UNIVERSITY OF WAIKATO

Hamilton
New Zealand

An Empirical Examination of Trade Relations

between New Zealand and China

in the Context of a Free Trade Agreement

Sayeeda Bano

Department of Economics

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Sayeeda Bano
Department of Economics
University of Waikato
Private Bag 3015
Hamilton
New Zealand, 3240

Phone: + 64 7 838 4045
Fax: +64 7 838 4331

Email: sbano@waikato.ac.nz

Abstract

This study examines the bilateral trade relations between New Zealand and China between 1980 and 2012. Specifically, it examines, first, the strength of the trade relationship using export and import intensity indices. Secondly, it identifies the degree of trade reciprocity using a 'trade reciprocity index'. Thirdly, it estimates the magnitude of intra-industry trade using the Grubel-Lloyd and Aquino indices. Fourthly, it analyses the results from these indices to consider how trade patterns, directions and trade relations have changed between 1980 and 2012. Finally, it assesses the future prospects of trade and economic cooperation between New Zealand and China in the context of the their 2008 free trade agreement. This is the first - and possibly the only study of its kind - since the signing of the trade agreement.

Key Words

international trade
New Zealand-China trade
intra-industry trade
economic integration
trade reciprocity
trade intensity indices
FTA, CER

JEL Classification

F10, F02, F13, F14, F15

1. Introduction

There is increasing recognition that the global 'first-best' policy of free trade under the auspices of the World Trade Organization (WTO) has limitations. The Doha Ministerial Declaration has acknowledged the need for a new regionalism as a 'second best' policy to complement and supplement the WTO. Free trade agreements (FTAs), with their complex, preferential provisions have come to dominate the agenda of trade negotiators in recent years. Asia is a relative latecomer in the negotiation of FTAs, but the region has been catching up rapidly over the past decade. As at September 2012, there were 103 FTAs, most of them bilateral, involving one or more countries from the region. There are another 26 FTAs already signed, 64 under negotiation and 60 more proposed. Most of the global action on FTAs now involves an Asian country (Asia Forum 2013). It is in light of this development that the FTA signed by China and New Zealand gains significance as a move towards greater integration.

In 14 April 2004 then New Zealand Prime Minister Helen Clark announced that New Zealand had decided to recognise China as a 'market economy', making New Zealand the first developed nation to negotiate a free-trade deal with China. The FTA between New Zealand and China (henceforth NZ-China FTA) was signed in Beijing in April 2008 and came into force in October 2008, after a negotiation process that spanned 15 rounds over three years. The agreement was the first comprehensive FTA concluded by China covering goods, services and investment as a 'single undertaking' from the outset.

This study examines New Zealand's trade relations with China, and is guided by the following questions: How significant is New Zealand-China trade? How has the trade relationship between them evolved? Has economic integration had a positive effect on trade intensity, trade reciprocity and intra-industry trade between New Zealand and China?

Section 1 of this paper briefly presents the development of trade between New Zealand and China. Section 2 reviews the relevant trade theories while Section 3 discusses the methodologies used. Section 4 examines trade intensity indices and analyses the results to show the nature and strength of bilateral trade relations. Section 5 estimates trade-reciprocity indices, followed by a discussion of the results. In Section 6 we show the development of trade in various industries and product groups using intra-industry trade indices. The final section provides some concluding remarks.

Overview of the Chinese Economy

Since the late 1970s, China has implemented far-ranging economic reforms which made its economy more market-driven, outward-oriented and integrated with the rest of the world. As a result of these reforms, China evolved from an internationally isolated, centrally planned, virtually autarkic and slow-growth economy into one of the world's fastest growing economies and an economic powerhouse. China's average annual GDP growth since 2001 has been over 9 per cent. In 2007, before the onset of the current recession in the US and the EU,

China's growth surpassed 14%, and has remained high at 10.4% in 2010 and 9.1% in 2011 despite the economic slowdown in many of its trading partners. With a GDP of about US$ 7.3 trillion, China is now the world's second largest economy after the US (World Bank 2012).

Overview of the New Zealand Economy

With average annual GDP growth of around 3.5 percent during the past decade, New Zealand was one of the best performing economies in the OECD. New Zealand also had one of the lowest unemployment rates in the OECD and had budget surpluses for over 10 years. The economic slowdown in 2008 and the earthquake that devastated Christchurch have, however, changed the situation: the budget has been in deficit and unemployment has been increasing.

Complementarity of China and New Zealand

Because of its size, China is important to every trade-seeking country. It is New Zealand's second largest trading partner after Australia. Trade between China and New Zealand has been growing rapidly, with 12% of New Zealand's total exports going to China and 16% of total imports coming from China in the year ending June 2011, and with exports increasing by 37% over the preceding year. In value terms, these are NZ $5.6 billion and NZ $7.1 billion, respectively (MFTA and Statistics New Zealand 2012). Of great relevance to New Zealand's export industries is the remarkable surge in commodity imports into China, making the latter the largest consumer of commodities in the world (NZIER 2005).

New Zealand's agriculture sector, in particular, has been estimated to benefit from an FTA with China. Tariff removal on New Zealand's logs and sawn timber, which constitute approximately 80% of forestry exports to China, is among the key outcomes of the FTA. Indeed, as a result of the FTA, agricultural exports to China surged to New Zealand $3.5 billion in June 2011, representing a tremendous increase of 51% over the previous year. China's middle class, estimated to number more than 100 million people and growing, is a big potential market for New Zealand's agricultural products.

Mutual Gains from the FTA

Initial study by New Zealand's Ministry of Foreign Affairs and Trade (MFAT 2005) suggested that an FTA between New Zealand and China would have a positive impact on New Zealand's economy. Gains were expected to result from the removal of tariff and non-tariff measures (NTMs), and were expected across all areas, including agriculture and the non-durable manufacturing sectors, as well as services exports such as education services, investment and potential improvements in trade facilitation. Comprehensive and reciprocal elimination of trade barriers would also allow citizens of both countries to benefit from increased efficiency and competition, lower prices, and a greater variety of goods and services. However, not everyone agreed that the impact of the FTA would be positive. The New Zealand clothing unions, for instance, claimed that the arrangement would bring in a flood of

cheap Chinese imports. Analysts also warned against China's practice of dumping cheap goods in foreign markets (Australian APR 15, 2004).

Table 1 (and Figure 2) presents exports and imports statistics between 1980 and 2011. During the early part of the period, New Zealand had a trade surplus with China. This turned into a deficit of US$23.8 million in 1990 and subsequently, with the highest deficit of US $2743 million posted in 2008. Positive outcomes emerged in the year following the signing of the FTA. In 2011, New Zealand's trade deficit with China decreased to US $1,204 million, which is 44% lower than that in the year 2008. This is the result of the significant increase in New Zealand exports to China from US $1,787 million in 2008 to US $4,701 million in 2011 and US $5,590.9 in 2012.

2. Review of Relevant Trade Theories: The Theory of Second Best

Economic Integration

The ultimate objective of economic integration is to increase welfare. Free trade maximises welfare. Integration between nations and/or regions is a move towards free trade, at least among members of the FTA or union. Therefore economic integration is welfare-enhancing. Being discriminatory to non-members, the move (towards integration) is, however, considered to be a 'second best' policy option. (See Verdoon 1960, Viner 1950).

Traditional trade models suggest that free trade is the 'first best' theory that maximises global efficiency in a distortion-free world in which all Pareto-efficient conditions are met. However, in the real world there are distortions like tariffs, quotas, subsidies and exchange controls. Under these situations, Pareto optimality is not achieved by the removal of one distortion. Therefore, the paradigm of new regionalism stresses the 'second-best theory' where some Pareto-efficient conditions are expected to be met while others may not be, or may even be disturbed because of the change.

The net result of economic integration could either be mutual gains from trade due to **trade-creation** effects or losses due to **trade-diversion** effects. Economic integration leads to trade creation when trade expansion takes place between member countries due to the reduction of trade barriers. There is a shift in product from a domestic producer, whose resource costs are higher, to a member producer whose resource costs are lower.

Trade creation is welfare increasing and beneficial to all participating members of the union, and is considered a 'first-best' policy approach, which means that it meets the well-known Pareto optimal condition that 'an increase in one person's welfare leads to an increase in social welfare only if there is no reduction in the welfare of any other member of the group'. Trade creation restructures production, generating higher output due to efficiency gains; higher output means that a larger quantity of goods and services are available, thus making some people of the society better off without making others worse off.

