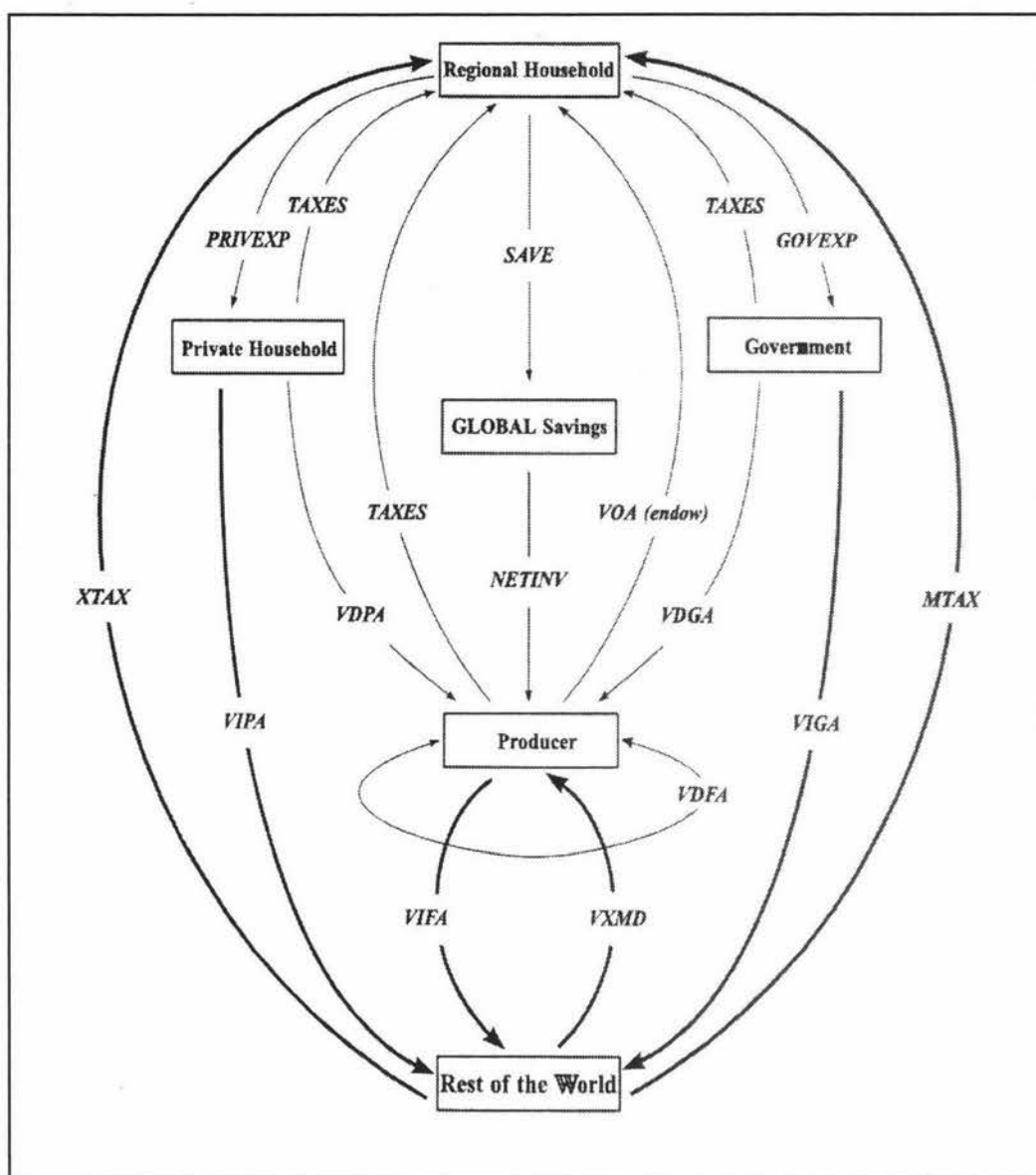
- (i) The accounting relationships which ensure that the expenditures and receipts of all economic agents are balanced; and
- (ii) The microeconomic foundation of behavioural equations which feature optimisation by all consumers and firms in each economy.

To explain the multi-region open economy model employed in GTAP, it is convenient to analyse the structure of monetary flows both graphically and theoretically. Following Hertel and Tsigas (1997, pp. 10-76) and Brockmeier (2000, pp. 5-20), this section first examines a pictorial representation of the GTAP model of trade, which is followed by a more detailed study of the flows involved.

Figure 6.1 below shows the various sectors and monetary flows employed in a simple, multi-region⁷³, open economy with government intervention:

⁷³ It is graphically more convenient to represent the various regions in the GTAP database by aggregating them into one sector named 'The Rest of the World', and to thus examine a two region model. The analysis can equally be extended to include more regions.

Figure 6.1 The GTAP Multi-Region Open Economy



(Source: Brockmeier, 2000, p. 16)

Key to the Monetary Flows in Figure 6.1

PRIVEXP Private household expenditures.

GOVEXP Government expenditures.

SAVE Value of household savings.

VOA (endow) Value of payments by producers to households in exchange for their endowment commodities.

NETINV Value of net investment goods provided by producers.

VDPA	Value of domestic private household purchases from domestic producers, evaluated at agents' prices.
VDGA	Value of domestic government purchases from domestic producers, evaluated at agents' prices.
VDFA	Value of intermediate input sales to domestic firms, evaluated at agents' prices.
TAXES	Net tax revenues (taxes less subsidies) collected by the regional household, paid for by private households, firms and the government.
VIFA	Value of imported intermediate inputs, purchased by domestic firms from foreign firms, at these agents' prices.
VIPA	Value of private household expenditures on imported goods, at agents' prices.
VIGA	Value of government expenditures on imported goods, at agents' prices.
VXMD	Value of exported domestic goods to the Rest of the World, at exporter's (market) prices.
MTAX	Import taxes paid by the Rest of the World on domestically produced goods to the regional household
XTAX	Export taxes paid by the Rest of the World to the regional household.

(Source: Brockmeier, 2000, pp. 15-20)

To explain the figure above, it is important first define the agents present in the model. The regional household associated with each country or region collects all the income that is generated in the economy. The private household is a representative individual household, and the government is self-explanatory. The producer is again a representative firm, and the Rest of the World is simply an aggregation of all the regions in the economy except for one.

Monetary flows in the GTPA model are indicated by the arrows in Figure 6.1. The regional household at the top of the figure has its expenditure determined by an aggregated Cobb-Douglas utility function. This ensures constant budget shares across the three demands of private expenditure (PRIVEXP), government expenditures (GOVEXP) and savings (SAVE). This utility function assumption has the distinct advantage of displaying an unambiguous increase in welfare after an increase in

income. However, it has a significant drawback in that government expenditure is not linked to tax revenue, so a decrease in tax revenue by no means results in a lower level of government spending (Hertel and Tsigas, 1997, p. 10).

Firms combine households' endowments (VOA(endow)) with domestic and imported intermediate goods (VDFA, VIDA) to produce final goods, and sell these goods to private households (VDPA), the government (VDGA), and to the Rest of the World (VXMD). Firms also provide investment goods, via an intermediary Global Bank (not shown in Figure 5.1), to satisfy the demand of the regional household for saving (NETINV). Consumption taxes are paid by the firm on both its domestic and imported inputs, and this value flow also includes production taxes net of subsidies. The Armington assumption is employed in the GTAP model, which allows imported goods to be distinguished by origin from similar, domestically produced goods. This assumption explains intra-industry trade of similar products, and allows for separate demand equations for domestic and imported intermediate goods (Brockmeier, 2000, p. 15).

Private households receive income from the sale of their endowment commodities⁷⁴ (VOA (endow)), and spend it on domestically produced goods (VDPA) and imported goods (VIPA). As explained above for firms, the Armington assumption necessitates separate demand functions for domestic and imported consumption goods. They must also pay income taxes and consumption taxes on these domestic and imported goods to the regional household (TAXES)⁷⁵.

The Government in this model spends its income on domestic goods (VDGA) and imported goods (VIGA), and also pays tax to the regional household. The Rest of the World receives the region's exports and provides intermediate goods to domestic firms, and also pays export and import taxes (XTAX, MTAX).

⁷⁴ These endowment commodities include skilled and unskilled labour, capital, land and natural resources. In the standard database, labour and capital are classed as being mobile endowments across industries within a region, and land and natural resources are 'sluggish' - imperfectly mobile or immobile. (McDougall, 1998, p. 8-2)

⁷⁵ All taxes and subsidies in the GTAP model "are computed by comparing the value of a given transaction, evaluated at agents' and market prices. If there is a difference between two of these values, then the difference must be equal to the tax or subsidy in question" (Brockmeier, 2000, p. 11). This also applies to import and export taxes, which are calculated as the difference between market and world prices.

There are two further, global, sectors to consider. Firstly GTAP includes a transportation sector, which is not shown in Figure 6.1. This sector accounts for the difference between the *f.o.b* and *c.i.f*⁷⁶ values for trade in a particular commodity. Secondly, “savings and investment are calculated on a global basis, so that all savers in the model face a common price for this savings commodity” (Brockmeier, 2000, p. 17). Providing that every other commodity is in equilibrium, with no firms earning positive profits, global investment must equal global savings to satisfy Walras’ Law. These two sectors complete the description of the graphical representation of the GTAP model.

6.6 The GTAP Version 4 Database

The GTAP database has been “the central ingredient in GTAP’s success” (Hertel, 1997, p. 2). Despite having being improved and expanded three times since its initial inception, the database’s fundamental structure has not altered drastically: “It combines detailed bilateral trade, transport and protection data characterizing economic linkages among regions, together with individual country input-output (I/O) data bases which account for inter-sectoral linkages within regions” (Hertel, 1997, p. 2). The version 4 database, released in 1998, encompasses 50 commodity sectors⁷⁷ and 45 regions⁷⁸ and offers further disaggregation of the agricultural and food sectors compared with earlier versions. This is particularly useful for studies involving New Zealand, as a significant proportion of its trade is in these commodities. For a comprehensive explanation of the database, see McDougall, Elbehri and Truong (1998).

⁷⁶ *f.o.b* denotes ‘Free on Board’ and is simply the price received by exporters of a commodity. *c.i.f* represents ‘Cost, Insurance and Freight’ and is the price paid by importers for the same commodity after considering transportation costs. In order to balance world trade, total world exports must equal total world imports, so the following relationship applies:

[Total Merchandise Imports (*c.i.f*) + Nonshipping Services] = [Total Merchandise Exports (*f.o.b*) + Nonshipping Services + Shipping Services].

⁷⁷ For a full listing of the sectors in each commodity grouping, see Table 8.3 in McDougall (1998, pp. 8-9 to 8-15).

⁷⁸ For a full listing of the countries in each region, see Table 8.2 in McDougall (1998, pp. 8-3 to 8-9).

6.6.1 Aggregating the GTAP database

For computational ease, and to more easily isolate and examine desired sectors, the aggregation of both regions and commodities is necessary. In this research, the database was aggregated into a fourteen region, seventeen commodity model. Since the main focus of this research is on Australia, New Zealand, Chile, Singapore and the United States, these nations were not aggregated into any composite regions. Other countries that were not included in any aggregations were Canada, Mexico, and Japan. This is because of their importance, in terms of trade volumes, to the five possible members of the PTAs studied in this research. The nations of the European Union were aggregated together, and the Asian nations were divided into North-East Asia, South-East Asia, and Other Asia. The Caribbean and Latin American nations were aggregated together, and the remaining regions were placed into a Rest-of-the-World aggregation. This gives a total of fourteen regional aggregations. The 50 commodities in the database were aggregated into seventeen groups, six of which are agricultural sectors. The agricultural commodities were intentionally left at a fairly detailed level of aggregation due to their importance in contributing to welfare gains from trade liberalisation⁷⁹. The full list of regions and commodities in these aggregations can be seen in Appendix B.

6.6.2 Updating the GTAP database tariffs

With such a significant amount of complex data required, compiling each updated GTAP database is a long and arduous project. So whilst the version 4 database brings together very detailed information on vast numbers of countries and commodities, and is thus a valuable resource for CGE modeling, it must be appreciated that it has some flaws that should be acknowledged before its use.

The most obvious issue is that the database only contains statistics up to 1995. With trade patterns evolving constantly, and numerous preferential trading areas (PTAs) emerging, this data is not likely to accurately represent current conditions. This is a problem facing CGE modelers which is difficult, if not impossible to resolve. On the

⁷⁹ As explained in Scollay and Gilbert (2000, p. 183), the elimination of trade barriers in agricultural sectors contributes between 50-70% of all gains from liberalisation in studies of the creation of an APEC preferential trading arrangement.

one hand, CGE models of international trade require an immense amount of data, which is often difficult and time-consuming to obtain and subsequently mould into a database, in order to ensure that the effects of a shock are correctly represented in the model. On the other hand, in order to make the most useful conclusions from CGE research, the modeler would ideally like to use the most up-to-date data possible. Thus the modeler is faced with the following problematic question: should they use a general equilibrium approach using slightly older data that completely encompasses the necessary economic linkages between regions and sectors, or should they use a partial equilibrium approach using more recent statistics which may only be available for certain sectors or regions⁸⁰? In this research, the former option is chosen, in order that the model captures all of the necessary microeconomic feedback and flow-through effects that occur with international trade policy shocks.

A problem also arises with the measurement of trade levels in the seven services sectors of the database. Unlike the manufacturing sectors, services trade data is not measured at both *c.i.f.* and *f.o.b.* values. Thus there are zero margins – services are subject to zero freight costs – and all services trade is assumed to be free of any import and export intervention (Bandara, McDougall and Van Leeuwen, 1998, p. 12-4). This is due to the fact that “the primary source [World Bank] data for global non-factor services characterized by both sectoral details and bilateral details are unavailable” (Bandara *et al*, 1998, p. 12-4). As a result of this data unavailability, it is impossible to incorporate freight costs or policy interventions in the services sectors into the database. In order to assemble the services trade data, a relatively complex procedure is followed to account for incomplete and inconsistent source data. For more details on how this was accomplished, see Bandara *et al* (1998, pp. 12-4 to 12.8). It must therefore be appreciated that care must be taken when analysing the results of experiments including the services sectors.

A further issue that must be addressed before using the GTAP version 4 database to make conclusions and policy recommendations is that the protection levels on bilateral

⁸⁰ For example, if a study on the removal of tariffs in the grains sector in New Zealand was being considered, there may be recent detailed trade data from 1999, so the use of a partial equilibrium approach would be possible in order to examine the effects of this policy shock in this single sector in New Zealand only. This approach, however, would not consider the effects of this shock on the livestock market in New Zealand, on grain markets in other regions, etc. A GE model such as GTAP *does* consider such effects, but uses slightly older data.

trade flows are also from 1995. As such, they too may not be an accurate representation of current international trade policies. Whilst the protection data is post-NAFTA and post-CER, and thus the tariffs on trade between the nations in these PTAs are correct, a number of other tariffs have changed since the database was compiled. This poses a problem because when these tariffs are reduced or eliminated in an experiment creating a PTA, any welfare gains may be inaccurate. For example, if the GTAP tariff on unprocessed meat entering Singapore was 25%, whereas the actual tariff in the year 2000 is only 5%, any gains made by countries exporting unprocessed meat to Singapore in a GTAP experiment that removed the 25% tariff would be disproportionately large, relative to those gained from the removal of the true tariff of 5%. This suggests that care must be taken in interpreting results from CGE models which use tariff data that is somewhat out of date.

To address this issue, a comparison was made between the tariffs used in the GTAP database [henceforth 'GTAP tariff'] and current tariff levels. This comparison was used to compare the GTAP and actual tariffs in New Zealand, Australia, Chile, Singapore and the United States⁸¹. The broad methodology employed was as follows:

- (i) Calculate the GTAP *ad valorem* tariffs on bilateral trade flows using the formula below:

$$Tariff_{i,r,s} = \frac{VIMS_{i,r,s}}{VIWS_{i,r,s}} - 1 \quad (6.11)$$

where i = commodity sector

r = source of import

s = destination for import

$VIMS_{i,r,s}$ = Value of imports of tradeable commodity i from source r to destination s evaluated at (importer's) market prices

$VIWS_{i,r,s}$ = Value of imports of tradeable commodity i from source r to destination s evaluated at world (*f.o.b.*) market prices

⁸¹ The tariffs for the other countries and regions in GTAP were not adjusted, as only tariffs between New Zealand, Australia, Chile, Singapore and the United States will be reduced or eliminated in the experiments in this research.

- (ii) Record the actual *ad valorem* tariffs on the same bilateral trade flows, using tariff data from the APEC tariff website (<http://www.apectariff.org>).
- (iii) Compare the GTAP tariffs and actual tariffs, note where discrepancies occur, and make changes as appropriate. No particularly scientific method was used to decide which tariffs to alter. The majority of significant discrepancies tended to be fairly obvious, usually with the GTAP tariff being far higher than the actual tariff. Small differences, of around 1-2%, between the actual and GTAP tariffs were accepted, and no changes were made in these sectors.

Step (ii) requires a little more explanation. The GTAP database in this research is aggregated into 17 commodity groups and 14 regions. The tariffs in GTAP therefore reflect these aggregations using trade-weighted tariffs. The tariff data available at the APEC tariff website is at a much more disaggregated level, with each separate commodity having its own tariff⁸². This poses a problem when trying to compare the GTAP and actual tariffs. For example, the GTAP tariff on the aggregated commodity group of “Motor Vehicles and Transport Equipment” products entering Singapore from Australia might be 10%. However, when the APEC tariff website is used to search for the actual tariff, data are only available for the disaggregated commodities from this group, such as “vehicles specially designed for travelling on snow”, “used or second-hand vehicles of a cylinder capacity not exceeding 1000cm³”, and “disc brake pads”. Therefore direct comparisons between the GTAP and actual tariffs is not a simple task.

There are at three options available to the researcher. First the researcher could simply leave the GTAP tariffs as they are, and accept that some of the results obtained from any experiments involving tariff removal may be inaccurate and potentially misleading. Second, he/she can list all of the disaggregated commodities from the APEC tariff website that are included in each GTAP aggregation, find the actual tariff level on each of these commodities, and then calculate a trade-weighted tariff for each aggregation. This would involve obtaining the total amount of bilateral imports that

⁸² The database at this website provides tariff details for disaggregated commodities at the Harmonised System 8-digit level, compared to the GTAP aggregated tariffs in this research which are for commodity groupings at around the 2 digit level.

comprise the GTAP commodity aggregation, and also the amount of bilateral imports in each of the Harmonised System 8 digit level disaggregated commodities. The next step in calculating this trade-weighted tariff would be to use the following formula:

$$TWT_{J,r,s} = \sum_{i=1}^{i=n} \left[\left\{ \frac{M_{i,r,s}}{\sum_{i=1}^{i=n} M_{i,r,s}} \right\} * T_{i,r,s} \right] \quad (6.12)$$

where TWT = Trade Weighted Tariff

J = GTAP commodity aggregation

M = Value of imports

i = disaggregated commodity in the GTAP aggregation J : $i = 1, 2, \dots, n$

r = source of import

s = destination for import

T = actual tariff from <http://www.apectariff.org>

This process would need to be repeated for each of the GTAP commodity aggregations and for each of the GTAP regional aggregations, before any alterations could be made to the GTAP version 4 database. If achieved, the researcher could be sure that the results obtained from any experiments centred on creating a PTA were completely accurate, notwithstanding any other data discrepancies in the database. Ideally, this is the process that this research would have followed, but this was infeasible both in terms of time and data availability. The third option available to the researcher is to isolate the major discrepancies between the GTAP and actual tariffs, and make some attempt to bring the two figures closer. This is the methodology followed in this research, as explained below.

The GTAP tariffs for Australia, New Zealand, Chile, Singapore and the United States were calculated using equation (6.11) above. Next, some of the most important disaggregated commodities in each of the GTAP commodity aggregations were selected, and the tariffs on these were noted from the APEC tariff website. By looking at these tariffs, an impression was gained as to the general level of actual tariffs in each GTAP commodity grouping. This estimate was then compared with the GTAP tariffs,

and any major discrepancies were highlighted. As an example, consider the GTAP tariff of 14.29% on 'Natural Resources' imports from Singapore into New Zealand. From the APEC tariff website it was found that the tariffs on coal, petroleum, oil, and gases from Singapore into New Zealand are all duty free. Since these would make up the majority of the imports in this GTAP aggregation, it would appear that the actual tariff on 'Natural Resources' should be far lower, and quite possibly zero. When significant differences between the GTAP and actual tariffs were found, changes were made to the GTAP database using the ALTERNAX⁸³ tool in the RunGTAP program. For the majority of cases, the need to make these changes was fairly obvious after looking at the actual tariff rates. In other cases, however, further investigation into the actual tariff levels was necessary, and these are outlined in Appendix C. Table 6.1 indicates the countries and commodity groupings for which tariffs have been altered in the GTAP database

⁸³ ALTERNAX allows GTAP users to change various tax rates – including tariffs - in the GTAP database. Whilst this might appear to be a simple task of altering one figure, "it is not desirable to simply change one tax and leave the rest of the data base unchanged, because doing this destroys the internal consistency of the database. In order to maintain the overall balance of the data base, it is necessary to change the tax in question, *and allow the other flows in the data base to adjust so as to maintain consistency*" (Malcolm, 1998, p. 1, emphasis added). The procedure followed is to 'shock' the tariff as required, and the GTAP model then calculates how this changed tariff affects other flows. The key feature of this process is that the internal consistency of the database is maintained. For further details on the ALTERNAX program, see Malcolm (1998), available online at <http://www.agecon.purdue.edu/gtap/techpaper/tp-12.htm>.

Table 6.1 Changes to the Tariffs in the GTAP Database

Import Destination	Import Source	GTAP Commodity Aggregation	Original GTAP Tariff (%)	Altered Tariff (%)
New Zealand	All Regions	Meat Products	Average Tariff of 16.73	5.00 ^a
New Zealand	Singapore	Wood and Paper	9.01	5.00
New Zealand	All regions except Australia	Motor Vehicles and Transport Equipment	Average Tariff of 5.77	15.00
Australia	United States	Clothing	18.61	12.00
Australia	United States	Metals and Metal Products	10.91	5.00
Australia	Singapore	Clothing	22.12	6.00
Australia	Singapore	Metals and Metal Products	8.93	5.00
Australia	Singapore	Motor Vehicles and Transport Equipment	0.92	10.00
Australia	Chile	Wood and Paper	13.04	5.00
Chile ^b	All regions except Mexico and Canada ^c	All commodities	Various	10.00
Singapore ^d	All regions	All commodities except Beverages and Tobacco, Motor Vehicles and Transport Equipment ^a , and Mineral and Petroleum Products	Various	0
United States	All regions except Japan, Mexico and Canada ^e	Meat Products	Average Tariff of 0.63	4.00 ^a
United States	Chile	Clothing	11.30	7.00
United States	Singapore	Clothing	15.42	7.00

^a See Appendix C for more details on how this figure was obtained.

^b Chile has recently moved to a flat tariff rate of 10% on all goods and services.

^c This reflects the bilateral free trade agreements that Chile has signed with Mexico and Canada in recent years.

^d All imports entering Singapore are now duty free, with the exception of the GTAP aggregations of Beverages and Tobacco, Mineral and Petroleum Products, and Transport and Motor Vehicle Equipment. The former two aggregations are left with their original GTAP tariffs, and the Transport and Motor Vehicles tariff has been changed from 2.78% to 5.00%, as outlined in Appendix C.

^e The majority of trade between the United States, Mexico and Canada is duty free due to the NAFTA. Thus all tariffs between these countries are left at their original levels. Data from <http://www.apectariff.org> indicates that the tariff on meat products from Japan is also zero.

6.7 Simulation Methodology and Experimental Design

The expansion of the Australia-New Zealand Closer Economic Relations (CER) agreement is modeled with three scenarios:

Experiment 1: The creation of a PTA between New Zealand, Australia and Singapore.

Experiment 2: The extension of the above PTA to include Chile.

Experiment 3: The further extension of the PTA to include the United States – the ‘Pacific Five’.

In addition to these CER expansion proposals, an experiment is also be conducted to evaluate the results of only New Zealand and Singapore signing the bilateral Closer Economic Partnership (CEP) trade agreement. Thus Singapore would not gain duty-free access to Australia. This agreement is currently being debated in the parliaments of the two nations. This is Experiment 4.

In each experiment, the liberalisation strategy involves the removal of the tariff equivalents in the GTAP database, and also the removal of export subsidies on the agricultural sectors⁸⁴. This liberalisation is not be on a Most Favoured Nation (MFN) basis: the trade barriers are only be removed on trade between the regions in the PTA. Protection levels of the PTA members with respect to the rest of the world are unaltered. Domestic production subsidies are also left at their pre-PTA levels in the regions forming the PTA. This is because the formation of PTAs, at least in the initial stages, often leaves domestic production subsidies unchanged. Such subsidies tend to be addressed and sometimes reduced or removed at a later date, when the PTA becomes more deeply integrated. Since these experiments all examine the short-run impacts of the PTA immediately after it is formed – a momentary ‘snap-shot’ of each economy after the policy shock – it is unlikely that any domestic subsidies would be eliminated.

⁸⁴ In the GTAP version 4 database, gaps exist between the domestic and world prices on both the import and export sides of the market. In the agricultural sectors, the gaps on the export side – export subsidies – are identical to the tariffs on these sectors. Thus in each experiment, the reductions in export subsidies are identical to the tariff reductions. These subsidies are only removed on the agricultural sectors, as they are very rare in the other manufacturing and services sectors. Indeed, these sectors are often subject to export taxes rather than subsidies. These are left unchanged in each experiment.

The creation of a PTA between groups of countries involves dismantling all barriers to trade between member nations. The elimination of all tariffs and non-tariff barriers however, is unlikely to occur completely at one specified date. The majority of PTAs phase in their trade barrier reductions over a specified time frame. An example of this would be the CER's initial aim in 1983 of removing all tariffs on trans-Tasman commodities by 1988, or NAFTA's goals of eliminating protection over a fifteen-year framework. The reasons behind the gradual abolition of barriers are that the abrupt adoption of completely free trade could potentially have a severe destabilising influence on the members' economies, and also that trade in some commodities is politically sensitive. As explained by Chatterjee, Rae and Shakur (2000, p. 4), "[a]gricultural markets have traditionally been ruled by a different set of regulations, institutions and political considerations than have those in manufactured goods". These agricultural sectors are particularly important to New Zealand and Australia, due to their importance in both nations' external trade, but they are politically sensitive due to the high levels of protection adopted by other governments.

Therefore, two alternative options for the creation of the PTAs in Experiments 1, 2 and 3 will be explored:

- Option A: Tariffs and export subsidies are completely removed on all sectors, except for agricultural and food commodities. The protection levels in these latter sectors⁸⁵ are left unaltered.
- Option B: Tariffs are completely removed on all sectors, and export subsidies are removed in the agricultural sectors. This would be the full PTA, and would be the ultimate goal of forming a PTA. This gives a benchmark against which to compare the results from Option A.

In Experiment 4 – the analysis of the CEP between New Zealand and Singapore – only Option B is examined. This is because the proposed agreement being discussed at the

⁸⁵ These GTAP aggregations are: (i) Unprocessed Meats and Wools
(ii) Meat Products
(iii) The Dairy sector
(iv) Raw and Processed Crops, Sugar, Oils and Fats
(v) Vegetables, Fruits and Nuts
(vi) Food Products

parliamentary level contains no sectoral exceptions. This gives a total of seven experiments to analyse and compare – options A and B for Experiments 1, 2 and 3, and option B for Experiment 4.

CHAPTER 7

RESULTS AND DISCUSSION

7.1 The GTAP Experimental Results to be Analysed

After conducting the experiments outlined in Chapter 6 (Section 6.7), GTAP produces a multitude of regional and sectoral results. This research examines the changes which result from shocking the original equilibrium state using a number of these regional and commodity indicators:

- (i) Welfare, measured in terms of Equivalent Variation
- (ii) Terms of Trade
- (iii) Gross Domestic Product
- (iv) Trade balances
- (v) Domestic output of commodities
- (vi) Domestic and world prices of commodities
- (vii) Quantity and value of exports of commodities

These variables are all self-explanatory, except for the welfare measure employed by GTAP. For an explanation of Equivalent Variation, see Appendix D.

7.2 A General Overview of the Experimental Results

In order to obtain a general overview of the effects of the experiments carried out to simulate the expansion of the CER trade agreement, Tables 7.1 to 7.7 provide the results for Equivalent Variation (EV) in 1995 US\$ millions, the contributions to this welfare change due to changes in the terms of trade and the effects of allocative efficiency changes, the change in each region's GDP, and the change in each region's

trade balance. The results are shown for only the regions who have been considered as partners in each scenario for an expanded CER agreement⁸⁶.

Table 7.1 Overview of Results from Extending the CER to Include Singapore: No Agricultural Liberalisation

Region	EV (1995 US\$ million)	Terms of Trade Effects on EV	Allocative Efficiency Effects on EV	% Change in GDP	Change in Trade Balance (1995 US\$ million)	% Change in Terms of Trade
NZ	-12.78	-13.58	-1.77	-0.14	-2.00	-0.07
Australia	-145.47	-117.85	-13.45	-0.23	9.03	-0.18
Singapore	34.97	30.56	4.17	0.06	9.74	0.02
World	17.88	-0.12	18.02			

These results suggest that a PTA involving the CER nations and Singapore, with no liberalisation in the agricultural sectors, would result in static welfare losses for New Zealand and Australia, and gains to Singapore. There is also a significant ‘free rider’ spillover effect of creating a welfare gain of US\$8.7 million to the United States. The global effect of creating such a PTA is to improve world welfare by US\$17.9 million. For each region, the majority of the welfare change is due to changes in the terms of trade (TOT). Despite New Zealand’s TOT falling just 0.07%, this results in a welfare loss of US\$13.6 million. The allocative effects⁸⁷ for each of the five regions in this scenario are very small. This reflects the fact that bilateral trade between New Zealand and Australia is already subject to zero tariffs in the baseline GTAP model, and that bilateral trade between the CER members and Singapore is also virtually duty-free. Thus when any remaining tariffs are removed, there is little re-allocation of resources.

⁸⁶ Full results can be obtained from the author.

⁸⁷ Allocative efficiency gains are achieved from the removal of trade barriers as resources will be removed from the previously protected sectors in the importing region, and switched into more efficient sectors. Efficiency gains are also made in the exporting region, as more resources are transferred to the sector which has been liberalised (Chatterjee *et al.*, 2000).

The changes in GDP for each region also suggest that the proposed PTA in this experiment may be detrimental for New Zealand and Australia on a macroeconomic level. Although the changes are relatively small, at -0.14% and -0.23% respectively, these are still important, as they suggest that economic growth may not occur in all PTA partners. Contributing to New Zealand's fall in aggregate output is a decrease in value of the trade balance of US\$2 million. Interestingly, the same logic does not apply to Australia, whose trade balance improves by over US\$9 million, as does that of Singapore, which experiences an increase of 0.06% in its GDP.

Table 7.2 Overview of Results from Extending the CER to Include Singapore: Full Liberalisation

Region	EV (1995 US\$ million)	Terms of Trade Effects on EV	Allocative Efficiency Effects on EV	% Change in GDP	Change in Trade Balance (1995 US\$ million)	% Change in Terms of Trade
NZ	-12.55	-13.43	-1.74	-0.14	-2.13	-0.07
Australia	-115.72	-92.43	-8.88	-0.23	11.33	-0.14
Singapore	11.51	7.49	3.70	0.07	8.80	0.00
World	22.00	-0.10	22.12			

The results shown above in Table 7.2 are for a PTA between the CER nations and Singapore, with 100% liberalisation in all sectors. The inclusion of agriculture in the tariff reduction procedure does not alter the direction of the changes in the variables when compared to the partial liberalisation scenario. The magnitude of some of the changes, however, is affected. Global welfare increases by US\$22 million in this scenario, so the inclusion of agricultural liberalisation has the expected positive effects on EV – increasing it by US\$2.1 million compared to when agriculture was excluded. The effect of reducing tariffs in these sectors has little effect on the welfare of New Zealand, due to the fact that there is no protection in the agricultural sectors on trade between New Zealand and Australia, and that barriers in these sectors on bilateral trade with Singapore are already at a very low level. There is a positive effect on the welfare of Australia from including agriculture in the PTA, resulting in its welfare loss being

reduced from US\$145 million to US\$116 million. This gain is primarily due to the fall in Australia's TOT being smaller when agriculture is liberalised. It would appear that Australia's gain is Singapore's loss, as the increase in Singapore's EV decreases from US\$35.0 million to US\$11.5 million when the agricultural sectors are liberalised. This decreased welfare gain is almost entirely due to a much weaker TOT effect for Singapore.

The majority of the other results are very similar to those when agriculture is not liberalised. The United States again increases its welfare by over US\$8 million, and the effects on GDP growth in the five regions are virtually identical to when there was no decrease in agricultural protection.

Table 7.3 Overview of Results from Extending the CER to Include Chile and Singapore: No Agricultural Liberalisation

Region	EV (1995 US\$ million)	Terms of Trade Effects on EV	Allocative Efficiency Effects on EV	% Change in GDP	Change in Trade Balance (1995 US\$ million)	% Change in Terms of Trade
NZ	-11.11	-12.07	-1.47	-0.13	-1.51	-0.06
Australia	-135.10	-110.37	-11.16	-0.22	9.73	-0.17
Singapore	38.14	33.35	4.52	0.07	10.65	0.03
Chile	-22.71	-20.90	-2.31	-0.14	-3.58	-0.11
World	18.69	-0.12	18.82			

The addition of Chile to an expanded CER agreement with Singapore has fairly small effects on the nations involved apart from Chile itself, as shown in Table 7.3. Global welfare increases by US\$18.7 million when agricultural sectors are not liberalised. The welfare losses to New Zealand and Australia respectively are around US\$1.7 million and US\$10 million smaller than when Chile is not included, and the gain to Singapore increases by over US\$3 million to US\$38.1 million. Chile suffers a welfare loss of over US\$22 million from joining the PTA, mainly due to the TOT effects of tariff

reduction – its TOT falls by 0.1% after it removes its flat 10% tariffs. The United States again ‘rides for free’ and this results in a welfare gain of around US\$9 million.

New Zealand (-0.13%), Australia (-0.22%) and Chile (-0.14%) all suffer negative economic growth as a result of the PTA, and Singapore’s GDP increases by 0.07%. Australia and Singapore’s trade balances both increase by around US\$10 million, whilst New Zealand’s again falls, albeit it by only US\$1.5 million. Chile also faces a decrease in its trade balance, by over US\$3.5 million, and the United States’ trade balance is subject to a decrease of nearly US\$10 million.

Table 7.4 Overview of Results from Extending the CER to Include Chile and Singapore: Full Liberalisation

Region	EV (1995 US\$ million)	Terms of Trade Effects on EV	Allocative Efficiency Effects on EV	% Change in GDP	Change in Trade Balance (1995 US\$ million)	% Change in Terms of Trade
NZ	-8.42	-9.65	-1.09	-0.12	-1.03	-0.05
Australia	-105.36	-85.05	-6.53	-0.22	11.99	-0.13
Singapore	14.80	10.40	4.06	0.07	9.75	0.01
Chile	-24.56	-23.18	-1.92	-0.16	-4.48	-0.12
World	23.28	-0.099	23.386			

Including agriculture in the trade liberalisation program in a PTA between the CER nations, Singapore and Chile has some important effects on the welfare, trade balance, economic growth and TOT results, as can be seen in Table 7.4. Global economic welfare increases by some US\$4.5 million compared to the scenario where agriculture is excluded, with Australia’s welfare loss decreasing by around US\$30 million. New Zealand also benefits from the inclusion of the agricultural sectors in the PTA, with its welfare loss decreasing from US\$11.1 million to US\$8.4 million. Chile’s welfare worsens, falling by another US\$2 million, but as with the CER-Singapore PTA, Singapore suffers significantly from the inclusion of agriculture – its welfare gain being reduced by over 60% from US\$38.14 million to US\$14.80 million. This is

mainly due to a great decrease (US\$23 million) in the contribution to EV from changes in its TOT.

In terms of economic growth, New Zealand's fall in GDP improves fractionally from -0.13% to -0.12%, and Chile's economy experiences a further slowdown when agriculture is included in the PTA, from -0.14% to -0.16%. Singapore's growth is unaffected, probably due to its low levels of trade with Chile in agricultural goods.

Not surprisingly, given their strong and efficient farming sectors, Australia's and New Zealand's trade balances improve when agriculture is added to the list of duty free products in the PTA. Australia, indeed, experiences an increase of US\$12 million from the PTA, over US\$2.2 million higher than when agriculture was excluded. New Zealand still has a deterioration in its trade balance to the tune of US\$1 million, but this is a 33% smaller decrease than when the tariffs on the six agricultural sectors were left unaltered.