Table 1a. New Zealand's Trade with China, 1980 – 2012

in US $Million

Year	Export (X)	Growth (%)	Import (M)	Growth (%)	Total Trade (X+M)	Growth (%)	Trade Balance (X-M)	Growth (%)	GDP	Growth (%)
1980	160.9		43.7		204.6		117.2		22383	
1981	122.7	-23.7	38.1	-12.8	160.9	-21.4	84.6	-27.8	23297	8.2
1982	108.1	-11.9	44.1	15.7	152.2	-5.4	64.1	-24.2	23064	-2.3
1983	110	1.8	35.1	-20.4	145.1	-4.7	75	17.0	22317	-0.7
1984	123	11.8	42.4	20.8	165.4	14.0	80.6	7.5	22211	-4.1
1985	135.8	10.4	53.4	25.9	189.2	14.4	82.4	2.2	22379	0.6
1986	207.3	52.7	38.2	-28.5	245.5	29.8	169.1	105.2	27232	26.9
1987	191.5	-7.6	71	85.9	262.5	6.9	120.5	-28.7	36672	27.0
1988	408.4	113.3	88.2	24.2	496.6	89.2	320.2	165.7	45150	20.4
1989	173.5	-57.5	95.4	8.2	268.9	-45.9	78.1	-75.6	43631	-3.5
1990	90.7	-47.7	114.5	20.0	205.1	-23.7	-23.8	-130.5	45289	1.7
1991	157.7	73.9	159.8	39.6	317.6	54.9	-2.1	-91.2	43172	-3.6
1992	192.5	22.1	242.9	52.0	435.4	37.1	-50.4	2300.0	41159	-4.1
1993	210.3	9.2	292.1	20.3	502.3	15.4	-81.8	62.3	44347	8.5
1994	336	59.8	388.8	33.1	724.8	44.3	-52.9	-35.3	52298	17.4
1995	346.5	3.1	482.7	24.2	829.2	14.4	-136.1	157.3	61644	18.0
1996	364.9	5.3	549.5	13.8	914.4	10.3	-184.6	35.6	68403	9.9
1997	387.4	6.2	674	22.7	1061.4	16.1	-286.6	55.3	68226	-0.2
1998	334.3	-13.7	634.5	-5.9	968.8	-8.7	-300.1	4.7	56152	-17.6
1999	325.6	-2.6	758	19.5	1083.6	11.8	-432.5	44.1	58277	4.8
2000	377.9	16.1	867.2	14.4	1245	14.9	-489.3	13.1	53435	-9.3
2001	541.1	43.2	930.4	7.3	1471.5	18.2	-389.3	-20.4	52553	-0.5
2002	655.1	21.1	1209	29.9	1864.1	26.7	-553.9	42.3	61399	15.7
2003	791.6	20.8	1669	38.0	2460.7	32.0	-877.4	58.4	81639	34.2
2004	1149.6	45.2	2249	34.8	3398.6	38.1	-1099.4	25.3	100679	22.2
2005	1104.1	-4.0	2842.8	26.4	3946.9	16.1	-1738.8	58.2	112320	12.1
2006	1220.01	10.5	3238.2	13.9	4458.1	13.0	-2018.2	16.1	108655	-3.2
2007	1442.6	18.2	4129.7	27.5	5572.4	25.0	-2687.1	33.1	132704	22.8
2008	1787.2	23.9	4530.5	9.7	6317.7	13.4	-2743.4	2.1	133062	-3.6
2009	2294.7	28.4	3869.9	-14.6	6164.6	-2.4	-1575.2	-42.6	118799	-9.1
2010	3499.4	52.5	4901.1	26.6	8400.5	36.3	-1401.7	-11.0	142022	20.7
2011	4701.2	34.3	5905.9	20.5	10607	26.3	-1204.7	-14.1	161835	13.8
2012	5590.9	18.9	6281.8	6.4	11872.7	11.9	-690.9	-42.6	169680	4.8

Sources
IMF World Economic Outlook Database (April 2013) and IMF Direction of Trade and Statistics Yearbooks, various issues. Author's calculations.

Table 1b. China's Trade with New Zealand, 1980 – 2012

in US $Million

Year	Export (X)	Growth (%)	Import (M)	Growth (%)	Total Trade (X+M)	Growth (%)	Trade Balance (X-M)	Growth (%)	GDP	Growth (%)
1980	30.3		156.5		186.8		-126.2		202458	
1981	28.5	-5.9	173.9	11.1	202.4	8.4	-145.4	15.2	168367	-4.1
1982	31.8	11.6	129.2	-25.7	161.0	-20.5	-97.4	-33.0	281280	0.5
1983	25.1	-21.1	145.7	12.8	170.8	6.1	-120.6	23.8	301803	6.5
1984	30.6	21.9	142.3	-2.3	172.9	1.2	-111.7	-7.4	310686	0.9
1985	31.6	3.3	160.8	13.0	192.4	11.3	-129.2	15.7	307017	-2.6
1986	28.0	-11.4	214.3	33.3	242.3	25.9	-186.3	44.2	297590	-1.5
1987	44.3	58.2	216.3	0.9	260.6	7.6	-172.0	-7.7	323973	8.4
1988	39.3	-11.3	407.5	88.4	446.8	71.5	-368.2	114.1	404149	25.3
1989	39.6	0.8	304.4	-25.3	344.0	-23.0	-264.8	-28.1	451311	11.2
1990	51.7	30.6	128.0	-57.9	179.7	-47.8	-76.3	-71.2	390279	-12.0
1991	65.5	26.7	169.7	32.6	235.3	30.9	-104.2	36.5	409165	4.9
1992	87.4	33.4	280.0	64.9	367.4	56.1	-192.5	84.8	488222	17.9
1993	131.0	49.8	265.3	-5.2	396.3	7.9	-134.3	-30.2	613223	28.2
1994	188.1	43.6	316.6	19.4	504.7	27.4	-128.5	-4.3	559224	-9.1
1995	232.2	23.4	345.8	9.2	578.0	14.5	-113.7	-11.5	727947	29.9
1996	231.4	-0.3	403.2	16.6	634.5	9.8	-171.8	51.1	856084	17.8
1997	237.6	2.7	346.4	-14.1	584.1	-8.0	-108.8	-36.7	952649	10.4
1998	274.8	15.6	407.6	17.7	682.4	16.8	-132.9	22.2	1019480	6.1
1999	342.8	24.8	481.3	18.1	824.2	20.8	-138.5	4.2	1083284	5.3
2000	416.2	21.4	638.3	32.6	1054.5	27.9	-222.1	60.4	1198477	8.4
2001	435.3	4.6	736.7	15.4	1172.0	11.1	-301.4	35.7	1324814	10.4
2002	596.2	37.0	803.3	9.0	1399.5	19.4	-207.1	-31.3	1453833	10.5
2003	802.6	34.6	1023.6	27.4	1826.2	30.5	-221.1	6.7	1640961	13.4
2004	1077.8	34.3	1409.8	37.7	2487.5	36.2	-332.0	50.2	1931646	17.7
2005	1354.0	25.6	1326.7	-5.9	2680.7	7.8	27.3	-108.2	2256919	17.5
2006	1620.2	19.7	1314.1	-0.9	2934.3	9.5	306.1	1019.6	2712917	22.1
2007	2160.8	33.4	1537.3	17.0	3698.1	26.0	623.5	103.7	3494235	25.4
2008	2504.4	15.9	1891.3	23.0	4395.6	18.9	613.1	-1.7	4519951	29.7
2009	2086.1	-16.7	2475.7	30.9	4561.8	3.8	-389.6	-163.5	4990526	11.9
2010	2764.0	32.5	3755.1	51.7	6519.1	42.9	-991.0	154.4	5930393	17.4
2011	3736.4	35.2	4990.5	32.9	8726.9	33.9	-1254.1	26.5	7321986	21.0
2012	3876.4	3.7	5806.1	16.3	9682.6	11.0	-1929.7	53.9	8227037	12.4

Trade diversion takes place when economic integration leads to a shift in product origin from a lower cost non-member country producer to a higher cost member country producer. For example, imports from outside the FTA or union are replaced by imports from a less efficient source within the union, thus generating a loss in welfare. Consumers pay more for the goods that they buy and more efficient producers are displaced by less efficient ones. Such a move is considered welfare-reducing for both members and non-members, and indeed for the world as a whole.

According to Viner, who developed these concepts, if trade creation outweighs trade diversion, the beneficial effects of the union dominate, and such a move (towards an FTA) will be welfare generating for the members. Viner suggested a set of conditions under which the trade-creation effects will outweigh the trade-diversion effects, namely, (1) pre-union tariffs are high and non-discriminatory; (2) post–union tariffs on third countries are relatively low, reducing the incidence of trade diversion; (3) the union includes the world's lowest cost source for certain commodities, leading to welfare-enhancing trade creation rather than welfare- decreasing trade diversion; (4) there exists a high degree of factor mobility between trading partners; and (5) the partners have similar economies in terms of production methods, monetary and fiscal policies, consumer tastes, incomes, welfare system, and common language, ethnic and cultural backgrounds. Proposed in the context of the creation of European Economic Community, these conditions may need to be taken into consideration in free trade negotiations and in the analysis of their policy implications.

The Changing Size and Nature of International Trade

Since World War II international trade has grown faster than world output. The growth has been most marked in intra-industry trade, particularly among affluent nations. It represents a major shift in the trading and consumption habits of developed nations, replacing the old-style trade in which New Zealand exported primary products to the UK in exchange for the latter's manufactured goods, with the exchange of goods which are similar but differentiated and are close substitutes. The overwhelming evidence on the importance of intra-industry trade has resulted in the development of new trade models and new theoretical approaches to explain its existence and growth.

Inter-Industry and Intra-Industry Trade

Inter-industry trade is the exchange of goods that belong to different industries (for example, the exchange of agricultural products for finished manufactured goods). This takes place between countries with different factor endowments, different levels or stages of development, and different per capita incomes, such as between industrialized nations and developing countries. In this case, division of labour and specialization takes place between industries. The gains from inter-industry trade are explained by the well-known Ricardian and Heckscher-Ohlin-Samuelson (HOS) trade theories.

Intra-industry trade is the simultaneous export and import of goods within the same industry or within similar product groups, such as the exchange of automobiles between the U.S. and Japan. In this case, the division of labour and specialization takes place within industries. Two-way international trade also takes place within multiple-product industries. These products are differentiated (by styles, designs and other characteristics) and are close substitutes.

Intra-industry trade analysis suggests that the greater is the similarity between countries in terms of income levels, factor endowments and levels of development, the higher will be the trade intensities between them (Linder 1961). This has led to the development of 'new' theories of international trade, such as increasing returns to scale, product differentiation, and technological advancement. It has been suggested that inter-industry trade results from comparative advantage while intra-industry trade results from economies of scale (Helpman and Krugman 1985, Bernhofen 2002, Krugman 1980, 1995, Rose 1991, Hummels 2001, Lloyd and Lee 2002, Grubel and Lloyd 1975, Lohrmann 2002).

According to traditional trade wisdom, the greater are the disparities between nations, the greater will be the intensity of bilateral trade between them. Intra-industry trade provides a case for economic integration even between nations which are similar in terms of factor endowments, human capital, technologies, cultures and levels of development. The analysis of intra-industry trade also provides a way out of the risk that larger trading partners may dominate smaller ones, as it suggests that small countries can overcome the problem of limited domestic market size by adopting a narrower type of specialization as an industrial strategy.

Two kinds of intra-industry trade have been distinguished: 'horizontal' and 'vertical'. Horizontal intra-industry trade takes place where goods are identified by different attributes such as style and design. In this case, different varieties of a finished product are of similar quality. Vertical intra-industry trade, on the other hand, takes place where goods are differentiated by different qualities. In this case, countries specialize in inputs, components, parts and varieties of a finished product with different qualities.

The distinction between vertical and horizontal intra-industry trade is important for the analysis of bilateral trade development between developed and developing countries. The OECD-China study by Hellvin (1996) found that the share of intra-industry trade in China-OECD trade increased from 12 percent of manufacturing trade in 1980 to over 20 percent in 1992. He also noted that due to many country-specific differences, 'vertical intra-industry trade' exists between China and OECD countries. China tended to specialize in and export low-cost, labour-intensive, lower quality varieties in exchange for capital-intensive and high-quality varieties from OECD countries. Another study, by Ishii and Yi (1997), reported that vertical specialisation explains at least 21 per cent of total exports for ten OECD countries in 1990, which represented 60 per cent of world trade (Schmitt and Yu 2002).

Given the rapid growth of China during the last few decades and its eventual joining of the ranks of industrialized nations, as well as optimistic indications of strengthening trade relations between New Zealand and China, it is appropriate to identify the potential areas where trade between the two countries could be further intensified. To do this, we examine bilateral trade intensities using inter industry trade and intra-industry indices.

3. Methodology

Intensity of Trade Index

The intensity of trade index was pioneered by Brown (1949) and was later developed and popularised by Kojima (1964). Kojima's intensity of trade index concentrates on variations in bilateral trade levels that result from differential resistances. 'Resistances' refers to overt trade barriers such as transport costs and protectionism, or more subtle 'subjective resistance' such as imperfect information about foreign markets (Garnaut and Drysdale 1994, Drysdale *et al*. 1982). Trade intensity indices have been employed as indicators of the relative strength or resistance to bilateral trade flows, with variations in the index over time being explained by the nature and importance of various factors, such as those mentioned above (Kojima, 1964; Wadhva and Asher 1985, Garnaut and Drysdale 1994, Bano 2002).

Researchers have explained variations in the indexes over time and across bilateral trading relationships by analysing the nature and importance of various resistance factors. Trade may be more intense with a country and its trading partners than with the rest of the world because the resistance between them is lower. Trade intensity provides a way of measuring these trading relations without the bias resulting from the comparative size of the trading partners. The trade intensity analysis allows us to infer that New Zealand exports to China are high not because these countries are economically large (or small) but because the resistances between them are relatively low (and are expected to be even lower under the FTA).

Drysdale and Garnaut (1994), however, regard the intensity of trade index as only a rough index of relative resistances, because it fails to make allowance for the varying commodity composition of countries' foreign trade. When the commodities are not substitutable, opportunities for bilateral trade are limited by the degree to which one country's exports complement another country's imports.

In order to examine whether the bilateral trading relationship between New Zealand and China is strengthening or weakening, both export-intensity index and import-intensity index have been estimated. The indices show in a rather simple way whether New Zealand's trade with these countries is greater or less than might have been expected given the importance of the trading partner's share in total world trade. If New Zealand is reported as home country i and each trading partner as country j, then the intensity of trade index (TII_{ij}) for both exports and imports is calculated using the following formulas:

$$XII_{ij} = (X_{ij}/X_i)/[M_j/(M_w - M_i)] \qquad MII_{ij} = (M_{ij}/M_i)/[X_j/(X_w - X_i)] \qquad \text{(1a, 1b)}$$

where:

X_{ij}	=	country i exports to country j	M_{ij}	= country i *imports* to country j
X_i	=	total exports of country i	M_i	= total imports of country i
M_j	=	total imports of country j	X_j	= total exports of country j
M_w	=	total world imports	X_w	= total world exports
XII_{ij}	=	export intensity index	MII_{ij}	= import intensity index

X_{ij}/X_i, is the proportion of exports that are sent to the trading partner as a percentage of total domestic exports. This indicates how significant the trading partner is to the home country for its exports. $M_j/(M_w\text{-}M_i)$, is the trade partner's total imports as a proportion of total world imports less the import of the domestic economy. Countries that import at proportionally high levels from the same country to which they send most of their exports will have a high trade intensity (XII_{ij}). Conversely, a country with diverse markets that is not reliant on any one country for their imports will have low trade intensity (XII_{ij}). A trade intensity index greater than one indicates that a country is exporting more to its partner than would be expected by its share in world trade, while a value of trade intensity less than one indicates the opposite.

The trade-intensity index is affected by socio-economic factors, such as economic complementarities, geography, and political, historical and institutional ties (Kojima 1964). It has only limited application for measuring potential bilateral trade between nations. For instance, it does not indicate the amount of bilateral trade flows taking place due to 'natural factors' such as GDP, population, geographical distances, location and other barriers.

Trade Reciprocity

Trade reciprocity refers to the mutual changes in trade policy which bring about changes in the volume of each country's imports that are of equal value to changes in the volume of its exports. The methodology was developed by Wadhva and Asher (1985) to measure reciprocity in the overall balance of trade between any two trade partner countries (or two regions.) Trade reciprocity is measured using the following formula:

$$\theta = 1 - \frac{\sum_{j=1}^{n}\left[\frac{\left|a_{ij} - a_{ji}\right|}{(a_{ij} - a_{ji})} \cdot \sum_{i=1}^{n} a_{ij}\right]}{(n-1) \cdot \sum_{i=1}^{n}\sum_{j=1}^{n} a_{ij}}$$

(2)

where:

a_{ij} = exports of country i (NZ) to partner j (China)

a_{ji} = exports of country j (China) to partner i (NZ)

n = total number of countries involved in the context of the bilateral or regional

θ = the trade reciprocity index (TRI).