Table 7.5 Overview of Results from Extending the CER to Include Chile, Singapore and the United States: No Agricultural Liberalisation

Region	EV (1995 US\$ million)	Terms of Trade Effects on EV	Allocative Efficiency Effects on EV	% Change in GDP	Change in Trade Balance (1995 US\$ million)	% Change in Terms of Trade
NZ	-67.27	-74.76	-7.59	-0.79	-9.29	-0.38
Australia	-776.51	-658.18	-33.87	-1.31	72.41	-1.01
Singapore	72.88	60.19	13.33	0.07	27.48	0.05
Chile	-409.11	-369.82	-47.45	-2.64	-59.47	-1.95
USA	769.78	396.28	320.45	0.05	-15.80	0.05
World	398.86	-7.537	406.73			

The inclusion of the United States in an expanded CER agreement – the so-called Pacific 5 – has major effects on the economies involved in the PTA. Global welfare increases substantially by US\$400 million, which is over 20 times the size of the

welfare change when the United States is not a PTA member, as shown in Table 7.5. The distribution of this welfare improvement is, however, very uneven. The United States is the main benefactor, its welfare improving by over US\$750 million, and Singapore's EV nearly doubles compared to the experiments when the United States was not included. The welfare gain to the United States is composed almost equally of benefits from an improved TOT and from efficiency gains. Australia, on the other hand, suffers vastly from the Pacific 5 formation as its welfare decreases by nearly US\$700 million – mainly due to a significant deterioration in its TOT of over 1%. Chile also suffers greatly, with its EV showing a welfare loss of over US\$400 million, over 16 times the loss incurred when the United States was not a PTA member. This loss can mainly be accounted for by a 1.95% decrease in its TOT. Compared to these two nations' losses, New Zealand's loss of US\$67 million is relatively small, but it is still over five times the size of the welfare loss incurred when the United States is not involved.

The effects of the creation of the Pacific 5 on economic growth are also significant. Whilst the United States and Singapore both experience minor growth of 0.05% and 0.07% respectively, the negative effects on the other PTA members are far larger. Chile's GDP falls by over 2.5%, Australia's GDP decreases by 1.3%, and New Zealand is also strongly affected, experiencing a downturn in economic growth of 0.8%. Australia's loss must be due to a shrinking domestic sector, as its trade balance actually improves by over US\$70 million, but losses of US\$9 million and US\$59 million for New Zealand and Chile respectively indicate how vital external trade is to these regions.

The removal of tariffs and subsidies on the agricultural sectors in the Pacific 5 scenario has major impacts for the PTA members, as shown in Table 7.6 overleaf.

Table 7.6 Overview of Results from Extending the CER to Include Chile and Singapore and the United States: Full Liberalisation

Region	EV (1995 US\$ million)	Terms of Trade Effects on EV	Allocative Efficiency Effects on EV	% Change in GDP	Change in Trade Balance (1995 US\$ million)	% Change in Terms of Trade
NZ	-13.57	-25.93	-0.24	-0.53	2.67	-0.12
Australia	-660.89	-564.65	-17.03	-1.19	79.09	-0.86
Singapore	48.38	35.87	12.97	0.08	26.88	0.03
Chile	-413.14	-381.15	-40.23	-2.70	-63.30	-2.01
USA	662.45	290.64	329.73	0.04	-22.73	0.04
World	432.60	-6.787	439.67			

The elimination of tariffs and export subsidies on agricultural products results in a less bleak outlook for New Zealand, with its welfare loss falling to US\$13.6 million, indicating that there are important benefits to be gained through the continuation of lobbying to reduce trade barriers in these sectors. New Zealand's EV loss in this scenario consists almost entirely of TOT effects – there are only very minimal negative resource allocation effects after the formation of the PTA. Australia's loss is also significantly smaller, falling by US\$115 million from US\$-776 million to US\$-661 million. Chile becomes worse off after agriculture is liberalised, with its EV moving from US\$-409 million to US\$-413 million. The welfare gains experienced by Singapore and the United States decrease, although the benefits are still large at US\$48 million and US\$662 million respectively. Around half of the United States' total welfare gain is due to a more efficient allocation of resources after tariffs are removed. This may be explained by the fact that of the five nations examined, agricultural protection is only significant in the United States, and when it is removed, there are major efficiency gains.

The decreases in economic growth in New Zealand and Australia are lower than when agriculture is excluded, although the falls are still large at -0.5% and -1.2% respectively. Chile's GDP growth again falls by a significant amount – a decrease of 2.7%. This may cast doubt upon the theory that Chile should be “the model for the programs of economic restructuring, market liberalization, and stabilization”

(Bosworth *et al*, 1994, p. 1). Economic growth occurs in both Singapore and the United States as a result of the formation of the PTA, but this growth is far from dramatic at levels less than 0.1%. One interesting feature of this scenario for New Zealand is that its trade balance would actually improve by US\$2.7 million – the only experiment in which this occurs. This suggests that the value of its exports of agricultural products must increase sharply after protection in the United States is removed.

Table 7.7 Overview of Results from Creating a PTA between New Zealand and Singapore: Full Liberalisation

Region	EV (1995 US\$ million)	Terms of Trade Effects on EV	Allocative Efficiency Effects on EV	% Change in GDP	Change in Trade Balance (1995 US\$ million)	% Change in Terms of Trade
NZ	-13.16	-13.62	-1.55	-0.11	-1.47	-0.07
Singapore	3.19	2.80	0.38	0.01	0.98	0.00
World	2.06	-0.008	2.062			

This much smaller PTA – the proposed Closer Economic Partnership between New Zealand and Singapore - has far less substantial effects than any of the other scenarios examined. It has minimal effects on other regions, other than increasing the United States' welfare slightly, and decreasing its trade balance, both by negligible amounts. The main effect is that New Zealand would suffer a welfare loss of over US\$13 million from the bilateral PTA, almost entirely due to the effects of a weaker TOT. Singapore does benefit from the CEP agreement, with a welfare gain of US\$3.2 million, but this is less than one third of the gains achieved when Australia is included in the PTA. This fact would support the suggestions of the foreign affairs and trade select committee that "the direct benefits are not considered substantial for either party in the initial stages of liberalisation" (New Zealand Herald Online, 20th October 2000). This is because both regions already have very low levels of import protection, and thus there are fewer gains to be made from eliminating the isolated remaining tariffs. It must be realised however, that the CEP is not a purely economic policy change – particularly

for the New Zealand government, the CEP is seen as a gateway for further trade pacts with the ASEAN nations, which could lead to immense benefits. This belief is confirmed by the aforementioned committee: "it is the longer-term strategic possibilities to advance trade liberalisation both regionally and globally that ... will be of considerable value to both parties" (New Zealand Herald Online, 20th October 2000).

To summarise this section:

1. The effects on global welfare of creating an expanded CER trade agreement are as expected. As the size of the PTA increases, so do the gains to the global economy. The welfare gains to the world also increase when full liberalisation is pursued, as opposed to scenarios when agricultural sectors are left unchanged. The effects of adding the United States to the PTA are immense, with global welfare increasing up to US\$432.6 million under the fully liberalised Pacific 5 scenario, compared to a maximum of US\$23.3 million when the United States is not included. This suggests that the removal of tariffs on goods entering the United States would be hugely beneficial to world welfare with gains of up to US\$330 million being accrued purely due to the more efficient allocation of resources in that region. These global welfare gains occur despite the removal of tariffs affecting a relatively small number of exporters.
2. The consistent benefactors in all scenarios of the creation of an expanded CER agreement are the United States and Singapore, with both nations experiencing unambiguous welfare gains. Singapore also gains from the proposed bilateral CEP with New Zealand, whilst New Zealand suffers a large fall in welfare.
3. New Zealand, Australia and Chile all face welfare losses from an expanded CER. For the former two, these welfare losses are diminished once agriculture is liberalised, whilst the latter actually faces a further EV loss when barriers in the agricultural sectors are removed. The welfare gains to the United States and Singapore decrease substantially when this occurs. Australia experiences far greater welfare losses than New Zealand, at levels of nine to twenty times the size of the losses in New Zealand.

4. When agricultural products are subject to tariff removal, global welfare increases by 23% for the CER-Singapore scenario, by 25% for the CER-Chile-Singapore scenario, and by only 8% under the Pacific 5 scenario.
5. The majority of the changes in welfare are due to changes in the terms of trade for each region. For an explanation of *why* the terms of trade changes in New Zealand, see the following section. Allocative efficiency effects contribute far less, and generally account for around 10-20% of any welfare changes.
6. New Zealand's trade balance falls in all scenarios except full liberalisation in a Pacific 5 agreement. It also falls under the CEP agreement with Singapore. These falls range between US\$1 million - US\$9 million. This suggests that after entering an expanded CER agreement, New Zealand's current account difficulties may be compounded. Australia's trade balance improves under all scenarios, and the inclusion of agriculture adds US\$2 million - US\$6.5 million to these gains. Singapore also improves its trade balance in all scenarios, although agricultural liberalisation tends to decrease these gains by around US\$1 million. Chile and the United States both suffer falls in their trade balances in all experiments.
7. The effects of expanding the CER in terms of economic growth vary dramatically depending on the scenario and the region examined. New Zealand's GDP falls in all experiments, with the most significant decrease of 0.79% occurring when the P5 is created without agricultural liberalisation. Australia's growth also falls in all cases, with those decreases being nearly double the magnitude of those experienced in New Zealand – up to a fall of 1.3% in GDP. Chile appears to suffer quite badly when included in the PTA, with its economic growth falling by up to 2.7%.
8. The New Zealand-Singapore CEP trade agreement does not seem to be very beneficial to New Zealand, as it experiences a welfare loss of over US\$13 million, whilst Singapore gains slightly. However, it must be remembered that there may be significant strategic, long-term gains to be made from promoting free trade in the ASEAN region. A further explanation of this result is that many of the liberalisation schemes to be implemented in the CEP are in the services sectors, an area of the GTAP database that is sometimes problematic.

7.3 A Focus on New Zealand

In order to present concisely the main effects of New Zealand being a member of an expanded CER agreement, Table 7.8 shows some of the key results from each scenario. The column title “No Agri” represents the PTA scenarios when there is no liberalisation in the agricultural sectors, and “Full” denotes 100% liberalisation in *all* sectors.

Table 7.8 Key Results for New Zealand

Variable	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
EV (US\$ millions)	-12.781	-12.554	-11.109	-8.416	-67.274	-13.569	-13.155
TOT Effects on EV (US\$ m)	-13.578	-13.428	-12.07	-9.647	-74.762	-25.925	-13.618
Efficiency Effects on EV (US\$ m)	-1.773	-1.743	-1.473	-1.093	-7.591	-0.241	-1.546
Terms of Trade (% Δ)	-0.07	-0.069	-0.062	-0.049	-0.384	-0.121	-0.074
Trade Balance (US\$ m)	-2.003	-2.125	-1.513	-1.027	-9.288	2.665	-1.469
GDP (% Δ)	-0.139	-0.143	-0.127	-0.116	-0.788	-0.533	-0.11

Since this research is aimed at examining the economic effects of expanding the CER for New Zealand specifically, this section tries to explain *why* New Zealand appears to suffer welfare losses in all of the seven scenarios analysed. Appendix E shows the experimental results for the percentage change in New Zealand’s domestic output in each sector⁸⁸. The results clearly show that the removal of tariffs when an expanded CER PTA is formed leads to domestic expansion in the majority of sectors in New Zealand, but almost always by less than 1%. New Zealand expands the most in the sectors in which it has a comparative advantage over the other PTA members – namely the agricultural sectors, and particularly in the dairy sector. Conversely, New Zealand’s output of services decreases in each scenario, which suggests that New Zealand is not an efficient producer in this area, and thus imports more from its PTA members. In general, the expansion of the CER leads to a small expansion of domestic

⁸⁸ For a full listing of the commodities in each GTAP aggregation, see Appendix B.

production in New Zealand, and this does not appear to account for the decrease in welfare that New Zealand experiences in all scenarios. This is also shown by the small allocative efficiency effects for New Zealand of expanding the CER, as shown in Table 7.8.

The over-riding contributing factor to New Zealand's welfare losses is the change in its terms of trade. Falling export and world prices and rising import prices lead to New Zealanders receiving less for the products that they sell in foreign markets, and spending more on goods purchased overseas. This has a detrimental effect on New Zealand's welfare. The terms of trade change can be broken down into three components in order to analyse their respective importance, and these three variables – the contributions to the change in the terms of trade due to world prices, export prices and import prices – are shown in Table 7.9.

Table 7.9 The Contribution to New Zealand's Change in Terms of Trade Due to Changes in World, Export and Import Prices

	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
Change in TOT (%) ^a	-0.07	-0.069	-0.062	-0.049	-0.384	-0.121	-0.074
Contribution of World Prices	-0.005	0.003	-0.005	0.003	-0.031	-0.01	-0.001
Contribution of Export Prices	-0.105	-0.113	-0.095	-0.091	-0.577	-0.316	-0.074
Contribution of Import Prices	-0.04	-0.041	-0.037	-0.038	-0.225	-0.205	-0.001

^a The change in the terms of trade is calculated from its three components using the following formula:
 $\Delta \text{TOT} = \text{Contribution of World Prices} + \text{Contribution of Export Prices} - \text{Contribution of Import Prices}$

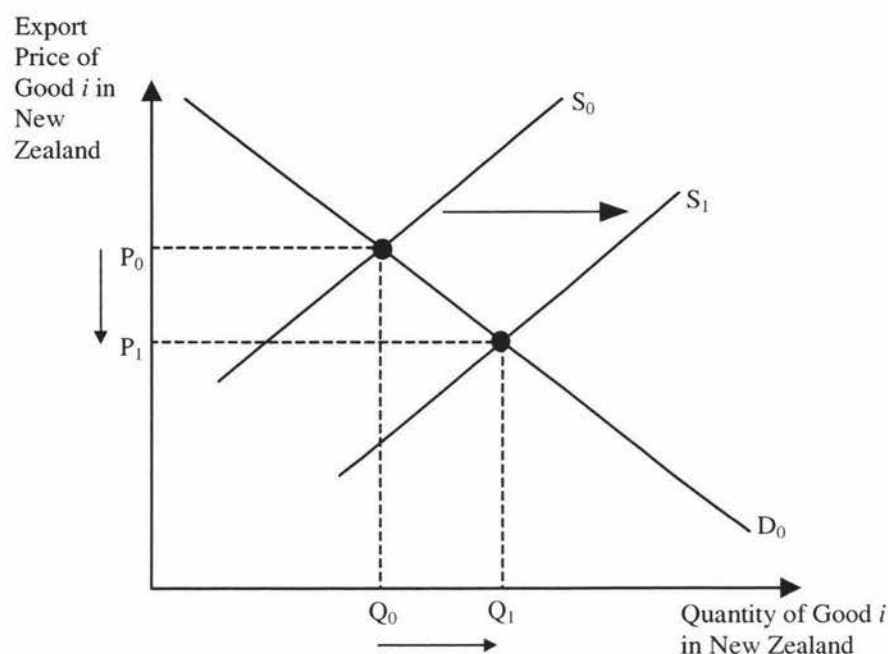
This table shows that in all scenarios, changes to the world price in each sector have very little effect on New Zealand's terms of trade. As can be seen in Appendix G, world prices are virtually unaffected by an expanded CER which does not include the United States. The majority of sectors experience near-negligible decreases in their world price. The only exception to this is when the dairy sector is liberalised under the full liberalisation scenarios. When this occurs, world dairy prices increase by 0.04%, and therefore New Zealand dairy exporters receive a higher price on the world market.

Since dairy exports represent a large share of total exports, this has a beneficial welfare effect – albeit very small - for New Zealand, as is shown in Table 7.9 above by the positive values for the contribution to New Zealand’s change in terms of trade due to changes in the world price under full liberalisation.

When the United States is added to the expanded CER, changes to world prices are far more significant. World prices fall in the vast majority of sectors, and this has a detrimental effect on New Zealand’s terms of trade, particularly when agricultural goods are not liberalised. This is because New Zealand’s exporters receive a lower price for their goods overseas. When agricultural goods are liberalised in the Pacific 5 scenario, dairy prices *increase* by 0.18%, and this has the effect of reducing the negative impact of changes in world prices on New Zealand’s terms of trade. These results clearly show the importance of the dairy sector to New Zealand with regards to its terms of trade and therefore its welfare.

A more important factor in explaining the welfare losses experienced by New Zealand is the decreases in New Zealand’s export prices that occur after each PTA is formed. The full table of results for this variable can be seen in Appendix H. Simple economic theory suggests that when the tariff on a commodity is removed, imports of the good increase, and its output and price *rise* in the countries who produce that good more efficiently. For example, New Zealand is a more efficient producer of dairy products than Singapore. If a PTA were formed between the two nations, the removal of tariffs on the dairy sector would lead to increased imports of dairy into Singapore, increased production of dairy products in New Zealand, and an increased price. In a multi-region setting, however, the effects of removing a tariff are less obvious, due to the many changes that occur in a general equilibrium context. In Table H.1, prices *fall* in every sector in New Zealand, in each scenario. This can be explained by New Zealand’s domestic output increasing in the majority of sectors after protection is removed, as shown in Appendix E. The increased supply (shown by Q_0 to Q_1) in each sector i leads to falling prices (P_0 to P_1), as shown in Figure 7.1 below:

Figure 7.1 The Effect of a Tariff Reduction on the Supply and Export Price of Good i in New Zealand



The lower export prices received by New Zealand exporters reduce New Zealand welfare. These price reductions are not substantial until the United States is introduced into the PTA, whereupon prices fall by around 0.5 - 1% in all sectors, especially when agricultural products are not liberalised. These decreased export prices have a significant negative effect on sectoral producer surpluses (the sum of the differences between the market price and the price at which producers would be willing to supply the commodity). This fall in producer welfare contributes to the decrease in equivalent variation experienced by New Zealand in all scenarios. The transport sector in particular sees a large fall in export prices when the Pacific 5 PTA is formed, so producers in this sector will suffer significantly.

It is clear that New Zealand's welfare decreases when export prices fall after the CER is expanded. It is useful therefore, to examine which sectors contribute the most to New Zealand's falling export prices. For example, a fall in the export price of dairy products would have a far greater effect on New Zealand's welfare than a similar fall in the natural resources sector, as New Zealand exports a great deal of the former, and relatively little of the latter. Table I.1 in Appendix I shows the contribution of each sector to New Zealand's export price decreases. The individual values in Table I.1 are obtained by multiplying the percentage change in price in each sector by that sector's

export share. This gives an indication of the relative importance of the fall in price in that specific sector to the overall contribution of falling export prices to New Zealand's terms of trade deterioration. To arrive at the *total* contribution to the change in terms of trade due to export prices, the sectoral values in Table I.1 are summed⁸⁹. These sums, shown in the last row of Table I.1, correspond to the 'Contribution of Export Prices' values in Table 7.9

In the scenarios where the United States is not included in the PTA, some clear patterns emerge. The terms of trade deterioration in each scenario appears to be due mainly to the decline in the export prices of meats, dairy, other food products, wood and services. However, since the latter two sectors have relatively low shares in New Zealand's total exports, it is the changes in the agricultural prices that primarily cause New Zealand's terms of trade to fall. This again highlights the importance of agriculture to the New Zealand economy, and why opposition is often encountered when liberalisation of these sectors is suggested. When the United States is also a member of the PTA, there are more wide-ranging sectoral effects, with the chemicals, metals and manufacturing sectors also being large contributors to New Zealand's terms of trade deterioration. The agricultural sectors – particularly unprocessed meats, dairy and other food products – remain the most important causes however, due to their large export shares.

The third factor that must be examined when attempting to explain New Zealand's deteriorating terms of trade after the CER is expanded is the change in its import prices. Since New Zealand is reliant on imports for a great deal of its intermediate inputs to production, it is necessary to compare the changes in export prices with those of imported goods. Table J.1 in Appendix J shows the percentage change in the price of imported goods in each scenario.

Comparing this table and Table H.1, it is easy to see that whilst import prices fall in every sector in all scenarios, they fall by *less* than export prices in the vast majority of cases. Exceptions to this observation include the beverages, wood, transport and

⁸⁹ The formula used is:

$$\text{Contribution to } \Delta \text{ in TOT due to Export Prices} = \sum_i \frac{\text{Value of Exports of } i}{\text{Value of Total Exports}} * \% \Delta \text{ Export Price of } i$$

manufacturing sectors, but in general, import prices fall by less than export prices. This fact explains why New Zealand's terms of trade deteriorates in each experiment, as shown in Table 7.8, and this deterioration in turn accounts for the majority of the welfare losses experienced by New Zealand. Only when the United States is involved in the PTA are the changes in import prices a significant factor. This implies that the fall in New Zealand's export prices after the CER is expanded is the main contributor to its deteriorated terms of trade.

In a similar process to that explained above for export prices, the contributions of each sector to New Zealand's falling import prices can be seen in Table K.1 in Appendix K. These import price falls improve New Zealand's terms of trade, *ceteris paribus*, although as explained earlier, these falls do not compensate for the larger decreases in New Zealand's export prices in the scenarios studied, leading to an overall fall in the terms of trade. Whilst the contributions for most sectors are negligible, four sectors appear to have a noticeable effect on the overall fall in New Zealand's import prices - the services, manufacturing, transport equipment and metals sectors. This is because New Zealand imports a great deal in these sectors (they have a high import share weighting), and thus any price falls in these sectors will have a significant contribution to the overall level of import price decreases. These falls in turn cause a terms of trade welfare gain, as New Zealanders pay less for these imports.

New Zealand's welfare losses may also be explained by examining the *value* of its exports and imports. If the value of New Zealand's exports increases, and the value of its imports decreases, its trade balance improves, indicating that New Zealand is effectively earning more, and spending less. This results in a welfare gain for New Zealand. Table 7.8 shows that New Zealand's trade balance *falls* in every scenario except for full liberalisation in the Pacific 5, and Table 7.10 shows these values, along with the change in value of New Zealand's aggregate exports and imports.

Table 7.10 Change in New Zealand's Trade Balance, Value of Exports and Value of Imports

Variable	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
Change in Trade Balance (US\$ m)	-2.003	-2.125	-1.513	-1.027	-9.288	2.665	-1.469
Change in Value of Aggregate Exports (%)	-0.035	-0.035	-0.019	-0.001	-0.097	0.189	-0.001
Change in Value of Aggregate Imports (%)	-0.026	-0.026	-0.012	-0.005	-0.052	0.192	0.008

This table shows that the value of imports into New Zealand falls in each scenario – excluding the full liberalisation in the Pacific 5 – which, *ceteris paribus*, leads to an improved trade balance. This is not the result, however, as the value of New Zealand's exports falls by a greater amount than its imports in most experiments. Only one scenario leads to New Zealand's export value increasing, when all sectors are liberalised in the Pacific 5 PTA, and despite its imports also increasing in value, this caused New Zealand's trade balance to improve slightly. This suggests that exporting producers in New Zealand would prefer any expanded CER agreement to include the United States, and also for the liberalisation program to include the agricultural sectors. A further interesting result is that the CEP between New Zealand and Singapore would have very little benefit in terms of increased exports from New Zealand, but that its aggregate imports increase very slightly - by 0.008% - in value.

Since exporters are often among the most powerful lobbyists when such a policy change is being considered, it is useful to examine the changes in export quantities and values by each sector in New Zealand. Table L.1 in Appendix L shows the percentage changes in export sales values by sector that occur after the CER is expanded in each scenario. These results show that the majority of New Zealand's exporters would see the value of their product sold overseas decrease. This applies even to agricultural sectors, unless they are liberalised when the United States is involved in the PTA. Two sectors experience increased export sales in all scenarios – the transport equipment and beverages sectors. This is probably due to the fact that tariffs in these sectors are relatively high for New Zealand's trading partners, and once removed, exports from New Zealand increase to these regions. As would be expected due to their high levels of protection, once the United States is a PTA member, there are significant gains to

many exporting sectors, particularly when the agricultural sectors are liberalised. The sectors that experience the largest increase in export values are the dairy sector (where sales value rises by 1.3%), the beverages sector (2.2%), meats (0.8%), and minerals sector (1.7%). It should be realised that for the dairy and meats sectors, these percentage changes are from a much larger initial export value, so in dollar terms the gains to exporters in these sectors is likely to be substantial.

To further examine these changes in export values, it is possible to examine the effect of the policy shock on each sector's export *quantities* to each destination. The full results for New Zealand's exports to the other potential PTA members can be seen in Appendix M, but of particular interest are the changes in the agricultural, beverages, and transport sectors. The results for these sectors are shown below in Table 7.11. In each experiment, the percentage change in exports to each destination are shown for the full liberalisation scenarios only⁹⁰.

Table 7.11 Selected Results for the Percentage Change in the Quantity of New Zealand Exports

Scenario	NZ-Aus-Singa	NZ-Aus-Singa-Chile		Pacific 5				NZ-Singa
	<i>Destination of New Zealand's Exports</i>							
Sector	<i>Singa</i>	<i>Singa</i>	<i>Chile</i>	<i>Aus</i>	<i>Singa</i>	<i>Chile</i>	<i>USA</i>	<i>Singa</i>
UNPROC	-7.740	-7.753	-21.871	-0.043	-7.467	-23.306	-11.867	-7.820
MEATS	-1.768	-1.781	9.851	-0.678	-1.459	7.662	3.417	-1.851
DAIRY	0.171	0.156	9.935	-0.745	0.467	7.775	52.398	0.080
CROPS	0.172	0.16	9.961	1.207	0.519	8.113	5.612	0.080
V_F	0.152	0.138	9.948	-0.067	0.426	7.956	0.673	0.069
FP_NEC	0.18	0.168	9.957	-0.705	0.534	7.987	0.726	0.086
BEV	26.914	26.899	9.936	-0.717	27.322	7.63	16.360	26.800
TRANSP	5.236	5.232	9.946	-0.228	6.106	8.516	2.302	5.072

In the scenarios where the agricultural sectors are liberalised, New Zealand's exporters experience some significant changes. When the expanded CER includes Singapore only, New Zealand's exports of unprocessed meats decrease by nearly 8%, and its exports of processed meats fall by around 2%. There are large exporter gains, however,

⁹⁰ The change in exports to Australia are not shown for the first two experiments, as they are not significantly affected until the United States joins the expanded CER agreement in the Pacific 5 scenario. Full results can be seen in Tables M.1 to M.4 in Appendix M.

in the beverages and transport sectors, where bilateral exports increase by 26.9% and 5.2% respectively. This is due to the fact that these two sectors have fairly high tariffs in Singapore, and once they are removed, New Zealand experiences a gain in efficiency.

If Chile is included in the PTA with New Zealand, Australia, and Singapore, and the agricultural sectors are liberalised, New Zealand's exports to Chile in most sectors increase by around 10%. It must be remembered, however, that these changes are from initial export quantities which are relatively small. There is a large fall in exports (21.9%) in the unprocessed meats sector, which reflects the comparative advantage that Chile has in this sector. New Zealand's exports of forestry products to Chile also decrease, albeit very slightly, again suggesting that Chile is a relatively efficient producer in this sector. The changes in exports to Singapore in this scenario are almost identical to those when Chile is not included.

The creation of the Pacific 5 PTA, particularly when all sectors are liberalised, leads to some significant changes in exports for New Zealand. The most startling result is that New Zealand's exports of dairy products to the United States increase by over 52%, clearly showing that there are substantial gains to be made from the United States removing its tariffs in this sector, in which New Zealand is a very efficient producer. There are also large increases in New Zealand's exports of beverages, by 7.6% to Chile, 27.3% to Singapore, and by 16.4% to the United States. Other sectors to experience expansion in their exports to the United States are crops (5.6%), meats (3.4%), clothing (6.1%), minerals (6.0%) and chemicals (4.4%). Since the United States is New Zealand's third largest export destination (NZTDB, 2000b, p.9), these percentage changes will be sizeable in terms of actual quantities. The only sector that experiences a substantial fall in its exports in this scenario is the unprocessed meats sector, where exports decrease by 23.3% to Chile, by 7.5% to Singapore, and by 11.9% to the United States. These results certainly explain why New Zealand's trade balance would improve by US\$2.665 million in this scenario, and why, from a political economy viewpoint, New Zealand exporters continue to lobby for reductions or the removal of tariffs in the United States, especially in the agricultural sectors.

The results for the New Zealand - Singapore bilateral CEP reinforce the view that there may not be substantial economic gains to be made by New Zealand by entering into such an agreement. Exports from New Zealand to Singapore fall by 7.8% in the unprocessed meats sector, and by 1.9% in the meats sector. This is perhaps surprising, as New Zealand traditionally has a comparative advantage in such sectors. There are, however, large increases in New Zealand's exports of beverages (26.8%) and transport (5.1%), which illustrates the reallocation of resources in New Zealand after Singapore removes its tariffs in these sectors. All other sectors experience very slight increases in export quantities, but these are all insignificant, at less than 0.1%.

As discussed in Chapter 4 (Section 4.3.2), the levels of Vinerian trade creation and diversion that result from the formation of a PTA can be used as a crude measure of the effects that the PTA might have on world welfare. Notwithstanding the caveats that apply to such analysis (see Section 4.3.3), a PTA that is a net creator of trade can be said to be beneficial to global welfare. Whilst a detailed analysis of trade creation and diversion is beyond the scope of this research, Appendix N gives an indication of the change in imports into the combined CER region after the Pacific 5 (full liberalisation) PTA is formed⁹¹. There is certainly a significant change in the source of imports for the combined CER region, with imports from within the Pacific 5 PTA increasing by \$US791.4 million, and those from non-PTA members decreasing by US\$532.6 million. The majority of these expanded intra-PTA imports are sourced from the United States, from whom the CER region imports over US\$720 million more than before the PTA was formed. The CER's imports from Singapore also increase by over US\$110 million. This suggests that a large amount of trade creation occurs within the PTA, as the removal of tariffs leads to a change in the lowest-cost source of imports for the PTA members. In contrast, after the PTA is formed the CER region imports over US\$190 million *less* from the European Union, US\$132 million less from Japan, and imports from the Asian regions also fall by over US\$160 million. That is, a large amount of trade is diverted away from non-PTA members. A sectoral analysis shows that the CER region increases most its imports of manufactured goods from its PTA members. After the PTA is formed, the CER imports an additional US\$429.9 million of manufactured goods from its PTA partners, the majority of which (US\$355.5

⁹¹ The results for the other scenarios are similar, although less pronounced than in the scenario of a fully liberalised Pacific 5 PTA. Full results can be obtained from the author.

million) is sourced from the United States. Imports in this sector decrease from the EU (by US\$70.0 million), Japan (US\$37.4 million), and from Asia (US\$47.3 million). The transport sector also sees a significant change, with an additional US\$196.8 million of imports into the CER originating within the PTA, again mainly coming from the United States (\$US183.2 million). This has a large impact on Japan's exports to the CER in this sector, which decrease by \$US46.1 million, and on imports from the EU, which fall by \$US23.0 million. The sources of the CER's imports of chemicals also alters dramatically after the PTA is formed, with imports from within the PTA increasing by over US\$130 million. These intra-PTA imports stem primarily from the United States (US\$120.1 million) and Singapore (US\$14.8 million), and these would appear to chiefly replace imports from the EU, whose exports to the CER in this sector fall by \$US19.5 million. The CER region also experiences large changes in the sources of its imports in the clothing, wood, metals and food products sectors, with imports increasing from the United States and Singapore, and decreasing mainly from the EU, Japan and Asia. These observations would certainly seem to indicate that in the scenario where a fully liberalised Pacific 5 PTA is formed, there is a substantial change in the source of imports into the CER region – there is evidence of a large amount of trade creation and diversion. Imports from within the PTA increase, with the United States being the main benefactor, and this appears to be at the expense of non-PTA members, and the EU and Japan in particular.

CHAPTER 8

CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

8.1 Conclusions

Due to the multitude of difficulties being experienced by many nations when trying to conduct multilateral trade liberalisation negotiations via the World Trade Organisation, many countries are turning towards smaller, regional, preferential trading arrangements in order to reduce trade barriers. New Zealand has been an active participant in such trade agreements. The aim of this study was to conduct a computable general equilibrium (CGE) analysis of the recent proposals to expand the New Zealand-Australia Closer Economic Relations (CER) trade agreement to include one or more of Singapore, Chile and the United States. The New Zealand - Singapore bilateral free trade agreement was also analysed. The focus of these analyses was the implications for New Zealand of creating these preferential trading arrangements. The main reason behind this study was that New Zealand is a small, open economy, for whom external trade is vitally important, and thus any change in trade policy is likely to have significant effects therein. The study also fills a gap in the existing literature on trade liberalisation studies using CGE models, as many authors have analysed the impact of creating an APEC preferential trading arrangement, but there have been no attempts to demonstrate the effects of expanding the CER.

By analysing the attitudes of New Zealand, Australia, Chile, Singapore, and the United States towards regional or preferential trading agreements, it was found that all five nations have a strong history of entering into such arrangements. The five countries have all demonstrated a recent willingness to participate in regional, rather than multilateral liberalisation programs, and thus would be likely to seriously consider the proposal to create an expanded CER agreement. The use of bilateral trade statistics showed that there is a considerable amount of trade between the five nations, and

indicated the sectors in which each nation might gain if it entered into an expanded CER trade agreement.

A review of the extensive theoretical literature written on the subject of preferential trading arrangements suggested that while many hypotheses have been formulated in order to measure the likely effects of creating such arrangements, there has been little consensus on the majority of issues. By examining a range of numerical studies of trade liberalisation, it was concluded that the use of computable general equilibrium techniques is a widely accepted and commonly employed method in the analysis of international trade policy modelling.

The specific model used to analyse the economic impacts of expanding the CER agreement was the GTAP computable general equilibrium model, employing the GTAP version 4 database, which was aggregated into 17 sectors and 14 regions. Some changes were made to the tariff levels in the database, to more accurately represent current trading conditions. By shocking the original database to reflect the policy changes required to create a PTA – that is, removing tariffs on trade between the members – changes in a number of economic variables were analysed. Four possible PTAs were examined:

1. New Zealand, Australia, and Singapore
2. As above, plus Chile
3. As in [2], plus the United States
4. New Zealand-Singapore only

In scenarios 1 – 3, two possible liberalisation options were analysed:

- A. 100% removal of all tariffs on trade between the PTA members, excluding the agricultural sectors.
- B. 100% removal of all tariffs in *all* sectors, plus the removal of agricultural export subsidies.

The two types of liberalisation were considered due to the fact that trade barriers in the agricultural sectors have been difficult to address in trade negotiations, due to their

political sensitivity and complex nature. Since agriculture is of vital importance to New Zealand, the two liberalisation strategies were also considered in order to demonstrate the difference in results for New Zealand between PTAs that liberalise these sectors and those which do not.

The results of the GTAP experiments produced some very interesting outcomes, particularly for the New Zealand economy. In general terms, global welfare increased in all of the scenarios, by up to US\$432.6 million, and these gains were larger when the United States was included in the PTA, and when agricultural sectors were liberalised. The distribution of these welfare gains, however, was highly unequal, with the United States and Singapore gaining significantly, and New Zealand, Australia, and Chile all suffering significant welfare losses. New Zealand and Australia's losses were smaller when the agricultural sectors were liberalised, with the United States and Singapore seeing their welfare gains decreasing. The changes in economic welfare experienced by each region were almost entirely due to changes in their terms of trade, while allocative efficiency gains accounted for only around 10 – 20% of the total changes. The effects of the PTAs on economic growth were the most significant in Australia and Chile, who both experienced decreased GDP, by up to 1.3% in Australia, and up to 2.7% in Chile.

By focusing on the experimental outcomes for New Zealand in particular, some important results were noted. Contrary to many studies of trade liberalisation including New Zealand, welfare decreases in all scenarios by between US\$8.4 million and US\$67.3 million. These welfare losses were smaller when the agricultural sectors were liberalised, which clearly demonstrates the importance of these sectors to New Zealand. The results for other macroeconomic variables were also fairly pessimistic, with New Zealand's trade balance deteriorating in all scenarios except for full liberalisation in the Pacific 5 PTA, and economic growth falling unambiguously, by up to 0.79%. The increasing trade deficit was explained by the fact that the value of New Zealand's exports fell by more than the decrease in value of its imports. A sectoral analysis showed that domestic production would expand slightly in the majority of sectors, excluding services, transport, minerals and clothing. The largest changes in output occurred in the agricultural sectors, especially in dairy and meats production, but even these were usually less than 1%. Export prices (and therefore domestic

prices), however, fell in all sectors in every scenario, by up to 1%, and whilst import prices also fell, the decreases in export prices were generally larger than those of imports. This caused New Zealand's terms of trade to deteriorate in every experiment, and this was the major factor in New Zealand's welfare losses. By examining the contributions of each sector to New Zealand's falling export prices, it was found that the dairy, meats, unprocessed meats, and other food products sectors were responsible for the bulk of these decreased prices, due to their large export shares. There were, nonetheless, some sectors that would gain substantially from New Zealand entering into an expanded CER agreement. Export quantities in the beverages, transport, and dairy sectors all expand significantly, especially when the United States is a member of the PTA. Dairy exports increase by no less than 52% to the United States when tariffs are removed in this sector.