The use of the formula results in an index that will always lie between 0 and 1. When every pair of countries in a group tends to have a perfectly balanced two-way trade, the value of θ reaches its maximum (that is, unity). On the other hand, when there exists only one-way flow of trade between the pair of trading partners (say, complete dependence of country A on country B for its imports or exports), the value of θ is at its minimum (that is, zero). The index thus measures the degree of trade reciprocity (Wadhva and Asher 1985). It is, however, difficult to apply Wadhva and Asher's equation for measuring trade reciprocity. We therefore modify the index by re-writing the equation, with the first part of the numerator inside the summation mark, as follows:

$$\theta = 1 - \frac{\sum_{j=1}^{n}\left[\frac{\left|a_{ij}-a_{ji}\right|}{(a_{ij}-a_{ji})} \cdot \sum_{i=1}^{n} a_{ij}\right]}{(n-1)\cdot \sum_{i=1}^{n}\sum_{j=1}^{n} a_{ij}}$$

(3)

For two countries (n=2), it can be written as:

$$\theta = 1 - \frac{\sum_{j=1}^{2}\frac{\left|a_{1j}-a_{j1}\right|}{(a_{1j}-a_{j1})}a_{1j} + \frac{\left|a_{2j}-a_{j2}\right|}{(a_{2j}-a_{j2})}a_{2j}}{(2-1)\left[\sum_{i=1}^{2}\sum_{j=1}^{2} a_{ij}\right]}$$

(4)

By further substitution,

$$\theta = 1 - \frac{\left[\frac{\left|a_{11}-a_{11}\right|}{(a_{11}-a_{11})}a_{11} + \frac{\left|a_{12}-a_{21}\right|}{(a_{12}-a_{21})}a_{12} + \frac{\left|a_{21}-a_{12}\right|}{(a_{21}-a_{12})}a_{21} + \frac{\left|a_{22}-a_{22}\right|}{(a_{22}-a_{22})}a_{22}\right]}{(2-1)(a_{11}+a_{12}+a_{21}+a_{22})}$$

(5)

Since a country cannot export to itself,

$$\theta = 1 - \frac{\left[0 + \frac{\left|a_{12}-a_{21}\right|}{(a_{12}-a_{21})}a_{12} + \frac{\left|a_{21}-a_{12}\right|}{(a_{21}-a_{12})}a_{21} + 0\right]}{(2-1)(0+a_{12}+a_{21}+0)}$$

(6)

This modified formula has been used in this study for estimation purposes. A more detailed explanation and an example are available from the author.[1]

Intra-industry Trade Indices

A comprehensive survey of the various ways of measuring of intra-industry trade (IIT) can be found in Tharakan (1983), Aquino (1978), Bano (1991), Vona (1991) and Lloyd and Lee (2002). Among these, the Grubel and Lloyd (1975) intra-industry trade indices have been the most popular and widely used. This study uses the Grubel-Lloyd index (IITB$_i$), the Grubel-Lloyd weighted mean index (IITB), the Grubel-Lloyd trade imbalance adjusted index (IITC) and the Aquino adjusted index (IITQ). We first look at the Grubel and Lloyd Index (1975) and then, briefly, at the related Aquino Adjusted Measure (Aquino 1978).

Grubel and Lloyd Index

Grubel and Lloyd (1975) developed indices to measure the extent of intra-industry trade in a country's total trade and explained intra-industry trade in the context of the Heckscher-Ohlin-Samuelson trade theories. Following Grubel and Lloyd a number of studies on the theories, measurement and the related policy issues have been developed; among these are Aquino (1978), Greenaway and Milner (1981, 1987) and Tharakan (1983). The work of Vona (1991), Bano (1991), Greenaway and Rayner (1993) and Bano and Lane (1995), among others, make use of the Grubel-Lloyd intra-industry trade index.

Intra-industry trade is defined by Grubel and Lloyd (1975) as the value of exports in an industry which is exactly matched by imports in the same industry and is measured by:

$$IITB_i = \frac{(X_i + M_i) - |X_i - M_i|}{X_i + M_i} \times 100 \tag{7}$$

where X_i and M_i are exports and imports of industry i, respectively. This measure varies from 0 to 100, with higher values representing higher levels of intra-industry trade. Grubel-Lloyd devised a summary measure to calculate intra-industry trade across industries (or countries) at a given SITC (United Nations Standard International Trade Classification) product group level of aggregation. The summary measure is a weighted average of $IITB_i$, the weight being the share of each industry in the country's total trade. The Grubel-Lloyd summary measure is therefore:

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[1] My attention was drawn by Piyadasa Ratnayaka from Saga University, Japan, regarding the Trade Reciprocity Index (TRI) developed by Wadhva *et al.* (1985) and, in particular, the measurement difficulties in its original form. We modified Wadhava TRI index. It was then first used used by Piyadasa Ratnayaka in his book *Lost Opportunities: Sri Lanka's Economic Relationship with Japan* (2004). His acknowledgement of my contribution is appreciated.

$$IITB = \overline{IITB_i} = \frac{\sum_{i=1}^{n}(X_i + M_i) - \sum_{i=1}^{n}|X_i - M_i|}{\sum_{i=1}^{n}(X_i + M_i)} \times 100$$

(8)

where IITB is the weighted average of the value of $IITB_i$ across industries, $i = 1,2, ... n$, and n is the number of industries in the sample. $IITB_i$ is an accurate measure if there is balanced bilateral trade. If, however, total trade (or the trade of that subset of industries being measured) is unbalanced, then the index is downward biased because the denominator is overstated. In such a situation, the $IITB_i$ measure cannot attain its maximum value of 100 percent. In order to avoid any bias introduced by unbalanced trade, the mean must be adjusted by removing this trade imbalance effects. In view of this, Grubel and Lloyd devised the adjusted measure as shown in equation (9):

$$IITC = \frac{\sum_{i=1}^{n}(X_i + M_i) - \sum_{i=1}^{n}|X_i - M_i|}{\sum_{i=1}^{n}(X_i + M_i) - \left|\sum_{i=1}^{n}X_i - \sum_{i=1}^{n}M_i\right|} \times 100$$

(9)

Aquino Adjusted Measure

In order to avoid any bias introduced by unbalanced trade, Aquino (1978) suggested that the adjustment should be made at each industry level rather than at the aggregate level. Aquino simulates balanced trade by calculating 'theoretical values' of exports and imports at the industry level:

$$X_i^e = X_i \frac{1}{2} \frac{\sum_{i=1}^{n}(X_i + M_i)}{\sum_{i=1}^{n}X_i} \qquad M_i^e = M_i \frac{1}{2} \frac{\sum_{i=1}^{n}(X_i + M_i)}{\sum_{i=1}^{n}M_i}$$

(10)

The derived values for exports (X_i^e) and imports (M_i^e) are applied to the Grubel-Lloyd measures in equations (3) and (4) to arrive at the corresponding measures of $IITQ_i$ at the industry level and IITQ for total trade. The Aquino measure is represented by the following equation:

$$IITQ = \frac{\sum_{i=1}^{n}(X_i^e + M_i^e) - \sum_{i=1}^{n}|X_i^e - M_i^e|}{\sum_{i=1}^{n}(X_i^e + M_i^e)} \times 100$$

(11)

4. Analysis of Trade Intensity between New Zealand and China and Selected Partners

Table 2 shows the summary values of estimated trade intensities for the period 1980–2011 between New Zealand and China as well as with selected trading partners. The results show varying values of the trade-intensity index across the countries; in particular, they show that in some cases trade relations between New Zealand and selected trading partners have strengthened while in other cases they have weakened.

New Zealand-China Trade and Trade Intensities

Export and import intensities show different results. The degree of export intensity between NZ and China in 1980 was 2.9, indicating strong NZ representation in China's markets. However, since 1980 the index has decreased, reaching a low value of 0.6 in 1990, and has since remained close to 1, with all values falling between 0.7 and 1.1. But after the signing of the FTA, the index increased from 0.8 in 2008 to 1.2 in 2009 and to 1.3 in 2010. In terms of the import intensity index, New Zealand's imports from China exhibited an increasing trend from the end of the 1990s up to 2007, when a value of 13.1 was reached. Since 2008, however, the index has shown a decreasing trend, to 12.1 in 2009 and 10.5 in 2010.

Figure 1 shows the movements in the export (XII) and import intensity (MII) indices for the period 1980 to 2011. The movements of the MII show three discernible stages. From 1980 to 1990 the MII fluctuated at a low level, which is not surprising since the low level of bilateral trade during that period was low. During the second stage, 1990-2007, the MII increased at a fast and steady pace. In the third stage, which came after 2008, the MII tended to decrease, while the export intensity (XII) increased slightly but at a very low level.

Figure 1 Export and Import Intensity Index of NZ to China, 1980-2012
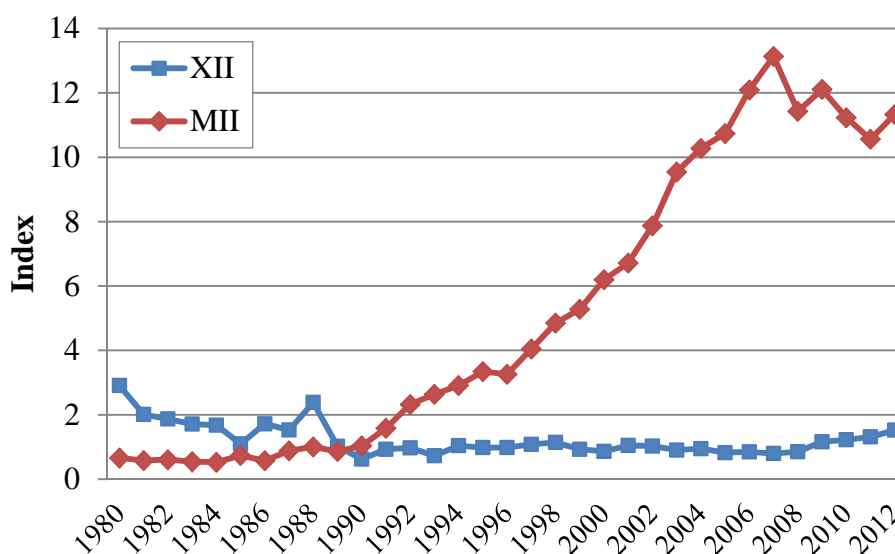
Sources: IMF Direction of Trade and Statistics Yearbooks, Various Issues. Author's calculations.