The results also indicated strong evidence of trade creation and diversion. In the fully liberalised Pacific 5 scenario, the CER imported over \$US790 million more from its PTA members than before the PTA was formed. In contrast, imports from the non-PTA members decreased by over \$US530 million. Imports sourced from within the PTA expanded mainly in the manufactured goods, transport equipment and chemicals sectors, with the United States seeming to gain at the expense of the European Union, Japan, and Asia.

8.2 Policy Implications for New Zealand

This research has shown that New Zealand should be very careful when considering the expansion of the CER agreement with Australia. Current economic policy in New Zealand appears to be directed at reducing trade barriers on a regional, bilateral or tri-lateral basis, complementing the multilateral route via the World Trade Organisation. This study has shown that this policy direction may lead to welfare losses to New Zealand, due to significant deteriorations in its terms of trade. The analysis of the recently signed Common Economic Partnership bilateral free trade agreement with Singapore suggests that there are very few economic benefits to be gained by New Zealand, with welfare decreasing by over US\$13 million, and the trade balance falling by US\$1.5 million. These results are not surprising, given the extremely low pre-

agreement levels of tariffs on trade between the two countries. This research does not, however, capture the dynamic or strategic benefits that may be gained by New Zealand from signing such an agreement, with the CEP possibly acting as a step towards free trade in the ASEAN region – a move which would almost certainly result in large welfare gains for New Zealand. The GTAP model also does not account for the impact of the CEP on investment flows from Singapore, which may result in significant gains for New Zealand.

If the recent proposals to expand the CER proceed, this research suggests that the New Zealand government should attempt to include the United States in any such discussions – a Pacific 5 trading agreement would result in large benefits for New Zealand exporters, as the United States is a major agricultural importer with a substantial degree of agricultural protection. The gains to New Zealand are larger when agricultural sectors are liberalised, so the removal of tariffs and other trade barriers in these sectors is of paramount importance for New Zealand, despite the known difficulties of negotiations involving agricultural commodities. The United States, however, may well continue to press for protection to be maintained in agriculture, as its welfare gains are substantially larger when this is the case. The dairy sector, in particular, could be very problematic, due to the large losses that could be made by United States' producers if the United States remove its high levels of protection. Dairy producers in the United States are unlikely to support any liberalisation in this sector, and therefore the negative political implications of such a move in the United States could be significant.

8.3 Limitations and Recommendations for Further Research

Computable general equilibrium models in general, and the specific GTAP model used in this research, are now becoming popular for trade policy analysis, and are widely accepted as being suitable for such tasks. It must be remembered, however, that there are a number of limitations with these tools that need to be considered when interpreting the results produced. As discussed in Chapter 6, on a broad level, CGE models are sometimes criticised as subjective judgements are often used to determine

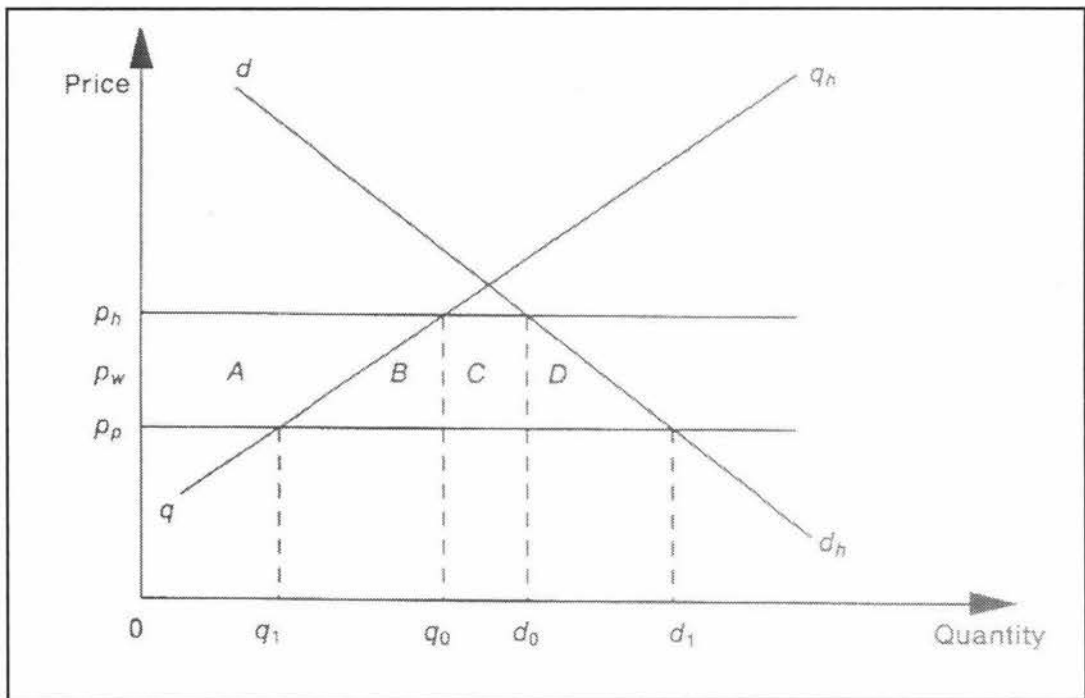
certain key parameters, such as elasticities, rather than these being based on objective econometric estimates. These judgements, however, are often necessary because such econometric estimates simply do not exist. Problems also occur with the modeling of trade barriers, especially when non-tariff barriers are involved, such as tariff rate quotas. *Ad valorem* tariff equivalents are often employed to capture these barriers, but these are not always accurate. This is particularly important in the analysis of agricultural sectors, where a wide range of import protection tools are employed by regions. There are also caveats to consider with the GTAP model itself, and in particular, the GTAP version 4 database. These include the fact that the trade and tariff data is based on 1995 figures, and thus it may not accurately portray current international trading conditions. Whilst some attempts were made to update the tariff data in the database, there are many areas where this data could be further improved. A further issue to consider is that the services sectors in the GTAP database suffer from data collection problems, and thus some of the data therein may be inaccurate or incomplete. The standard GTAP model also fails to capture the full impacts of trade policy shocks on investment flows between regions, and this is obviously a very important factor to consider in the analysis of trading arrangements.

In order to address some of these issues, there are a number of opportunities for further research in this area. When updated bilateral trade and tariff data are available, similar experiments to those carried out in this research may well result in different outcomes for the countries involved. There is also a great deal of scope for improving the techniques used to model the levels of protection in agricultural trade. Barriers such as tariff rate quotas can now be modeled with GTAP, and this will more accurately represent protection instruments and levels in these sectors. This is particularly relevant for CGE studies including New Zealand, as significant gains may be expected in its agricultural sectors when they are liberalised. Further work on the services sectors of the GTAP database may also be needed in order to capture the full effects of trade agreements, and more attention to investment flows would also be beneficial. The static GTAP model employed in this research could be replaced by the now-available dynamic version. Finally, further investigation into an expanded CER agreement could be explored by using a CGE model to determine the effects of creating PTAs between the CER members and the North American Free Trade Agreement nations, or between the CER countries and the ASEAN nations.

APPENDIX A

A GRAPHICAL EXPOSITION OF VINERIAN TRADE CREATION AND DIVERSION

Figure A.1 A Trade Creating Preferential Trading Arrangement



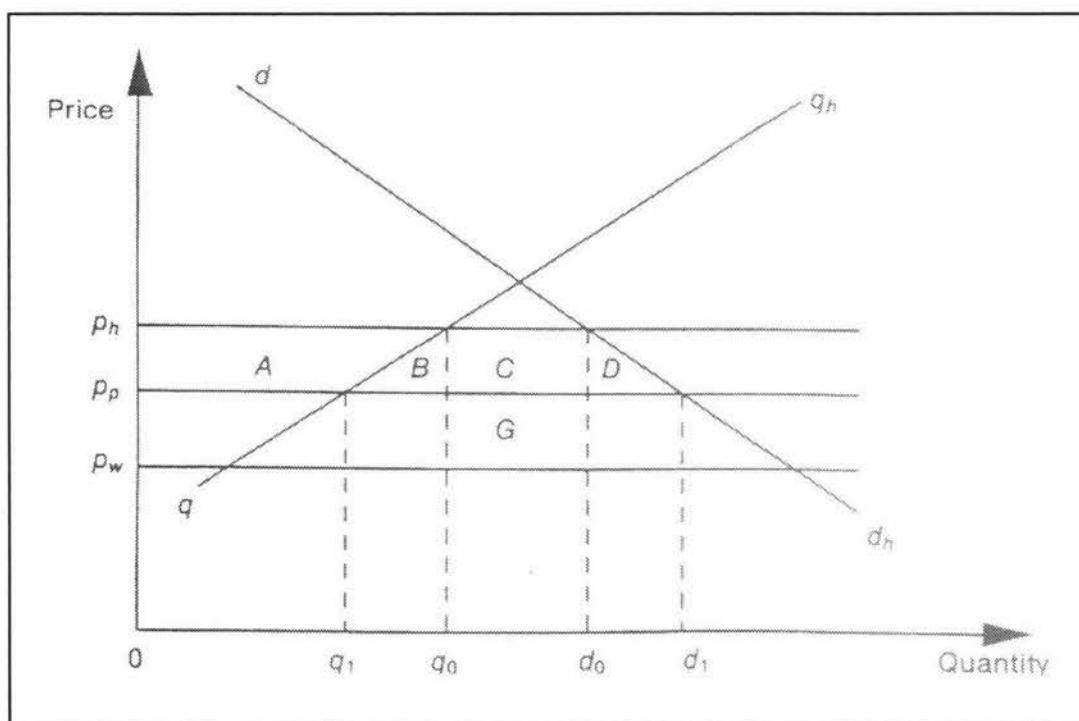
(Source: Bowen *et al*, 1998, p. 505)

Explanation of Figure A1

Following Bowen *et al* (1998, pp. 505-507), assume that there are three countries: the home country (H), the potential PTA partner country (P) and a non-potential member of the PTA (W). Consider trade in a single good only. The home country is small compared to P and W , and thus faces infinitely elastic supply at prices p_p and p_w . The home country's supply is represented by qq_h and its demand for the commodity is shown by dd_h . Before H forms a PTA with P , it places an *ad valorem* tariff (τ) on imports from both W and P .

Assume initially that P is the least-cost (i.e. most efficient) supplier of the commodity. Thus $p_p < p_w$ and the domestic price in H is $p_h = (1 + \tau) p_p$. At this price, H produces quantity q_0 and consumes d_0 , and imports $(d_0 - q_0)$ from P . Now let H and P form a PTA, so that no tariff is placed on the commodity when imported from P . The price in H thus drops to p_p and demand increases to d_1 . Production in H drops to q_1 , so imports from P increase to $(d_1 - q_1)$. The sum of the two distances q_0q_1 and d_0d_1 represent the **trade creation** from this PTA. The lower prices in H mean that the producers' surplus falls by area A . Tariff revenue falls by area C . Consumers increase their surplus by the area $(A+B+C+D)$. Thus the net gain in welfare is shown by the sum of areas B and D , which is positive. So in this case, the PTA is a trade-creating proposal which increases world welfare.

Figure A.2 A Trade Diverting Preferential Trading Arrangement



(Source: Bowen *et al*, 1998, p. 505)

Explanation of Figure A2

Now assume that W was the initial lowest-cost producer of the commodity. Prior to forming a PTA, the price in H would be $p_h = (1 + \tau) p_w$ and imports would be represented by the distance $(d_0 - q_0)$. After the PTA is formed with country P , then with the elimination of the tariff, country H will import from P at $p_p < (1 + \tau) p_w$. So **trade is diverted** away from the most efficient producer (W) in favour of the less efficient P . However, because of this lower price, the volume of imports increases from $q_0 d_0$ to $q_1 d_1$, so there is some trade creation. The decline in price in H reduces producers' surplus by the area A , but consumers' surplus increases by $(A+B+C+D)$. The area $(C+G)$ represents the loss in tariff revenue on imports previously bought from W . Thus this PTA will be trade diverting if area G is larger than area $(B+D)$. If this is the case, the PTA will lead to a welfare loss.

APPENDIX B

REGION AND COMMODITY AGGREGATIONS USED IN THE GTAP EXPERIMENTS

Table B.1 Regional Aggregations

Aggregate Region	GTAP Notation	Countries in Aggregate
Australia	AUS	Australia
New Zealand	NZ	New Zealand
Chile	CHL	Chile
Singapore	SING	Singapore
The United States	USA	The United States
Canada	CAN	Canada
Mexico	MEX	Mexico
Central and South America	CSA	Central America and the Caribbean Venezuela Colombia Andean Pact Argentina Brazil Uruguay Rest of S. America
European Union	EU	UK Germany Denmark Sweden Finland Rest of EU
Japan	JAP	Japan
North East Asia	NEA	Taiwan

		Hong Kong
		Korea
South East Asia	SEA	Thailand
		Philippines
		Vietnam
		Malaysia
		Indonesia
Other Asia	OAS	China
		India
		Sri Lanka
		Rest of South Asia
Rest of the World	ROW	All other remaining regions

Note: For a full, disaggregated, listing of the countries in each GTAP region, see Table 8.2 in McDougall (1998, pp. 8-3 to 8-9).

Table B.2 Commodity Aggregations

Aggregate Commodity	GTAP Notation	Commodities in Aggregate
Unprocessed Meats and Wools	UNPROC	Bovine cattle, sheep, goats, horses Animal products nec Wool, Silk worm cocoons
Meat Products	MEATS	Bovine cattle, sheep, goats, horsemeat products Meat Products nec
Dairy Sector	DAIRY	Dairy Products Raw Milk
Raw and Processed Crops, Sugar, Oils and Fats	CROPS	Paddy Rice Wheat Cereal Grains Processed Rice Sugar Cane, Sugar Beet Sugar Crops nec Oil Seeds

		Plant-based Fibers
		Vegetable Oils and Fats
Vegetables, Fruits and Nuts	V_F	Vegetables, Fruits and Nuts
Food Products	FP_NEC	Food Products nec
Beverages and Tobacco	BEV	Beverages and Tobacco
Clothing	CLTH	Textiles
		Leather Products
		Wearing Apparel
Natural Resources	NAT_RES	Coal
		Oil
		Gas
		Minerals nec
		Fishing
Forestry	FORST	Forestry
Wood and Paper	WOOD	Wood Products
		Paper Products, Publishing
Chemicals	CHEM	Chemical, Rubber, Plastic Products
Services	SERV	Construction
		Water
		Electricity
		Gas Manufacture, distribution
		Financial, Business, Recreational Services
		Public administration and Defence, Education and Health
		Dwellings
		Trade, Transport
Metals and Metal Products	METALS	Ferrous Metals
		Metals Products
		Metals nec
Mineral and Petroleum Products	MINERAL	Mineral Products nec
		Petroleum, Coal Products nec
Motor Vehicles and Transport Equipment	TRANSP	Motor Vehicles and Parts
		Transport Equipment nec
Other Manufactures	OTH_MAN	Electronic Equipment
		Machinery and Equipment nec
		Manufactures nec

Note: 'nec' indicates 'not elsewhere classified'.

APPENDIX C

UPDATING THE TARIFFS IN THE GTAP VERSION 4 DATABASE: FURTHER EXPLANATIONS

As explained in the Methodology chapter, an attempt was made in this research to update some of the tariff data present in the GTAP Version 4 database. Most of the discrepancies between the actual tariff levels from <http://www.apectariff.org> [henceforth ‘the APEC tariff website’] and those calculated in the GTAP database [henceforth ‘GTAP tariffs’] were obvious. A few tariffs, however, required a more detailed analysis, and the explanations below will indicate how the updated tariff information was acquired.

C.1 The Tariff on ‘Meat Products’ in the United States

It is important that this tariff is accurately portrayed, as agricultural sectors have been shown to be vital when PTAs are formed between nations. As explained by Scollay and Gilbert (2000, p. 190), CGE models considering trade liberalisation between APEC nations suggest that the reduction in tariffs in agricultural sectors is responsible for 50-70% of the total welfare gains experienced by APEC members. The GTAP tariff on meat products entering the United States is very low, at a level of 0.63% on average. In order to find an estimate of the actual level of tariffs in this sector, the following methodology was used:

- (i) The total amount of United States imports of “meats and edible meat offal” (Harmonised System [henceforth HS] category 02) in 1999 was US\$2,798,185,338 (Industry Canada, 2000).
- (ii) Import data was available for a multitude of meats products at the more disaggregated 6 digit level. Each of these commodities was grouped into one of the following aggregations: *Bovine*, *Swine*, *Sheep/Lamb*, *Offal*, *Poultry*, or *Other*.

- (iii) The total amount of imports in each of these six groups was calculated. Each of these six values was divided by the total imports of meat products - from (i) – to create an import weighting for each group. This weight represented the contribution to total imports of each of these six groups.
- (iv) The tariffs for each of the 6-digit level commodities were obtained from the APEC tariff website. This gave an impression as to the actual tariffs for each of the six groups listed in part (ii). The weights and approximated tariff levels for the six categories are shown below in Table C.1.

Table C.1 Trade Weights and Approximate Tariff Levels for Disaggregated Meat Product Imports into the United States in 1999

Category of Meat Product	Trade Weighting (% of total meat imports)	Approximate Tariff
Bovine	68.2%	4%
Swine	17.9%	\$1.70 per kg (specific)
Sheep/Lamb	6.3%	\$0.80 per kg (specific)
Offal	4.0%	0%
Poultry	0.3%	\$9.50 per kg (specific)
Other	3.3%	3%
Total		100%

It is clear that with over 68% of United States meat imports by value consisting of bovine products which are subject to a 4% *ad valorem* tariff, the actual tariff rate in this sector must be higher than the 0.63% included in the GTAP database. Due to the importance of beef in ‘Meat Products’ imports, it was therefore assumed that the tariff in the GTAP database for ‘Meat Products’ should be the same as that for beef, and was correspondingly altered to 4%.

C.2 The Tariff on the ‘Motor Vehicles and Transport Equipment’ Sector in Singapore

Some of the few remaining tariffs on goods entering Singapore are levied on cars and motorcycles. Cars and other large vehicles are subject to a 31% tariff, and motorcycles are subject to a 12% tariff. All other commodities in this GTAP sector are duty free. The GTAP tariff in this sector is at an average level of 2.78%, and more importantly, is duty free for items coming from New Zealand, Chile and the United States, with goods originating in Australia being levied at 1.10%. These figures would appear to be incorrect. To estimate the actual tariff in this sector, the following steps were taken:

- (i) The total value of imports into Singapore of ‘Transport Equipment’ (HS 73) in 1997 was US\$8,127,150,000 (UNCTAD, 1997, p. 157).
- (ii) Of this total import value, ‘Passenger Motor Vehicles’ (HS 781) accounted for US\$670,800,000, ‘Lorries and special motor vehicles not elsewhere classified’ (HS 782) contributed US\$503,400,000, and ‘Cycles, motorised or not’ (HS 785) were valued at US\$297,700,000 (United Nations, 1997, pp. 195-199).
- (iii) A trade-weighted tariff (TWT) for this sector was then calculated⁹²:

$$\begin{aligned} \text{TWT} &= \left[\frac{670,800,000}{8,127,150,000} * 31\% \right] + \left[\frac{503,400,000}{8,127,150,000} * 31\% \right] + \left[\frac{297,700,000}{8,127,150,000} * 12\% \right] \\ &= 4.92\% \end{aligned}$$

This suggests that the tariff on the ‘Motor Vehicles and Transport Equipment’ sector should be increased to around 5% for imports from all countries.

C.3 The Tariff on ‘Meat Products’ in New Zealand

The GTAP tariff in New Zealand on imports of ‘Meat Products’ is at an average level of 16.73%. Of particular interest to this research is that the GTAP tariff on this sector is 30.98% on goods received from the United States, 43.66% on those received from

⁹² Note that no other trade weightings are included in this equation, as they would all be multiplied by a zero tariff.

Singapore, and 32.37% from Chile. These tariffs appear high given that New Zealand has an extremely low level of trade protection in general. In order to estimate the actual tariffs for this aggregation, tariff data for meat products down to the HS 8-digit level was obtained from the APEC tariff website. This showed that the actual level of tariffs on the majority of these commodities was 5%, and so the tariff in this sector on goods originating from all regions was changed to 5% in the GTAP database.

C.4 The Tariff on the ‘Dairy Sector’ in the United States

The GTAP tariff in this sector averaged 51.77. Although high, it was found that this tariff could be justified due to the presence of Tariff Rate Quotas (TRQs) on dairy imports into the United States. As explained by Rae (2000, p. 4), TRQs were introduced in the Uruguay Round of the GATT/WTO as an alternative to non-tariff barriers and are “designed to permit a minimum level of market access (the quota volume) but to offer the possibility of much higher domestic protection through a tariff that applies on any imports beyond the quota amount”. For dairy products entering the United States, the *ad valorem* tariff on imports beneath the quota is 11% (Rae, 2000), and for those imports over and above the quota level, the tariff is levied at 70% (Rae, 2000). Thus if the United States receives dairy products well in excess of its set quotas, then an overall tariff on this sector could feasibly be close to the GTAP tariff of 51.77%. No change was made to the GTAP tariff in this case.

C.5 The Tariff on the ‘Dairy Sector’ in Australia

For imports of dairy products into Australia, the tariff in the GTAP database is at a level of 12.83% on average. The actual tariffs for the majority of commodities in this aggregation (milk, cream, butter, etc) are in fact zero, from the APEC tariff website. The GTAP tariff would therefore appear to be rather high. However, there is a specific tariff of around \$1.22 per kilogram of cheese imported into Australia. By finding the value and volume of cheese imports into Australia, using the FAOSTAT database, the

average price per kilogram was found to be A\$6.02. The specific tariff divided by this average price gives a tariff equivalent of 21.27%. Since cheese imports account for 53.8% of total dairy imports (United Nations, 1997, p. 84), this suggests that the average trade-weighted actual tariff for the dairy sector as a whole should be around 10.74%. This is not vastly different to the GTAP tariff, so no changes were made.

C.6 The Tariffs in the United States on ‘Raw and Processed Crops, Sugar, Oils and Fats’ and ‘Beverages and Tobacco’ imports from Australia

These tariffs proved to be somewhat more problematic to calculate compared to the others in this research. The GTAP tariff on imports of ‘Raw and Processed Crops, Sugar, Oils and Fats’ [henceforth ‘crops’] from Australia is 52.97%. This seemed rather high, as the average tariff on this sector in the United States is only 11.29%. However, trying to calculate the actual tariff for this sector was very difficult. As can be seen in Appendix B, Table B.2, this GTAP aggregation contains a wide variety of commodities, and this number is of course multiplied greatly when looking at the HS 8-digit data from the APEC tariff website. To obtain both import volume data (to calculate trade weighting in this sector) and tariff equivalent data on each of these commodities was outside the scope of this research. A similar problem arose with the tariff on ‘Beverages and Tobacco’ imports from Australia, which was at a questionable level of 287.83%, far greater than any other United States tariff. Once again, however, calculating the actual tariff would have involved a huge amount of work, and due to time and data constraints, this was not attempted. For these reasons, the two tariffs were left at their original GTAP levels, and it must be acknowledged that any results obtained in these sectors must be interpreted with due caution.

APPENDIX D

EQUIVALENT VARIATION

The measure of welfare change used in GTAP is the Equivalent Variation (EV). This Hicksian concept is widely used in welfare analysis, and is based on the ordinal approach to measuring consumer surplus (Rae, Chatterjee, and Shakur, 2000, p. 7). It essentially asks: ‘How much money would have to be taken away from the consumer before the policy change (i.e. the reduction in trade barriers) to leave him/her as well off as he/she would be after the policy change?’ In other words, what amount of income would the consumer be prepared to pay to avoid the policy change? (Varian, 1993, pp. 251-2).

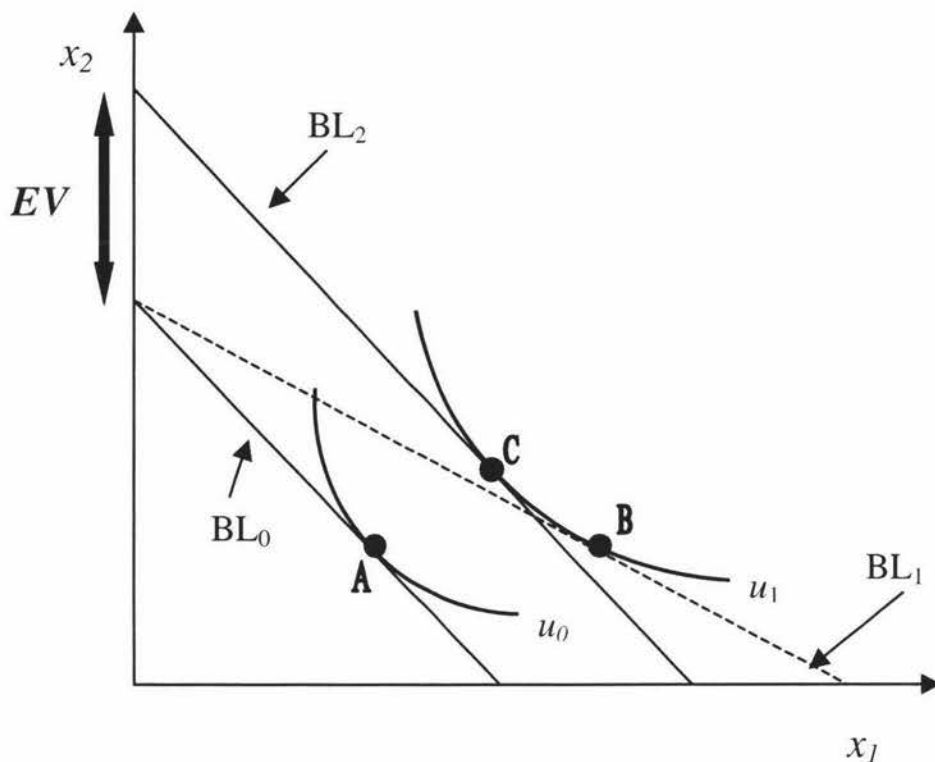
In theoretical terms, following Bowen, Hollander and Viaene (1998, pp. 211-213), assume that there are N goods, the initial prices of which are denoted by the price vector $\mathbf{p}_0 = (p_2^0, \dots, p_N^0)$, where the price of good 1 is the numeraire. The pre-shock utility level is u_0 . After the removal of trade barriers, a new price vector is obtained, denoted $\mathbf{p}_1 = (p_2^1, \dots, p_N^1)$, and a new level of utility u_1 is achieved. If S represents total expenditure or income, the EV is calculated as:

$$EV = S(\mathbf{p}_0, u_1) - S(\mathbf{p}_0, u_0) \quad (\text{D.1})$$

Formula (D.1) shows that the EV “measures the income change that, at the initial prices \mathbf{p}_0 , would allow the consumer [or nation] to achieve the welfare level u_1 in the absence of the price change [caused by the removal of trade barriers]” (Bowen *et al*, 1998, p. 212). A positive EV indicates that the policy shock causing the price changes has led to a gain in welfare terms, and conversely, a negative EV represents a loss in

welfare. The EV resulting from a reduction in tariffs on a commodity can also be represented diagrammatically⁹³:

Figure D.1 A Graphical Explanation of Equivalent Variation



The explanation of the diagram is as follows. Assume that a nation imports good x_1 at the initial price of p_1^0 . Let the other good, x_2 , be the numeraire such that $p_2^0 = p_2^1 = 1$. With these prices, our initial situation is at point A, on indifference curve u_0 . The removal of the tariff on x_1 leads to its price decreasing to $p_1^1 < p_1^0$. With this new set of prices, the nation's budget pivots from BL_0 to BL_1 reflecting the nation's ability to purchase more of x_1 with their original income. The increased level of welfare caused by this tariff removal is shown by the new indifference curve u_1 at the new equilibrium point B. To reflect the expenditure that would be required to stay at the new level of utility, u_1 , using the original set of prices, budget line BL_2 is drawn with the same slope (indicating the same relative prices) as the original BL_0 , tangential (at C) to u_1 . The

⁹³ Note that this diagram is a partial equilibrium representation of the EV. However, since the aim of the diagram is to explain the basic theory behind EV, it will suffice, even though the GTAP model deals with general equilibrium solutions.

difference on the vertical axis between the two budget lines represents the change in income that the nation that would be equivalent to the price change in terms of welfare (Mas-Colell, Whinston and Green, 1995, p. 82). As can be seen in the diagram, this change in income is positive, representing a welfare gain to the importing nation⁹⁴. This example considers only two goods, of course, but the EV principle can equally be expanded to show the welfare change from a policy change affecting a number of commodities.

⁹⁴ It should also be noted that we assume that in lieu of no longer having tariff revenue, the government redistributes this income to the representative consumer in the form of a lump-sum payment.

APPENDIX E

EXPERIMENTAL RESULTS: PERCENTAGE CHANGE IN OUTPUT OF COMMODITY *i* IN NEW ZEALAND

Table E.1 Percentage Change in Output by Sector in New Zealand

Sector	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
UNPROC	0.059	0.052	0.053	0.043	0.35	0.092	0.037
MEATS	0.056	0.041	0.051	0.031	0.314	0.598	0.019
DAIRY	0.064	0.064	0.057	0.155	0.324	1.139	0.047
CROPS	0.008	0.01	0.007	0.023	0.053	0.161	0.002
V_F	0.032	0.033	0.029	0.025	0.199	0.158	0.023
FP_NEC	0.034	0.04	0.03	0.036	0.191	0.194	0.038
BEV	-0.005	-0.004	-0.003	0.001	0.002	0.067	-0.005
CLTH	-0.022	-0.021	-0.02	-0.02	-0.005	0.004	0.003
NAT_RES	0.01	0.011	0.047	0.047	0.134	0.135	0.014
FORST	0.057	0.059	0.049	0.044	0.303	0.198	0.046
WOOD	0.008	0.008	0.01	0.009	0.069	0.065	0.018
CHEM	0.015	0.015	0.019	0.02	0.324	0.338	0.015
SERV	-0.009	-0.008	-0.007	-0.006	-0.046	-0.022	-0.009
METALS	0.028	0.029	0.034	0.033	0.238	0.205	0.025
MINERAL	-0.025	-0.026	-0.021	-0.016	-0.058	0.023	-0.024
TRANSP	-0.014	-0.014	-0.002	0	0.393	0.447	-0.013
OTH_MAN	0.014	0.015	0.03	0.028	0.138	0.104	0.029

APPENDIX F

EXPERIMENTAL RESULTS: PERCENTAGE CHANGE IN THE MARKET PRICE OF COMMODITY i IN REGION r

Experiment 1A: CER – Singapore PTA: No Agricultural Liberalisation

Table F.1 Percentage Change in Market Price of Commodity i in Region r

	AUS	NZ	CHL	SING	USA	CAN	MEX	CSA	EU	JAP	NEA	SEA	OAS	ROW
UNPROC	-0.18	-0.104	0.003	0.025	0.002	0.001	0.003	0.003	0.001	0.002	0.002	0.005	0.002	0.002
MEATS	-0.183	-0.108	0.003	0.03	0.001	0	0.002	0.003	0.001	-0.001	0.001	0.004	0	0.002
DAIRY	-0.182	-0.107	0.002	0.017	0.002	0.001	0.002	0.003	0.001	0	0.001	-0.016	0.002	0.002
CROPS	-0.178	-0.106	0.002	0.027	0.002	0	0.002	0.003	0.002	0.003	0.002	0.006	0.002	0.002
V_F	-0.177	-0.104	0.003	0.03	0.002	0.001	0.003	0.003	0.002	0.003	0.003	0.007	0.002	0.003
FP_NEC	-0.182	-0.108	0.002	0.016	0.002	0.001	0.002	0.003	0.001	0.001	-0.001	0.004	0.001	0.002
BEV	-0.168	-0.108	0.002	0.025	0.002	0.001	0.002	0.003	0.002	0.003	0.001	0.005	0.001	0.002
CLTH	-0.16	-0.1	0.002	0.027	0.002	0.001	0.002	0.003	0.001	0.002	0	0.005	0.001	0.002
NAT_RES	-0.176	-0.102	0.002	0.007	0.002	0.002	0.003	0.003	0.002	0.003	0.001	0.007	0.002	0.003
FORST	-0.178	-0.11	0.003	-0.001	0.002	0.002	0.003	0.003	0.002	0.003	0.003	0.007	0.002	0.003
WOOD	-0.18	-0.114	0.002	0.036	0.002	0.002	0.002	0.003	0.002	0.003	0.001	0.006	0.001	0.002
CHEM	-0.186	-0.102	0.002	0.029	0.002	0.001	0.002	0.002	0.002	0.002	0.001	0.005	0.001	0.002
SERV	-0.19	-0.111	0.003	0.033	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.006	0.001	0.003
METALS	-0.181	-0.118	0.002	0.016	0.002	0.001	0.002	0.003	0.001	0.002	0	0.002	0.001	0.002
MINERAL	-0.148	-0.087	-0.001	0.036	0.002	0.001	0.002	0.002	0.001	0.003	-0.003	0.005	0.001	0.002
TRANSP	-0.192	-0.092	0.002	-0.004	0.002	0.002	0.002	0.002	0.002	0.003	0.001	0.004	0.001	0.002
OTH_MAN	-0.214	-0.13	0.002	0.016	0.002	0.002	0.002	0.003	0.002	0.003	0.002	0.005	0.001	0.002

Experiment 1B: CER – Singapore PTA: Full Liberalisation

Table F.2 Percentage Change in Market Price of Commodity *i* in Region *r*

	AUS	NZ	CHL	SING	USA	CAN	MEX	CSA	EU	JAP	NEA	SEA	OAS	ROW
UNPROC	-0.195	-0.108	0.003	0.045	0.002	0.001	0.003	0.003	0.001	0.002	0.002	0.006	0.002	0.002
MEATS	-0.194	-0.113	0.003	0.043	0.002	0	0.002	0.003	0.001	-0.001	0.002	0.004	0	0.002
DAIRY	-0.193	-0.112	0.002	0.271	0.002	0.001	0.002	0.003	0.001	0	0.001	-0.016	0.002	0.002
CROPS	-0.192	-0.113	0.003	0.074	0.002	0	0.002	0.003	0.002	0.003	0.002	0.007	0.002	0.002
V_F	-0.192	-0.108	0.003	0.038	0.002	0.001	0.003	0.003	0.002	0.004	0.003	0.007	0.002	0.003
FP_NEC	-0.19	-0.115	0.003	0.086	0.002	0.001	0.002	0.003	0.001	0.001	-0.001	0.005	0.002	0.002
BEV	-0.18	-0.113	0.002	0.069	0.002	0.001	0.002	0.003	0.002	0.003	0.002	0.005	0.002	0.002
CLTH	-0.166	-0.103	0.002	0.031	0.002	0.001	0.002	0.003	0.001	0.002	0.001	0.005	0.001	0.002
NAT_RES	-0.18	-0.105	0.002	0.021	0.002	0.002	0.003	0.003	0.002	0.003	0.001	0.007	0.002	0.003
FORST	-0.183	-0.114	0.003	0.046	0.002	0.002	0.003	0.003	0.002	0.004	0.003	0.008	0.002	0.003
WOOD	-0.185	-0.117	0.003	0.039	0.002	0.002	0.002	0.003	0.002	0.003	0.001	0.007	0.002	0.002
CHEM	-0.191	-0.105	0.002	0.033	0.002	0.001	0.002	0.003	0.002	0.002	0.001	0.005	0.001	0.002
SERV	-0.195	-0.115	0.003	0.044	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.007	0.002	0.003
METALS	-0.186	-0.121	0.002	0.018	0.002	0.002	0.002	0.003	0.001	0.002	0	0.002	0.001	0.002
MINERAL	-0.151	-0.09	-0.001	0.039	0.002	0.001	0.002	0.002	0.001	0.003	-0.003	0.005	0.001	0.002
TRANSP	-0.196	-0.094	0.002	-0.003	0.002	0.002	0.002	0.003	0.002	0.003	0.001	0.004	0.002	0.002
OTH_MAN	-0.218	-0.133	0.002	0.017	0.002	0.002	0.002	0.003	0.002	0.003	0.002	0.005	0.001	0.002