At first glance, these movements and tendencies of both MII and XII are surprising. First, the XII stayed stable at a low level almost the whole time except after the signing of the FTA in 2008. Before that, the XII seems not to have responded to any of the economic integration efforts. Furthermore, the increase in the XII after the FTA has not been significant. On the other hand, the MII increased with bilateral trade during 1990- 2007 period. But two integration efforts - the first when China joined the WTO and the second when NZ recognized China as a market driven economy - had no influence on the MII; moreover, the response of MII to the FTA has tended to decrease. A plausible explanation, from China's perspective, may be that New Zealand is a small contributor to her total imports.

Surprising as these results are, they have an explanation. First, because the trade intensity index shows the percentage of bilateral trade in a country's total trade, any trade increase can only be a small part of the huge China trade. It is thus not surprising at all to see a steadily low level of XII New Zealand-China bilateral trade. Meanwhile, the small size of New Zealand tends to amplify the increase/decrease of MII. However, it cannot explain the drop of MII after the FTA, since imports actually increased significantly. By comparison, the trade intensity between NZ and Australia at the time also decreased, one possible reason being that New Zealand's trade diversification increased after 2007.

Figure 2 shows the trends in total bilateral trade, the trade balance between New Zealand and China, New Zealand's exports to China, and China's imports into New Zealand. Aside from a slight jump in 1988, New Zealand's exports to China have exhibited a relatively smooth and steady upward trend over the period 1980-2012. The value of exports remained comparatively low at less than US$ 0.5 billion until 2000, but this increased sharply during 2001-2012 compared to the period before 2000. This may be attributed to the impact of the Chinese economic reforms as well as to the various economic arrangements and agreements signed by and between New Zealand and China in the early 2000's (for example, meat access protocols and other trade agreements). The rapid increase in the export index after 2009 through 2012 may of course be attributed to the FTA between New Zealand and China signed in 2008.

Figure 2 also shows that bilateral trade between New Zealand and China increased steadily since 1980, with the growth showing a four-stage pattern. In the first stage (1980-1990), trade between New Zealand and China stayed at a very low level and showed nearly no growth. From 1990 to around 2004, bilateral trade started to take off, especially after China joined the WTO in 2001. After New Zealand recognised China as a market economy in 2004, bilateral trade, especially imports from China, rapidly and steadily increased. The final stage, after the New Zealand-China FTA went into force, saw trade between the two countries rise to new levels, with exports starting to catch up with imports and with both growing at the same pace. Although the global financial crisis which started in 2008 had a negative effect on imports, the impact on NZ-China trade has been much less compared to the bilateral trade between New Zealand and other main trade partners.

Figure 2a. New Zealand-China Trade, 1980 – 2012
in US$ millions
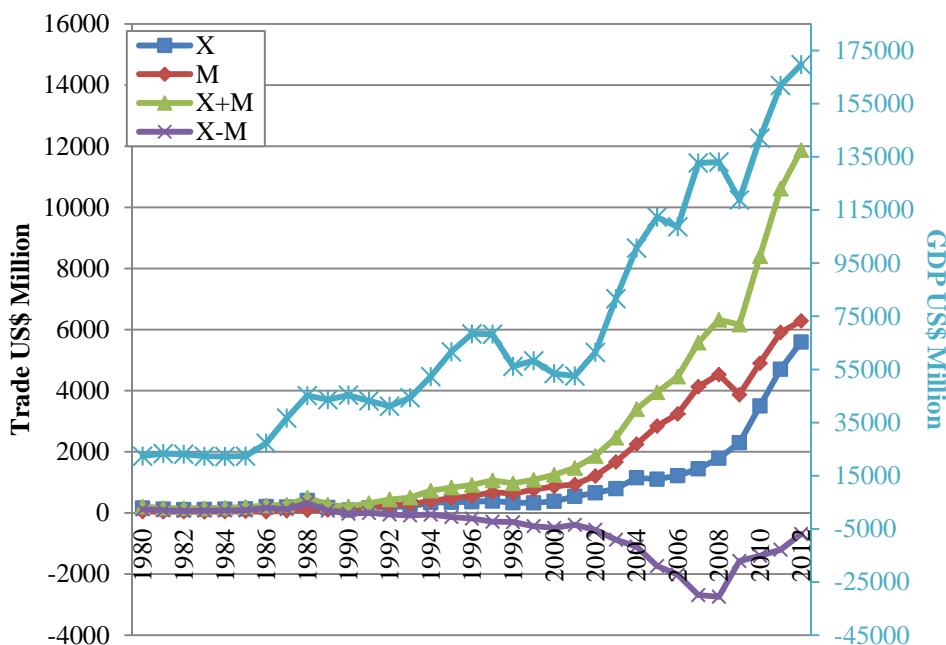
Sources: IMF Direction of Trade and Statistics Yearbooks, various issues. Author's estimates

Figure 2b. China-New Zealand Trade, 1980 – 2012
in US$ millions
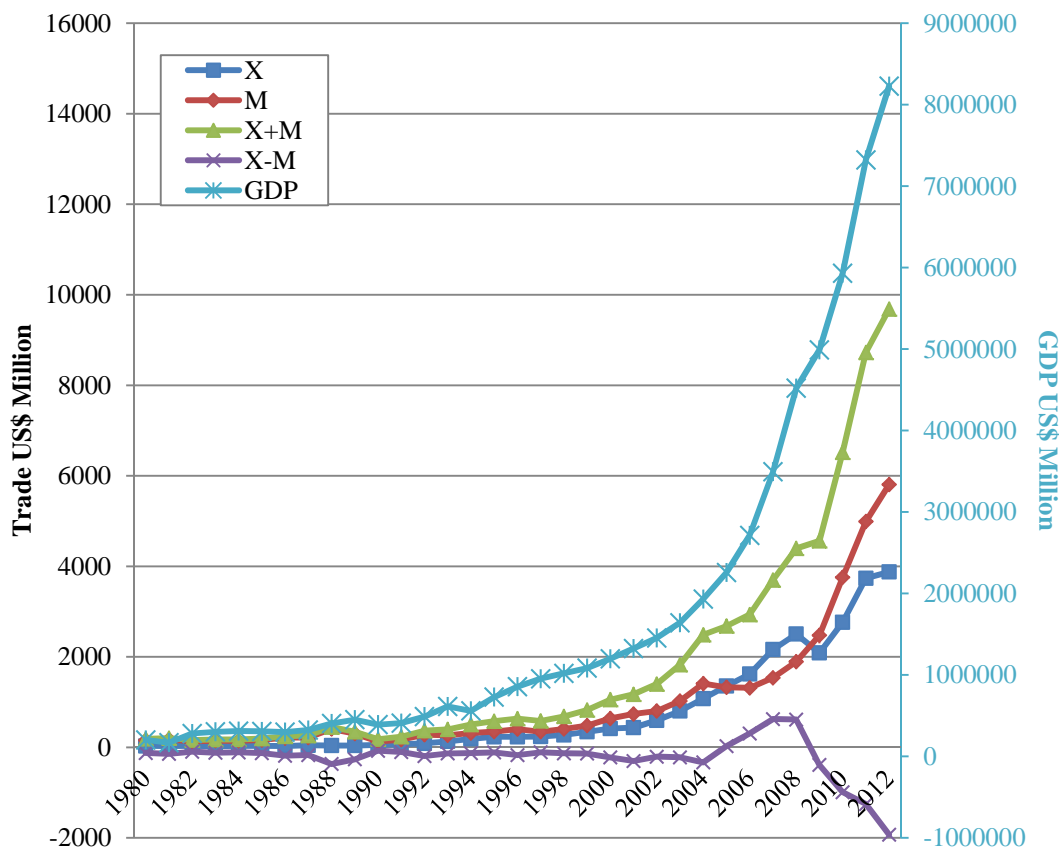
Sources: IMF Direction of Trade and Statistics Yearbooks, various issues.

Figure 2b shows that the growth of Chinese imports into New Zealand forms a relatively smooth curve rising over time. New Zealand's exports to China as a proportion of its total exports increased from one percent in 1990 to 12.5% in 2011, but the proportion of imports coming from China into New Zealand showed an even sharper increase from 0.8% in 1980 to over 16% in 2012.