Experiment 2A: CER – Chile - Singapore PTA: No Agricultural Liberalisation

Table F.3 Percentage Change in Market Price of Commodity *i* in Region *r*

	AUS	NZ	CHL	SING	USA	CAN	MEX	CSA	EU	JAP	NEA	SEA	OAS	ROW
UNPROC	-0.168	-0.094	-0.102	0.028	0.002	0.001	0.002	0	0.001	0.002	0.002	0.006	0.002	0.003
MEATS	-0.171	-0.098	-0.099	0.034	0.001	0	0.002	0	0.001	0	0.002	0.005	0	0.002
DAIRY	-0.17	-0.097	-0.095	0.019	0.002	0.001	0.002	0	0.001	0.001	0.001	-0.014	0.002	0.002
CROPS	-0.167	-0.095	-0.101	0.03	0.002	0	0.002	0	0.002	0.003	0.002	0.007	0.002	0.003
V_F	-0.166	-0.094	-0.104	0.034	0.002	0.001	0.002	0	0.002	0.004	0.003	0.008	0.002	0.003
FP_NEC	-0.17	-0.096	-0.102	0.019	0.002	0.001	0.001	0	0.001	0.001	-0.001	0.005	0.002	0.002
BEV	-0.158	-0.098	-0.11	0.028	0.002	0.001	0.002	0	0.002	0.003	0.001	0.006	0.002	0.003
CLTH	-0.15	-0.09	-0.088	0.03	0.002	0	0.002	0	0.001	0.003	0.001	0.005	0.001	0.002
NAT_RES	-0.16	-0.083	-0.109	0.008	0.002	0.001	0.002	0	0.002	0.004	0.001	0.008	0.002	0.003
FORST	-0.164	-0.095	-0.104	0	0.002	0.001	0.002	0	0.002	0.004	0.003	0.008	0.002	0.003
WOOD	-0.17	-0.103	-0.104	0.039	0.002	0.001	0.002	0	0.002	0.003	0.001	0.007	0.002	0.003
CHEM	-0.177	-0.093	-0.091	0.033	0.002	0.001	0.002	0	0.002	0.002	0.002	0.006	0.002	0.002
SERV	-0.177	-0.1	-0.11	0.037	0.002	0.001	0.002	0	0.002	0.004	0.002	0.007	0.002	0.003
METALS	-0.17	-0.111	-0.131	0.018	0.002	0.001	0.001	0	0.001	0.002	-0.001	0.003	0.001	0.002
MINERAL	-0.137	-0.079	-0.277	0.04	0.002	0.001	0.002	0	0.001	0.003	-0.002	0.006	0.001	0.002
TRANSP	-0.184	-0.085	-0.085	-0.002	0.002	0.001	0.002	0	0.002	0.003	0.001	0.005	0.001	0.002
OTH_MAN	-0.205	-0.122	-0.117	0.017	0.002	0.001	0.002	0	0.002	0.004	0.002	0.005	0.001	0.002

Experiment 2B: CER – Chile - Singapore PTA: Full Liberalisation

Table F.4 Percentage Change in Market Price of Commodity *i* in Region *r*

	AUS	NZ	CHL	SING	USA	CAN	MEX	CSA	EU	JAP	NEA	SEA	OAS	ROW
UNPROC	-0.182	-0.084	-0.114	0.049	0.002	0.001	0.002	0	0.001	0.002	0.002	0.007	0.002	0.003
MEATS	-0.181	-0.09	-0.116	0.047	0.001	0	0.001	0	0.001	0	0.002	0.005	0	0.002
DAIRY	-0.18	-0.088	-0.135	0.273	0.002	0.001	0.002	0	0.001	0.001	0.001	-0.013	0.002	0.002
CROPS	-0.18	-0.092	-0.115	0.078	0.002	0	0.002	0	0.002	0.003	0.002	0.008	0.002	0.003
V_F	-0.18	-0.082	-0.114	0.042	0.002	0.001	0.002	0	0.002	0.004	0.003	0.008	0.002	0.003
FP_NEC	-0.178	-0.095	-0.116	0.089	0.002	0.001	0.001	0	0.001	0.001	-0.001	0.005	0.002	0.002
BEV	-0.17	-0.092	-0.121	0.072	0.002	0.001	0.002	0	0.002	0.003	0.002	0.006	0.002	0.003
CLTH	-0.155	-0.082	-0.099	0.034	0.002	0	0.002	0	0.001	0.003	0.001	0.006	0.001	0.002
NAT_RES	-0.164	-0.075	-0.119	0.022	0.002	0.001	0.002	0	0.002	0.004	0.001	0.008	0.002	0.003
FORST	-0.169	-0.086	-0.115	0.047	0.002	0.001	0.002	0	0.002	0.004	0.003	0.009	0.002	0.003
WOOD	-0.174	-0.094	-0.115	0.043	0.002	0.001	0.002	0	0.002	0.003	0.001	0.008	0.002	0.003
CHEM	-0.181	-0.086	-0.103	0.036	0.002	0.001	0.001	0	0.002	0.002	0.002	0.006	0.002	0.002
SERV	-0.182	-0.091	-0.126	0.048	0.002	0.001	0.002	0	0.002	0.004	0.003	0.008	0.002	0.003
METALS	-0.174	-0.103	-0.141	0.02	0.002	0.001	0.001	0	0.001	0.003	-0.001	0.003	0.001	0.002
MINERAL	-0.14	-0.073	-0.283	0.043	0.002	0.001	0.002	-0.001	0.001	0.003	-0.002	0.006	0.001	0.003
TRANSP	-0.187	-0.08	-0.092	-0.001	0.002	0.001	0.002	0	0.002	0.004	0.001	0.005	0.002	0.002
OTH_MAN	-0.208	-0.114	-0.127	0.019	0.002	0.001	0.002	0	0.002	0.004	0.002	0.006	0.002	0.003

Experiment 3A: Pacific 5 PTA: No Agricultural Liberalisation

Table F.5 Percentage Change in Market Price of Commodity *i* in Region *r*

	AUS	NZ	CHL	SING	USA	CAN	MEX	CSA	EU	JAP	NEA	SEA	OAS	ROW
UNPROC	-0.989	-0.584	-1.898	0.037	0.049	0.031	0.035	-0.027	-0.003	-0.005	-0.003	0.008	-0.002	0.003
MEATS	-1.01	-0.606	-1.851	0.063	0.049	0.029	0.033	-0.027	-0.006	-0.016	-0.004	0	-0.012	0.001
DAIRY	-1.002	-0.595	-1.746	0.015	0.051	0.033	0.034	-0.028	-0.002	-0.013	-0.009	-0.103	-0.002	0.002
CROPS	-0.994	-0.593	-1.901	0.049	0.049	0.026	0.035	-0.026	-0.001	0.002	-0.001	0.015	-0.002	0.004
V_F	-0.991	-0.586	-2.009	0.057	0.051	0.032	0.035	-0.027	-0.001	0.005	0.003	0.02	-0.002	0.005
FP_NEC	-1.019	-0.6	-1.877	0.014	0.05	0.03	0.03	-0.029	-0.003	-0.009	-0.016	0.002	-0.004	0.001
BEV	-0.944	-0.605	-1.954	0.036	-0.036	0.032	0.032	-0.028	-0.002	0	-0.008	0.006	-0.004	0.003
CLTH	-0.981	-0.574	-1.882	0.062	0.043	0.024	0.034	-0.025	-0.002	-0.002	-0.009	0.007	-0.005	0.002
NAT_RES	-0.96	-0.559	-1.874	0.003	0.055	0.037	0.036	-0.027	-0.001	0.004	-0.009	0.016	-0.002	0.005
FORST	-0.974	-0.597	-1.875	-0.026	0.053	0.036	0.035	-0.027	-0.001	0.006	0.003	0.02	-0.001	0.005
WOOD	-1.035	-0.646	-2.039	0.088	0.05	0.035	0.033	-0.031	-0.002	0.001	-0.019	0.013	-0.005	0.003
CHEM	-1.141	-0.611	-2.116	0.067	0.046	0.03	0.031	-0.028	-0.001	-0.005	-0.006	0.009	-0.004	0.002
SERV	-1.044	-0.624	-1.986	0.041	0.054	0.036	0.035	-0.026	-0.001	0.004	-0.002	0.014	-0.004	0.005
METALS	-1.003	-0.64	-1.923	0.02	0.042	0.032	0.028	-0.03	-0.004	-0.004	-0.028	-0.012	-0.008	0.002
MINERAL	-0.835	-0.483	-1.65	0.072	0.043	0.029	0.034	-0.033	-0.006	0	-0.031	0.006	-0.009	0.003
TRANSP	-1.217	-1.036	-2.071	-0.356	0.043	0.033	0.031	-0.025	-0.002	0.002	-0.009	0.003	-0.005	0.003
OTH_MAN	-1.196	-0.686	-2.043	0.03	0.044	0.032	0.031	-0.025	-0.001	0.003	-0.008	0.007	-0.005	0.003

Experiment 3B: Pacific 5 PTA: Full Liberalisation

Table F.6 Percentage Change in Market Price of Commodity i in Region r

	AUS	NZ	CHL	SING	USA	CAN	MEX	CSA	EU	JAP	NEA	SEA	OAS	ROW
UNPROC	-0.872	-0.381	-1.959	0.059	0.032	0.025	0.027	-0.029	-0.001	-0.002	-0.002	0.012	-0.001	0.005
MEATS	-0.899	-0.409	-1.918	0.083	0.028	0.023	0.026	-0.029	-0.004	-0.012	-0.003	0.005	-0.008	0.003
DAIRY	-0.891	-0.393	-1.956	0.302	0.024	0.027	0.026	-0.03	-0.001	-0.009	-0.007	-0.08	-0.001	0.004
CROPS	-0.886	-0.418	-2.001	0.113	0.028	0.021	0.026	-0.028	0	0.004	0	0.018	0	0.006
V_F	-0.877	-0.374	-2.022	0.059	0.038	0.026	0.027	-0.029	0.001	0.008	0.004	0.023	0	0.006
FP_NEC	-0.931	-0.438	-1.984	0.103	0.033	0.024	0.022	-0.031	-0.001	-0.006	-0.015	0.006	-0.002	0.003
BEV	-0.89	-0.425	-2.014	0.087	-0.05	0.026	0.024	-0.03	0	0.002	-0.006	0.01	-0.002	0.005
CLTH	-0.894	-0.395	-1.922	0.071	0.032	0.019	0.026	-0.028	0	0.001	-0.007	0.01	-0.003	0.004
NAT_RES	-0.872	-0.382	-1.897	0.022	0.045	0.03	0.028	-0.029	0.001	0.006	-0.006	0.019	-0.001	0.007
FORST	-0.878	-0.392	-1.902	0.033	0.042	0.029	0.028	-0.029	0.001	0.008	0.004	0.023	0.001	0.007
WOOD	-0.948	-0.454	-2.066	0.095	0.039	0.029	0.026	-0.033	0	0.004	-0.016	0.017	-0.003	0.005
CHEM	-1.061	-0.447	-2.17	0.074	0.035	0.024	0.024	-0.03	0	-0.002	-0.004	0.012	-0.002	0.004
SERV	-0.943	-0.424	-2.017	0.057	0.043	0.03	0.027	-0.029	0.001	0.007	-0.001	0.017	-0.002	0.006
METALS	-0.911	-0.464	-1.946	0.026	0.032	0.026	0.021	-0.033	-0.002	-0.001	-0.026	-0.008	-0.006	0.004
MINERAL	-0.758	-0.338	-1.665	0.079	0.034	0.024	0.027	-0.035	-0.004	0.003	-0.027	0.009	-0.007	0.005
TRANSP	-1.141	-0.919	-2.088	-0.352	0.033	0.026	0.024	-0.027	0	0.005	-0.008	0.006	-0.003	0.004
OTH_MAN	-1.116	-0.51	-2.072	0.034	0.034	0.026	0.024	-0.028	0	0.005	-0.007	0.01	-0.003	0.005

Experiment 4: New Zealand – Singapore PTA: Full Liberalisation

Table F.7 Percentage Change in Market Price of Commodity i in Region r

	AUS	NZ	CHL	SING	USA	CAN	MEX	CSA	EU	JAP	NEA	SEA	OAS	ROW
UNPROC	-0.004	-0.074	0	0.005	0	0	0	0	0	0	0	0.001	0	0
MEATS	-0.004	-0.077	0	0.007	0	0	0	0	0	0	0	0	0	0
DAIRY	-0.004	-0.077	0	0.002	0	0	0	0	0	0	0	-0.004	0	0
CROPS	-0.004	-0.077	0	0.006	0	0	0	0	0	0	0	0.001	0	0
V_F	-0.004	-0.074	0	0.004	0	0	0	0	0	0	0	0.001	0	0
FP_NEC	-0.004	-0.079	0	0.009	0	0	0	0	0	0	0	0.001	0	0
BEV	-0.004	-0.077	0	0.003	0	0	0	0	0	0	0	0.001	0	0
CLTH	-0.004	-0.069	0	0.003	0	0	0	0	0	0	0	0.001	0	0
NAT_RES	-0.004	-0.071	0	0.001	0	0	0	0	0	0	0	0.001	0	0
FORST	-0.004	-0.08	0	0.002	0	0	0	0	0	0	0	0.001	0	0
WOOD	-0.005	-0.083	0	0.004	0	0	0	0	0	0	0	0.001	0	0
CHEM	-0.004	-0.069	0	0.003	0	0	0	0	0	0	0	0.001	0	0
SERV	-0.004	-0.081	0	0.004	0	0	0	0	0	0	0	0.001	0	0
METALS	-0.004	-0.082	0	0.002	0	0	0	0	0	0	0	0	0	0
MINERAL	-0.004	-0.06	0	0.004	0	0	0	0	0	0	0	0.001	0	0
TRANSP	-0.003	-0.062	0	0.001	0	0	0	0	0	0	0	0.001	0	0
OTH_MAN	-0.004	-0.098	0	0.002	0	0	0	0	0	0	0	0.001	0	0

APPENDIX G

EXPERIMENTAL RESULTS: PERCENTAGE CHANGE IN THE WORLD PRICE INDEX OF COMMODITY *i*

Table G.1 Percentage Change in the World Price Index for Commodity *i*

Sector	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
UNPROC	-0.002	-0.002	-0.002	-0.002	-0.021	-0.011	0
MEATS	-0.003	-0.003	-0.003	-0.003	-0.024	-0.02	0
DAIRY	-0.003	0.038	-0.003	0.038	-0.027	0.182	-0.001
CROPS	0	0.001	0	0.001	-0.011	-0.008	0
V_F	0.001	0.001	0	0	-0.022	-0.024	0
FP_NEC	0	0	-0.001	-0.001	-0.017	-0.021	0
BEV	0	0	0	0	-0.025	-0.025	0
CLTH	0.001	0.001	0.001	0.001	-0.008	-0.007	0
NAT_RES	-0.002	-0.002	-0.002	-0.002	-0.022	-0.021	0
FORST	0.001	0.001	0.001	0.001	-0.001	0	0
WOOD	0	0	0	0	-0.006	-0.006	0
CHEM	0	0	0	0	-0.006	-0.007	0
SERV	-0.001	0	-0.001	-0.001	-0.004	-0.004	0
METALS	0	0	-0.001	-0.001	-0.015	-0.015	0
MINERAL	0	0	0	0	-0.009	-0.008	0
TRANSP	0.001	0.001	0.001	0.001	0.002	0.001	0
OTH_MAN	0.001	0.002	0.001	0.002	0.003	0.003	0

APPENDIX H

EXPERIMENTAL RESULTS: PERCENTAGE CHANGE IN EXPORT PRICES IN NEW ZEALAND

Table H.1 Percentage Change in Export Prices by Sector in New Zealand

Sector	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
UNPROC	-0.104	-0.108	-0.094	-0.084	-0.584	-0.381	-0.074
MEATS	-0.108	-0.113	-0.098	-0.09	-0.606	-0.409	-0.077
DAIRY	-0.107	-0.112	-0.097	-0.088	-0.595	-0.393	-0.077
CROPS	-0.106	-0.113	-0.095	-0.092	-0.593	-0.418	-0.077
V_F	-0.104	-0.108	-0.094	-0.082	-0.586	-0.374	-0.074
FP_NEC	-0.108	-0.115	-0.096	-0.095	-0.6	-0.438	-0.079
BEV	-0.108	-0.113	-0.098	-0.092	-0.605	-0.425	-0.077
CLTH	-0.1	-0.103	-0.09	-0.082	-0.574	-0.395	-0.069
NAT_RES	-0.102	-0.105	-0.083	-0.075	-0.559	-0.382	-0.071
FORST	-0.11	-0.114	-0.095	-0.086	-0.597	-0.392	-0.08
WOOD	-0.114	-0.117	-0.103	-0.094	-0.646	-0.454	-0.083
CHEM	-0.102	-0.105	-0.093	-0.086	-0.611	-0.447	-0.069
SERV	-0.111	-0.115	-0.1	-0.091	-0.624	-0.424	-0.081
METALS	-0.118	-0.121	-0.111	-0.103	-0.64	-0.464	-0.082
MINERAL	-0.087	-0.09	-0.079	-0.073	-0.483	-0.338	-0.06
TRANSP	-0.092	-0.094	-0.085	-0.08	-1.036	-0.919	-0.062
OTH_MAN	-0.13	-0.133	-0.122	-0.114	-0.686	-0.51	-0.098

APPENDIX I

EXPERIMENTAL RESULTS: THE CONTRIBUTION OF EACH SECTOR TO NEW ZEALAND'S FALLING EXPORT PRICES

Table I.1 Contributions of Each Sector to New Zealand's Falling Export Prices

Sector	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
UNPROC	-0.006	-0.005	-0.005	-0.003	-0.032	0.046	-0.004
MEATS	-0.01	-0.007	-0.009	-0.005	-0.054	-0.009	-0.004
DAIRY	-0.009	-0.018	-0.008	-0.016	-0.051	-0.046	-0.007
CROPS	-0.001	-0.001	-0.001	-0.001	-0.006	-0.004	-0.001
V_F	-0.003	-0.003	-0.002	-0.002	-0.014	-0.008	-0.002
FP_NEC	-0.007	-0.007	-0.006	-0.006	-0.035	-0.025	-0.005
BEV	0	0	0	0	-0.002	-0.001	0
CLTH	-0.003	-0.003	-0.003	-0.003	-0.017	-0.012	-0.002
NAT_RES	-0.002	-0.002	-0.002	-0.001	-0.011	-0.007	-0.002
FORST	-0.003	-0.003	-0.003	-0.002	-0.015	-0.01	-0.002
WOOD	-0.009	-0.009	-0.008	-0.007	-0.049	-0.034	-0.006
CHEM	-0.007	-0.007	-0.006	-0.006	-0.039	-0.029	-0.004
SERV	-0.031	-0.032	-0.028	-0.025	-0.17	-0.115	-0.022
METALS	-0.007	-0.007	-0.006	-0.006	-0.034	-0.024	-0.005
MINERAL	0	0	0	0	-0.002	-0.002	0
TRANSP	-0.001	-0.001	-0.001	-0.001	-0.01	-0.009	-0.001
OTH_MAN	-0.007	-0.007	-0.007	-0.006	-0.037	-0.027	-0.005
Weighted Sum	-0.105	-0.113	-0.095	-0.091	-0.577	-0.316	-0.074

Note: The individual values in Table I.1 are obtained by multiplying the percentage change in price in each sector by that sector's export share. This gives an indication of the relative importance of the fall in price in that specific sector to the overall contribution of falling export prices to New Zealand's terms of trade deterioration. To arrive at the *total* contribution to the change in terms of trade due to export prices, the sectoral values in Table I.1 are summed⁹⁵. These sums, shown in the last row of Table I.1, correspond to the 'Contribution of Export Prices' values in Table 7.9.