For the period of 1981-1991, there was a general upward trend in the bilateral trade ($X+M$) between China and New Zealand, although the rate of increase was low. There was a slight deviation from the trend around 1988, when the value of exports to China was higher than would have been expected from the existing trend. This was around the time when China and New Zealand signed a bilateral Investment Promotion and Protection Agreement, which may have had something to do with the increase, although we do not know for certain. However, from 1990 to 1997 total bilateral trade between the two countries increased steadily from approximately US$0.2 billion to US$1 billion. Although total bilateral trade stagnated between 1997 and 1999, perhaps because of the 1997-1998 Asian financial crises, it thereafter increased sharply from approximately US$ 1 billion in 1999 to US$11 billion in 2011 and further increased to US$11.87 billion in 2012.

Prior to 1990, New Zealand's trade balance with China, which peaked at approximately US$0.3 billion in 1988, was in the former's favour, although the total annual trade at the time was relatively insignificant compared to current levels. By 1989, New Zealand's exports to China were approximately equal to its imports from the latter. Since then, however, there has been an increasing trend in New Zealand's trade deficit with China, starting at a level below US$0.1 billion in 1990 but increasing to approximately US$ 0.5 billion in 2000. From 2000, the trade deficit grew at a much steeper rate, reaching approximately US$ 2.7 billion in 2008, although it had since gone down to about US$ 1 billion in 2011. Overall, China dominates the trade relationship with New Zealand, which should be a matter of concern for New Zealand's policymakers.

5. Analysis Using the Trade Reciprocity Index

The degree of trade reciprocity between New Zealand and China, although initially quite low at 0.32 in 1980, has been increasing, and by 2012 has reached 0.89 as shown in Figure 3. The TRI peaked at 0..99 in 2003, but then started to decrease until 2007; thereafter there was a brief upward movement until 2009, after which it again declined, as Chinese imports became dominant over New Zealand's exports. The goal of a balanced trade between the two countries has not yet been attained, but the results indicate a move in that direction after the signing of the FTA.

Figure 3. Trade Reciprocity
New Zealand with Major Trading Partners, 1980-2012
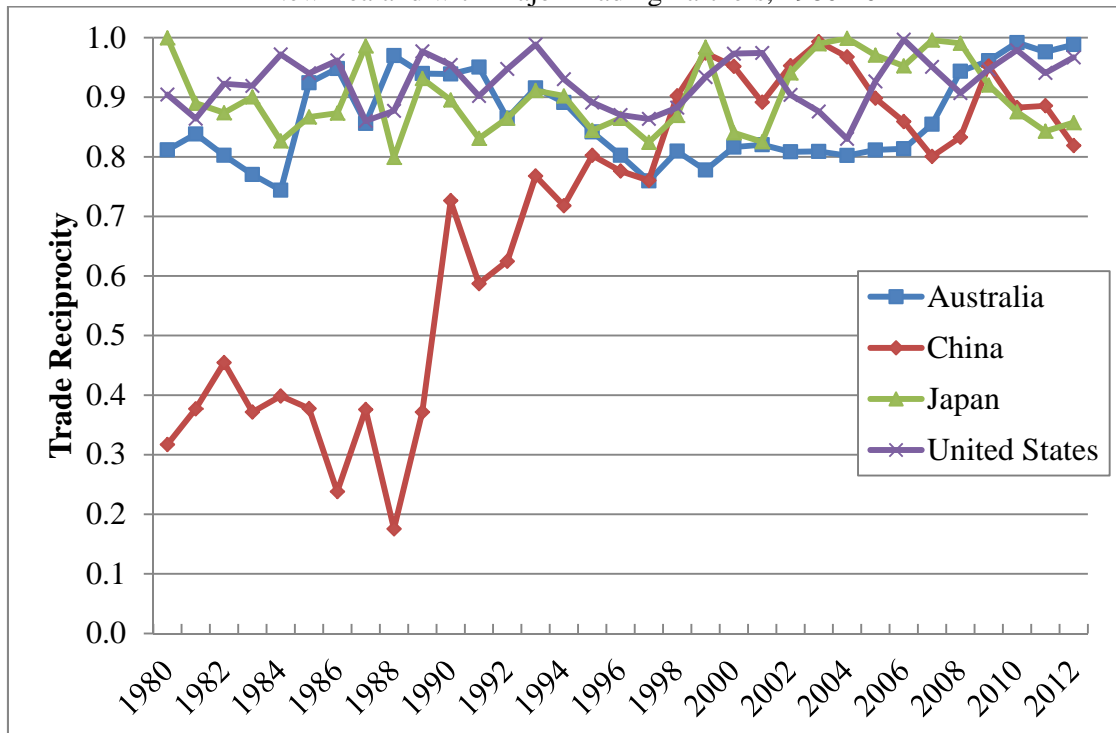
New Zealand's bilateral trade with other partners, as illustrated in Figure 3, shows moderate TRI, avoiding the extreme values of zero, which indicates complete lack of reciprocity, and unity, which indicates perfectly balanced bilateral trade. The TRI with Japan has remained relatively high and constant over the period, with values ranging from 0.8 in 1988 to 1 in 2004, but with no discernible pattern over the entire 1980-2011 period. The TRI with the US for the same period is relatively high, with values between 0.83 and 1.0 and with only marginal fluctuations. Perfect reciprocity was achieved in 2006, and all the indices for the last five years have been higher than 0.9.

It is to be noted that trade reciprocities tend to increase with bilateral trade intensities. One would therefore expect that with increasing integration, New Zealand's trade reciprocity with these countries would increase over time, resulting in a higher degree of mutual gain from trade. Indeed, the correlation coefficients between the XII and TRI for NZ's trade with Australia, Japan and the US were all positive and relatively strong, with the lowest being registered with Japan at 0.49 and the highest with the US at 0.71. On the other hand, the correlation coefficient between XII and TRI for China was also strong but negative at 0.74. When MII was correlated with the TRI, China was again the exception, with a relatively strong positive correlation at 0.45. Both Japan and the US showed relatively strong negative relationships at -0.66 and -0.68, respectively, while Australia showed a weak positive correlation at 0.2.

At first glance, there is no clear pattern in the movement of trade reciprocity and bilateral trade between New Zealand and China. Trade reciprocity increased together with bilateral trade until 2000, after which the TRI fluctuated between 0.8 and 1.0. At the same time, the bilateral trade increased steadily, with imports increasing faster than exports. Although there are observed fluctuations in the trade between New Zealand and China after 2000, these fluctuations are at the same level as those with New Zealand's other main trade partners. In other words, the TRI between New Zealand and China has reached a 'standard optimal level' similar to that of New Zealand's main trade partners. We can conclude that trade balance has been achieved around 2000 and that further economic integration efforts may no longer significantly change the situation. Once the TRI has reached its maximum level, reflecting balanced bilateral trade, it may no longer show any long-term trend except to fluctuate around the higher end.

6. Analysis of Intra-Industry Trade between New Zealand and China

This section examines the extent of New Zealand's intra-industry trade with China and selected trading partners for the years 1990-2011. IIT was computed using the UN Standard International Trade Classification at the 3-digit level (SITC Rev.3) for all industries from SITC 0 to SITC 9. New Zealand's IIT was calculated with particular focus on trade with China. The 3-digit summary values were also computed for SITC across all industries for the years 1990- 2011. The trade data used in the analysis are from the UN Statistical Department, Head Office, Commodity Trade Division based in New York. All export and import values are in US dollars for each calendar year. The results are presented in Tables 4a through Table 4c and the time series results are reported in Table 4(d) and Figure 3. This study is an extension of previous work on intra-industry trade by Bano and Lane (1986, 1987 and 1995), Bano (1991, 2002 and 2003) and Bano and Sandrey (2003).

Table 4 reports high and low levels of IIT between New Zealand and China. For comparison, 1990 and 2011 have been selected from the sample period. The results show high IIT in SITC 0 ('Food and Live Animals'). Only two products out of 13 industries in this section (Sugars, Molasses, Honey SITC 061 and Coffee, Coffee substitutes SITC 071) show high levels of IIT ranging from 46.3% to about 98.5% in 2011. It is noticeable that 'Sugars, Molasses, Honey; Fish, Dried, Salted, Smoked'; and Crustaceans, Molluscs, etc. had high IIT ranging from 59 to 76% in 1990. The remaining product in this group, 'Fruit etc' (SITC 058), shows expectedly low levels of IIT but high inter-industry trade, with a trade deficit with China in this category. Given the differences in factor endowments of the two countries, trade in this sector seems to be inconsistent with the predictions of traditional trade theory.

Industries in the group SITC-1, 'Beverages and Tobacco', show inter-industry trade and virtually no IIT. This is an interesting result, considering that a number of OECD countries have experienced high IIT in this category. For example, average IIT between NZ and Australia in this section is about 65% (Bano 2002). In this sector New Zealand has a trade deficit with China.

One out of 23 products in the SITC 278 category, shows a high degree of IIT in 1990, which moreover remained relatively high at 40.7 in 2011. The highest IIT in 2011, which is 98.9, belongs to 'Crude Vegetable Materials' (SITC 292), Within SITC 5 ('Chemicals and related products'), a wide variation in the distribution of inter and intra-industry trade is observed. For example, 'Medicaments' (SITC 542), 'Dyeing, Tanning Extracts, Synthetic Tanning Materials' (SITC 532), and 'Plastics, N.E.S.' (SITC 575) show high IIT intensity; while the remaining products also have high values of inter-industry trade in 2011. In 1990, 'Starches' (SITC 592) and 'Inorganic Chemical, Elems' (SITC 522) showed high IIT; by 2011 average IIT across industries was 11.8% compared to 23.4% in 1990. A possible explanation is that a large proportion of China's trade in this category is with the US, Japan and other OECD countries. In addition, new products have emerged in this category. It is also observed that there have been trade-widening effects in this category; for example, new products which are traded both ways have also emerged in this category.

'Perfumery, Cosmetics, Toilet Preparations, Excluding Soaps' (SITC 553) are at the lower end of the IIT index in both 1990 and 2011. All other goods classifications which appeared at the high and low ends of each industry in 2011 are different from those in 1990, indicating a broad and ever-changing industry classification.

There is a high intensity of IIT in SITC 6, which covers 'Manufactured Goods Classified by Materials', in 2011. This is particularly true in SITC 641:'Paper, Paperboard' (71.6 % IIT), SITC 655: 'knitted or crocheted fabrics' (57.2% IIT) and SITC 634: 'veneers, plywood, particle board, and other wood'. The results show that specialization is concentrated on a wide range of selected products where intra-industry trade has potential for growth. Other industries show relatively low levels of IIT. (See Table 4(a-c) for detailed industry results.)

SITC 7, which covers 'Machinery and Transport Equipment' (724); Textile, leather machines (771); Elect power machinery parts, which were at the high end of the IIT index in 1990 at 94.9 and 85, respectively, decreased in 2011 to 40.7 and 19.7. The IIT in 'Thermionic, Cold Cathode, or Photocathode Valve' (776) and 'Machine Tools for Working Metal' (733) increased significantly to 99.4 and 86, respectively, from 1990 to 2011.

There was very little or no IIT in SITC 8, which covers 'miscellaneous manufactured articles', in 1990; only inter-industry trade, with China having a comparative advantage.

However, in 2011, 'Instruments, appliances' (SITC 872) and 'Works of Art, Collectors' Pieces and Antiques' (SITC 896), had high IIT indices of 94.6 and 90.1, respectively.

In each industry except one, a greater number of goods can be classified in the 'high' end of the IIT index in 2011 compared to 1990. This makes sense, considering the general trend, mentioned earlier, of increasing IIT between New Zealand and China during this period. But perhaps the most striking finding is the high level of IIT in non-manufactured goods such as SITC 0-2. In a sense, this indicates a harmonization of the 'old' and 'new' trade. China and New Zealand continue to concentrate on their respective areas of comparative advantage in labour-intensive and land-intensive agricultural products such as food and food preparations, but have developed specific differentiation in a few products, processing them further to satisfy consumer demand for variety. China seems to have comparative advantage in (SITC 0-4) 'processed food, crude materials' (SITC 2) and 'finished manufactured products' (SITC 8), sectors which show low IIT (and by definition high inter-industry trade) with China. Figure 4 shows the time series results.

Figure 4. Intra-Industry Trade of New Zealand with China, 1990 – 2012
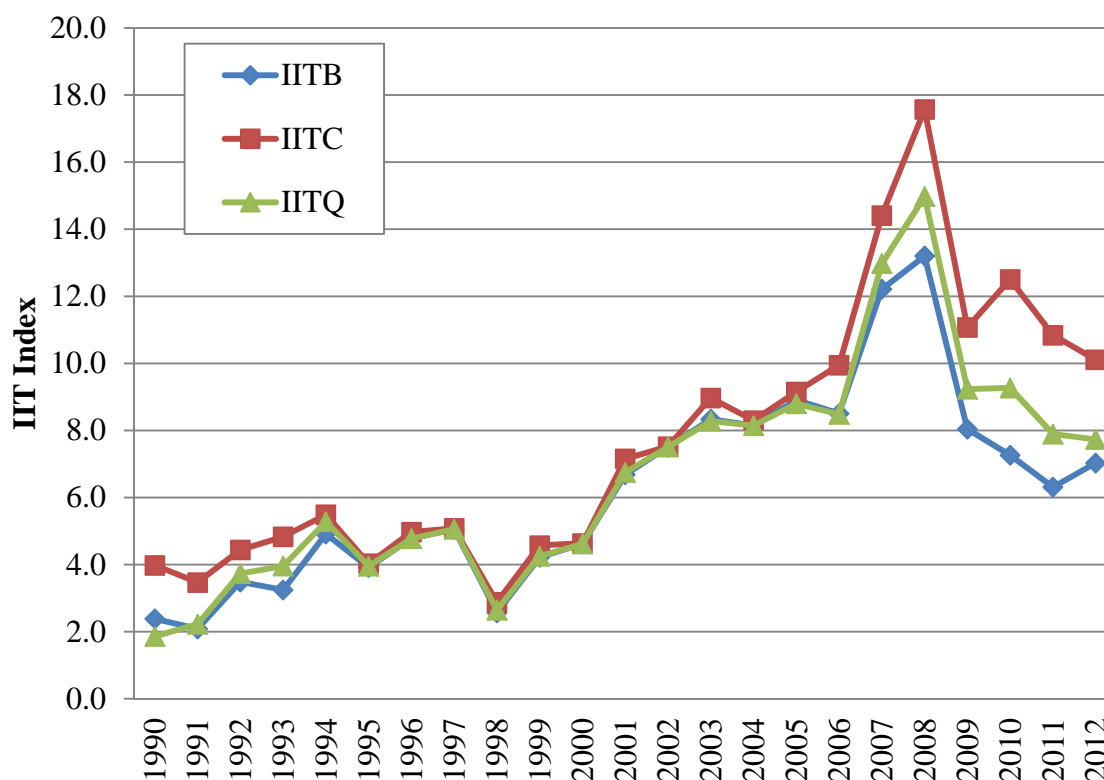
Figure 4 and Table 4(d) show different measures of IIT between New Zealand and China for the years 1990 to 2011. The results show that in 1990, the first year of the study period, IIT as a proportion of New Zealand's trade with China was high under the Grubel-

Lloyd weighted mean index and the Grubel-Lloyd and Aquino adjusted indexes, but was slightly lower during the period 1991-1995. From 1998 to 2001, New Zealand's IIT with China increased significantly on all the three indexes, although in 2000 the indexes dipped slightly. From 2001 to 2002 the indexes were relatively constant at just above the 2000 level. The values for 2004 were slightly lower while those for 2005 and 2006 were slightly higher than for 1990.

Although the IIT index was relatively stable between 2006 and 2008, it has since declined to below its 1990 level. This is consistent with the fact that New Zealand's trade with China for the period 1990-2000 grew annually at a staggering 12% (Livingstone, undated). The entry of China into the WTO also saw a fall in average tariffs from 25% to 10%, making New Zealand's products increasingly more attractive to the middle-class Chinese (Livingstone, undated). On the other hand, putting a limit on taxes greatly broadened tradable commodity categories between them. Therefore, following the expansion of IIT until 2006, the comparative advantages of each country are reflected in the increasing inter-industry trade. It is very clear that after the FTA between New Zealand and China went into force, the IITC decreased to about 10 % in 2009.

Some observations concerning the use of the three IIT indices are that: (a) They move in the same direction; (b) Their values vary during different years and the variations are substantial during some years and (c) For both countries, the Aquino adjusted measure is higher than the Grubel-Lloyd measure in most of the cases.

As discussed earlier, along with the increase in bilateral trade between the two countries, intra-industry trade also increased rapidly, especially in the industries mentioned above. However, the IIT indices tell a different story. Figure 4 shows that before 2000 all three IIT indices kept increasing; but after China joined the WTO in 2001, the IIT began to decrease, with the decrease even intensifying after the signing of the NZ-China FTA in 2008. Does this outcome lead to the conclusion that economic integration between New Zealand and China is actually negatively related to intra-industry trade? Not necessarily. The relation between economic integration and intra-industry trade remains, in our view, positive. The observed negative relation may be explained by the fact that with the economic integration between New Zealand and China, the number of tradable categories also expanded rapidly. As a result - and along with the rapid increase of intra-industry trade - new tradable industries arose which made inter-industry trade grow even faster than before. This has the effect of bringing down the IIT indices, since intra-industry trade and inter-industry trade move in opposite directions. For example, the list of traded goods at the 3-digit SITC level in 2011 is five time longer than the 1990 list. The other evidence is that there are new products and industries that have been classified under the category 'others', SITC 9. (This is not included in our tables, but data and results are available on request.)