⁹⁵ The formula used is:

$$\text{Contribution to } \Delta \text{ in TOT due to Export Prices} = \sum_i \frac{\text{Value of Exports of } i}{\text{Value of Total Exports}} * \% \Delta \text{ Export Price of } i$$

APPENDIX J

EXPERIMENTAL RESULTS: PERCENTAGE CHANGE IN IMPORT PRICES IN NEW ZEALAND

Table J.1 Percentage Change in Import Prices by Sector in New Zealand

Sector	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
UNPROC	-0.098	-0.106	-0.091	-0.099	-0.541	-0.243	-0.002
MEATS	-0.086	-0.132	-0.08	-0.144	-0.481	-0.607	-0.043
DAIRY	-0.123	-0.13	-0.115	-0.122	-0.68	-0.494	-0.003
CROPS	-0.093	-0.105	-0.087	-0.099	-0.525	-0.235	-0.008
V_F	-0.043	-0.062	-0.042	-0.063	-0.279	-0.564	-0.015
FP_NEC	-0.079	-0.229	-0.076	-0.354	-0.484	-1.548	-0.151
BEV	-0.071	-0.076	-0.159	-0.164	-1.072	-1.052	-0.008
CLTH	-0.034	-0.035	-0.034	-0.035	-0.355	-0.338	-0.007
NAT_RES	-0.019	-0.02	-0.019	-0.019	-0.128	-0.116	-0.001
FORST	-0.089	-0.09	-0.082	-0.083	-0.488	-0.438	-0.002
WOOD	-0.127	-0.128	-0.132	-0.133	-1.244	-1.221	-0.081
CHEM	-0.077	-0.078	-0.076	-0.077	-0.653	-0.633	-0.03
SERV	-0.031	-0.031	-0.029	-0.029	-0.18	-0.162	0
METALS	-0.153	-0.155	-0.168	-0.169	-0.791	-0.753	-0.082
MINERAL	-0.173	-0.174	-0.169	-0.17	-0.58	-0.549	-0.123
TRANSP	-0.065	-0.066	-0.064	-0.064	-1.59	-1.577	-0.037
OTH_MAN	-0.354	-0.354	-0.353	-0.353	-1.429	-1.418	-0.325

APPENDIX K

EXPERIMENTAL RESULTS: THE CONTRIBUTION OF EACH SECTOR TO NEW ZEALAND'S FALLING IMPORT PRICES

Table K.1 Contributions of Each Sector to New Zealand's Falling Import Prices

Sector	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
UNPROC	0	0	0	0	-0.001	-0.001	0
MEATS	0	0	0	0	-0.001	-0.001	0
DAIRY	0	0	0	0	-0.001	-0.001	0
CROPS	-0.002	-0.002	-0.002	-0.002	-0.01	-0.004	0
V_F	0	0	0	0	-0.001	-0.003	0
FP_NEC	-0.002	-0.002	-0.002	-0.002	-0.01	-0.011	0
BEV	0	0	0	0	-0.003	-0.002	0
CLTH	-0.002	-0.002	-0.002	-0.002	-0.01	-0.009	0
NAT_RES	-0.001	-0.001	0	0	-0.003	-0.002	0
FORST	0	0	0	0	0	0	0
WOOD	-0.002	-0.002	-0.002	-0.002	-0.011	-0.01	0
CHEM	-0.006	-0.006	-0.006	-0.006	-0.037	-0.034	0
SERV	-0.008	-0.008	-0.007	-0.007	-0.043	-0.038	0
METALS	-0.004	-0.004	-0.003	-0.003	-0.019	-0.017	0
MINERAL	-0.001	-0.001	-0.001	-0.001	-0.008	-0.007	0
TRANSP	-0.004	-0.004	-0.004	-0.004	-0.028	-0.026	0
OTH_MAN	-0.007	-0.007	-0.007	-0.007	-0.04	-0.038	0
Weighted Sum	-0.039	-0.039	-0.036	-0.036	-0.226	-0.204	0

Note: The individual values in Table K.1 are obtained by multiplying the percentage change in price in each sector by that sector's import share. This gives an indication of the relative importance of the fall in price in that specific sector to the overall contribution of falling import prices to New Zealand's terms of trade deterioration. To arrive at the *total* contribution to the change in terms of trade due to import prices, the sectoral values in Table K.1 are summed⁹⁶. These sums, shown in the last row of Table K.1, correspond to the 'Contribution of Import Prices' values in Table 7.9.

⁹⁶ The formula used is:

$$\text{Contribution to } \Delta \text{ in TOT due to Import Prices} = \sum_i \frac{\text{Value of Imports of } i}{\text{Value of Total Imports}} * \% \Delta \text{ Price of Import } i$$

APPENDIX L

EXPERIMENTAL RESULTS: PERCENTAGE CHANGE IN EXPORT SALES VALUE BY SECTOR IN NEW ZEALAND

Table L.1 Percentage Change in Export Sales Value by Sector in New Zealand

Sector	NZ-Aus-Singa		NZ-Aus-Singa-Chile		Pacific 5		NZ-Singa
	No Agri	Full	No Agri	Full	No Agri	Full	Full
UNPROC	-0.013	-0.014	-0.012	-0.011	-0.058	0.224	-0.002
MEATS	-0.011	-0.008	-0.009	-0.003	-0.058	0.834	-0.005
DAIRY	-0.011	-0.016	-0.012	0.15	-0.119	1.336	-0.004
CROPS	-0.015	-0.016	-0.014	0.076	-0.003	0.308	-0.005
V_F	-0.026	-0.027	-0.023	-0.021	-0.118	-0.032	-0.013
FP_NEC	-0.039	-0.039	-0.036	-0.035	-0.217	-0.133	-0.004
BEV	0.264	0.264	0.27	0.271	2.19	2.231	0.316
CLTH	-0.113	-0.112	-0.103	-0.101	-0.33	-0.26	-0.006
NAT_RES	-0.058	-0.059	0.148	0.148	-0.103	-0.055	-0.008
FORST	-0.004	-0.004	-0.003	-0.002	-0.033	-0.017	-0.005
WOOD	-0.076	-0.077	-0.062	-0.062	-0.387	-0.337	-0.005
CHEM	-0.053	-0.056	-0.036	-0.038	0.273	0.318	-0.006
SERV	-0.033	-0.033	-0.018	-0.018	-0.169	-0.147	0
METALS	-0.039	-0.04	-0.026	-0.025	0.04	0.07	-0.004
MINERAL	-0.032	-0.032	-0.017	-0.017	1.726	1.749	-0.005
TRANSP	0.112	0.112	0.18	0.18	0.303	0.322	0.149
OTH_MAN	-0.086	-0.087	-0.032	-0.032	-0.143	-0.098	-0.004

APPENDIX M

EXPERIMENTAL RESULTS: PERCENTAGE CHANGE IN NEW ZEALAND'S EXPORT QUANTITIES OF COMMODITY i TO REGION r

Table M.1 Experiment 1: CER – Singapore PTA

Sector	No Agricultural Liberalisation				Full Liberalisation			
	<i>Export Destination</i>				<i>Export Destination</i>			
	AUS	CHL	SING	USA	AUS	CHL	SING	USA
UNPROC	-0.07	0.105	0.156	0.102	-0.081	0.109	-7.74	0.105
MEATS	-0.116	0.103	0.145	0.098	-0.11	0.107	-1.768	0.102
DAIRY	-0.11	0.104	0.162	0.103	-0.201	0.109	0.171	0.107
CROPS	-0.074	0.104	0.156	0.1	-0.077	0.111	0.172	0.107
V_F	-0.116	0.107	0.146	0.088	-0.118	0.111	0.152	0.091
FP_NEC	-0.125	0.106	0.16	0.106	-0.118	0.113	0.18	0.113
BEV	-0.129	0.103	26.901	0.101	-0.121	0.108	26.914	0.105
CLTH	-0.118	0.097	0.159	0.096	-0.112	0.1	0.166	0.1
NAT_RES	-0.088	0.085	0.151	0.099	-0.089	0.088	0.156	0.102
FORST	-0.077	0.003	0.161	0.105	-0.078	0.003	0.17	0.108
WOOD	-0.092	0.111	0.205	0.11	-0.091	0.115	0.211	0.113
CHEM	-0.077	0.1	0.209	0.098	-0.081	0.103	0.214	0.101
SERV	-0.097	0.114	0.171	0.113	-0.094	0.118	0.177	0.117
METALS	-0.054	0.117	0.23	0.114	-0.053	0.12	0.235	0.117
MINERAL	-0.11	0.082	0.138	0.082	-0.109	0.084	0.143	0.084
TRANSP	-0.118	0.092	5.228	0.092	-0.117	0.095	5.236	0.094
OTH_MAN	-0.077	0.129	0.234	0.128	-0.076	0.132	0.238	0.132

Table M.2 Experiment 2: CER – Singapore - Chile PTA

Sector	No Agricultural Liberalisation				Full Liberalisation			
	<i>Export Destination</i>				<i>Export Destination</i>			
	AUS	CHL	SING	USA	AUS	CHL	SING	USA
UNPROC	-0.068	-0.029	0.154	0.092	-0.092	-21.871	-7.753	0.082
MEATS	-0.112	-0.039	0.141	0.089	-0.117	9.851	-1.781	0.082
DAIRY	-0.107	-0.035	0.16	0.093	-0.21	9.935	0.156	0.085
CROPS	-0.071	-0.022	0.152	0.09	-0.083	9.961	0.16	0.087
V_F	-0.111	-0.024	0.144	0.079	-0.124	9.948	0.138	0.07
FP_NEC	-0.121	-0.026	0.156	0.095	-0.123	9.957	0.168	0.094
BEV	-0.124	9.96	26.898	0.092	-0.126	9.936	26.899	0.086
CLTH	-0.112	9.949	0.157	0.088	-0.117	9.924	0.154	0.08
NAT_RES	-0.09	9.974	0.14	0.081	-0.101	9.956	0.135	0.073
FORST	-0.078	-0.076	0.151	0.091	-0.09	-0.084	0.149	0.082
WOOD	-0.089	10.007	0.201	0.1	-0.099	9.987	0.196	0.091
CHEM	-0.071	9.99	0.206	0.089	-0.085	9.972	0.202	0.082
SERV	-0.094	9.976	0.167	0.102	-0.104	9.952	0.16	0.093
METALS	-0.044	10.041	0.23	0.107	-0.052	10.025	0.225	0.1
MINERAL	-0.103	9.972	0.137	0.074	-0.11	9.954	0.133	0.068
TRANSP	-0.113	9.964	5.232	0.085	-0.119	9.946	5.232	0.081
OTH_MAN	-0.072	10.007	0.233	0.12	-0.081	9.987	0.226	0.112

Table M.3 Experiment 3: Pacific 5 PTA

Sector	No Agricultural Liberalisation				Full Liberalisation			
	<i>Export Destination</i>				<i>Export Destination</i>			
	AUS	CHL	SING	USA	AUS	CHL	SING	USA
UNPROC	-0.052	-1.67	0.639	0.611	-0.043	-23.306	-7.467	-11.867
MEATS	-0.628	-1.828	0.623	0.594	-0.678	7.662	-1.459	3.417
DAIRY	-0.599	-1.787	0.646	0.617	-0.745	7.775	0.467	52.398
CROPS	1.216	-1.562	0.663	0.602	1.207	8.113	0.519	5.612
V_F	-0.021	-1.624	0.594	0.541	-0.067	7.956	0.426	0.673
FP_NEC	-0.677	-1.651	0.661	0.635	-0.705	7.987	0.534	0.726
BEV	-0.674	7.871	27.521	16.572	-0.717	7.63	27.322	16.36
CLTH	-0.578	7.968	0.926	6.246	-0.629	7.73	0.766	6.056
NAT_RES	-0.432	8.584	0.651	1.151	-0.486	8.399	0.495	0.966
FORST	-0.384	-1.486	0.734	0.621	-0.466	-1.5	0.555	0.417
WOOD	-0.446	8.745	0.857	0.95	-0.519	8.511	0.679	0.753
CHEM	-0.276	8.591	0.958	4.592	-0.317	8.403	0.807	4.42
SERV	-0.516	8.209	0.758	0.685	-0.599	7.946	0.564	0.471
METALS	-0.27	9.138	0.99	4.472	-0.346	8.931	0.825	4.289
MINERAL	-0.554	8.454	0.585	6.129	-0.577	8.281	0.454	5.97
TRANSP	-0.206	8.678	6.217	2.431	-0.228	8.516	6.106	2.302
OTH_MAN	-0.488	8.435	1.053	3.333	-0.562	8.218	0.885	3.143

Table M.4 Experiment 4: New Zealand – Singapore PTA

Sector	Full Liberalisation			
	<i>Export Destination</i>			
	AUS	CHL	SING	USA
UNPROC	0.066	0.072	-7.82	0.071
MEATS	0.069	0.071	-1.851	0.069
DAIRY	0.068	0.073	0.08	0.073
CROPS	0.068	0.073	0.08	0.071
V_F	0.055	0.075	0.069	0.062
FP_NEC	0.071	0.076	0.086	0.076
BEV	0.069	0.072	26.8	0.071
CLTH	0.061	0.066	0.073	0.066
NAT_RES	0.062	0.058	0.072	0.068
FORST	0.071	0	0.082	0.075
WOOD	0.075	0.079	0.09	0.079
CHEM	0.061	0.066	0.076	0.065
SERV	0.077	0.081	0.088	0.081
METALS	0.074	0.08	0.093	0.078
MINERAL	0.051	0.055	0.063	0.055
TRANSP	0.056	0.06	5.072	0.061
OTH_MAN	0.091	0.095	0.108	0.095

APPENDIX N

EXPERIMENTAL RESULTS: THE DIFFERENCE BETWEEN THE IMPORTS INTO THE CER BEFORE AND AFTER THE FORMATION OF THE PACIFIC 5 PTA

Table N.1 The Difference in US\$ millions Between the CER's Imports Before and After the Formation of the Pacific 5 PTA

	PTA					PTA Total	Non PTA										Non PTA Total	Total
	1 AUS	2 NZ	3 CHL	4 SING	5 USA		6 CAN	7 MEX	8 CSA	9 EU	10 JAP	11 NEA	12 SEA	13 OAS	14 ROW			
1 UNPROC	-0.005	-0.401	0	-0.001	-0.07	-0.477	-0.014	0	-0.012	-0.07	-0.016	-0.013	-0.026	-0.017	-0.003	-0.171	-0.647	
2 MEATS	-0.053	-0.21	-0.001	0.002	0.028	-0.234	-0.1	0	-0.003	-0.105	-0.037	-0.003	-0.237	-0.005	-0.035	-0.525	-0.755	
3 DAIRY	-0.069	-0.977	0	0.009	1.14	0.103	-0.01	0	0	-0.616	0	-0.004	-0.003	0	-0.122	-0.755	-0.648	
4 CROPS	-0.408	0.116	0.019	0.822	3.697	4.246	0.021	0.017	0.425	0.933	0.211	0.13	1.699	0.401	0.704	4.541	8.786	
5 V_F	-0.125	-0.148	0.144	0.018	0.75	0.639	-0.009	-0.004	-0.108	-0.017	0	0	-0.097	-0.104	-0.139	-0.478	0.159	
6 FP_NEC	-0.718	-2.288	0.409	0.572	10.369	8.344	-0.243	-0.029	-0.778	-2.804	-0.383	-0.555	-3.491	-0.387	-1.122	-9.792	-1.448	
7 BEV	-0.243	-0.184	0.444	0.091	1.9	2.008	-0.006	-0.031	-0.048	-2.203	-0.039	-0.042	-0.012	-0.017	-0.091	-2.489	-0.479	
8 CLTH	-0.802	-3.056	0.051	0.536	25.894	22.623	-0.301	-0.059	-0.338	-6.462	-1.213	-5.391	-3.886	-21.257	-1.787	-40.694	-18.073	
9 NAT_RES	-0.255	-0.956	-0.013	-0.118	-0.37	-1.712	-0.289	-0.006	-0.31	-0.377	-0.249	-0.152	-6.313	-0.37	-13.484	-21.55	-23.266	
10 FORST	-0.001	-0.005	0	0	-0.005	-0.011	0	0	0	-0.009	0	0	0	0	-0.002	-0.011	-0.024	
11 WOOD	-0.798	-5.318	0.149	4.207	29.857	28.097	-1.85	-0.013	-0.542	-11.645	-1.028	-1.442	-3.426	-1.234	-1.11	-22.29	5.805	
12 CHEM	-1.661	-2.592	0.251	14.794	120.058	130.85	-1.367	-0.144	-0.435	-19.508	-5.837	-3.582	-2.514	-2.706	-4.923	-41.016	89.831	
13 SERV	-3.344	-9.007	-0.119	-7.888	-27.693	-48.051	-2.777	-0.224	-2.463	-44.602	-35.483	-15.343	-4.763	-3.11	-13.158	-121.92	-169.976	
14 METALS	-1.208	-1.988	0.602	3.632	12.933	13.971	-0.451	-0.149	-0.636	-7.363	-4.052	-3.091	-0.742	-1.93	-1.398	-19.812	-5.837	
15 MINERAL	-0.691	-0.118	0.004	-1.077	6.185	4.303	-0.044	-0.038	-0.137	-3.993	-0.785	-0.432	-0.904	-0.947	-0.432	-7.712	-3.409	
16 TRANSP	-2.256	-0.425	0.201	16.015	183.235	196.77	-1.844	-0.002	-0.356	-22.96	-46.072	-5.791	-2.454	-0.863	-1	-81.342	115.426	
17 OTH_MAN	-3.289	-4.503	0.094	82.111	355.518	429.931	-2.978	-0.447	-0.887	-70.039	-37.363	-21.549	-9.205	-16.559	-7.564	-166.59	263.341	
Total	-15.929	-32.057	2.234	113.725	723.426	791.399	-12.262	-1.127	-6.623	-191.843	-132.35	-57.26	-36.375	-49.107	-45.667	-532.61	258.79	

Note: The formula used to calculate each value in Table N.1 above is:

$$\frac{[\text{Post-PTA Value of New Zealand's Imports} + \text{Post PTA Value of Australia's Imports}]}{[\text{Pre-PTA Value of New Zealand's Imports} + \text{Pre PTA Value of Australia's Imports}]} \quad (\text{N.1})$$

This was calculated for the Pacific 5 scenario only, with full liberalisation in all sectors.

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