7. Summary and Conclusions

In recent years, China has become New Zealand's second largest trading partner. In this study, we examined statistically New Zealand's bilateral trade relations with China, as well as with Australia, Japan and US, New Zealand's traditional trading partners. We examined the strength of the trade relations by estimating trade reciprocity indices, intra-industry trade indices and trade (export and import) intensity indices. The results show that New Zealand's trading relations with China has strengthened and improved over time. The trade reciprocity indices between New Zealand and its trading partners vary across countries over time: with Australia, it has been high, showing near balanced bilateral trade; with China it has been relatively low but has increased since integration in 2008, indicating positive effects from the FTA between the two countries. IIT has also been increasing in selected industries.

In the FTA negotiations between New Zealand and China, there were concerns that the larger trading partner (China) will dominate the smaller one (New Zealand). Our analysis of IIT suggests that there is a way out, which is that small countries can overcome their limited domestic markets by adopting as an industrial strategy a narrower type of specialization. The other apprehensions – for example, on employment, decline of certain industries - have not come about, suggesting that the trade liberalization initiatives pursued under the FTAs, CEPs and CERs can all be beneficial to all participants. With economic integration between the two countries also come increased investment, technology transfer, and people-to-people contacts and cultural exchanges, contributing to further economic integration, leading to a virtuous spiral of progress among the participating countries, in particular, and the Asia-Pacific region, in general.

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Table 4(a). New Zealand Intra-Industry Trade (IIT) with China at 3-Digit SITC, 2012
in US$ Thousand, Grubel-Lloyd Index (IITBi)

SITC	Description	IITBi	Export (X)	Import (M)	Total Trade (X+M)	Trade Balance (X-M)
061	sugars, molasses, and honey	99	3572	3677	7249	-106
071	coffee and coffee substitutes	46	111	34	145	78
091	margarine and shortening	30	10	57	68	-47
081	feeding stuff for animals (not including unmilled cereals)	27	17428	2713	20141	14715
054	vegetables; roots, tubers and other edible vegetable products, n.e.s.	24	2054	14926	16980	-12872
098	edible products and preparations, n.e.s.	23	128391	16621	145012	111771
059	fruit juices (incl. grape must) and vegetable juices	22	836	6867	7703	-6031
073	chocolate and other food preparations containing cocoa, n.e.s.	21	121	1049	1170	-927
036	crustaceans molluscs,aqutcinvrtbrtsfrshchsltdetc	19	132584	13679	146263	118905
034	fish, fresh, chilled or frozen	15	89476	7489	96965	81987
057	fruit and nuts	12	71671	4463	76133	67208
	Av IITBi and Totals	**4**	**1989578**	**137194**	**2126772**	**1852384**
111	nonalcoholic beverages, n.e.s.	39	372	1520	1892	-1148
	Av IITBi and Totals	**10**	**18591**	**2239**	**20830**	**16351**
292	crude vegetable materials, n.e.s.	99	5321	5210	10531	111
278	crude minerals, n.e.s.	41	7479	29265	36744	-21785
223	oil seeds and oleaginous fruits	22	192	1560	1752	-1368
287	ores and concentrates of base metals, n.e.s.	15	37	449	487	-412
	Av IITBi and Totals	**3**	**1616237**	**46034**	**1662271**	**1570202**
334	petroleum oils and oils from bituminous minerals	26	17	110	127	-94
	Av IITBi and Totals	**26**	**17**	**110**	**127**	**-94**
431	animal or vegetable fats and oils processed; waxes and inedible mixtures	43	114	418	532	-304
422	fixed vegetable fats and oils (other than soft), crude, refined or fractionated	18	68	693	762	-625
	Av IITBi and Totals	**2**	**85584**	**2884**	**88468**	**82700**
542	medicaments (including veterinary medicaments)	64	6117	13127	19244	-7010
532	dyeing and tanning extracts, and synthetic tanning materials	60	187	80	267	107
575	plastics, n.e.s., in primary forms	48	1908	6122	8030	-4214
533	pigments, paints, varnishes and related materials	23	1024	7877	8901	-6853
572	polymers of styrene, in primary forms	18	187	1875	2062	-1688
513	carboxylic acids and anhydrides	17	1083	12004	13087	-10921
598	miscellaneous chemical products, n.e.s.	14	1029	13282	14311	-12254
583	monofilament with a cross-sectional dimension exceeding 1 mm	14	101	1362	1463	-1261
	Av IITBi and Totals	**12**	**124911**	**268636**	**393547**	**-143725**
641	paper and paperboard	72	34710	62244	96954	-27533
655	knitted or crocheted fabrics	57	1864	4658	6522	-2794

SITC	Description	IITBi	Export (X)	Import (M)	Total Trade (X+M)	Trade Balance (X-M)
634	veneers, plywood, particle board, and other wood, worked, n.e.s.	53	21506	7672	29178	13834
613	furskins, tanned or dressed	44	300	1055	1355	-756
682	copper	23	1534	11893	13427	-10360
654	woven fabrics of textile materials	18	400	4033	4433	-3632
664	glass	18	2434	25011	27445	-22576
629	articles of rubber, n.e.s.	17	963	10431	11395	-9468
653	woven fabrics of manmade textile materials	14	1331	17738	19069	-16407
	Av IITBi and Totals	**12**	**90277**	**884159**	**974436**	**-793881**
776	thermionic, cold cathode or photocathode valve	99	12894	13042	25935	-148
733	machine tools for working metal, sintered metal carbides or cermets	86	4214	3180	7394	1034
728	machinery and equipment specialized for particular industries	57	9482	23972	33454	-14490
718	power generating machinery and parts thereof, n.e.s.	51	1189	3468	4657	-2280
721	agricultural machinery (excl tractors) and parts thereof	47	4486	14704	19190	-10217
724	textile and leather machinery, and parts thereof, n.e.s.	41	938	3672	4610	-2734
735	parts and accessories	37	4995	1139	6133	3856
772	electrical apparatus for switching or protecting electrical circuits	33	8477	42599	51076	-34122
793	ships, boats and floating structures	28	547	3308	3855	-2761
771	electric power machinery	20	3609	33104	36714	-29495
774	electro-diagnostic apparatus for medical, surgical, dental	19	145	1364	1509	-1219
743	pumps (not for liquids), air or gas compressors and fans	15	2018	24514	26532	-22496
745	nonelectrical machinery, tools and mechanical apparatus	13	2182	31001	33183	-28819
792	aircraft and associated equipment	13	64	908	971	-844
786	trailers and semi-trailerscontainers	12	1306	20549	21854	-19243
748	transmission shafts and cranks	12	425	6869	7295	-6444
	Av IITBi and Totals		**75922**	**2279738**	**2355660**	**-2203817**
872	instruments and appliances	95	12133	10891	23023	1242
896	works of art, collectors' pieces and antiques	90	617	753	1370	-136
874	measuring, checking, analysing and controlling instruments and apparatus, n.e.s.	26	3504	23618	27123	-20114
	Av IITBi and Totals	**3**	**26236**	**1923714**	**1949950**	**-1897479**
931	special transactions and commodities not classified according to kind	64	104613	49572	154185	55041
	Av IITBi and Totals	**64**	**104613**	**49572**	**154185**	**55041**
017	Meat And Edible Meat Offal, Prepared or Preserved N.E.S.	89	451	361	813	90
054	Vegetables; Roots, Tubers And Other Edible Vegetable Products, N.E.S.	61	5982	13522	19504	-7541
061	Sugars, Molasses, And Honey	53	9733	3523	13257	6210
071	Coffee And Coffee Substitutes	48	101	32	133	68
072	Cocoa	41	54	208	262	-154
073	Chocolate And Other Food Preparations	30	263	1477	1740	-1214

SITC	Description	IITBi	Export (X)	Import (M)	Total Trade (X+M)	Trade Balance (X-M)
	Containing Cocoa, N.E.S.					
074	Tea And Mate	29	133	790	924	-657
098	Edible Products And Preparations, N.E.S.	27	133307	20502	153809	112805
081	Feeding Stuff For Animals (Not Including Unmilled Cereals)	17	20567	1925	22492	18641
036	Crustaceans Molluscs,Aqutc Invrtbrts Frsh Ch Sltd Etc	15	158677	13018	171695	145659
059	Fruit Juices (Incl. Grape Must) And Vegetable Juices	14	429	5802	6231	-5372
058	Fruit Preserved, And Fruit Preparations	12	1253	19132	20385	-17879
	Av IITBi and Totals	**5**	**2528470**	**137707**	**2666177**	**2390763**
111	Nonalcoholic Beverages, N.E.S.	62	726	1623	2349	-897
112	Alcoholic Beverages	8	26266	1095	27362	25171
	Av IITBi and Totals	**12**	**26993**	**2718**	**29711**	**24274**
287	Ores And Concentrates Of Base Metals, N.E.S.	93	26	30	56	-4
292	Crude Vegetable Materials, N.E.S.	85	4808	6492	11301	-1684
273	Stone, Sand And Gravel	83	154	218	372	-64
278	Crude Minerals, N.E.S.	43	5731	20994	26725	-15263
	Av IITBi and Totals	**4**	**844614**	**40467**	**885082**	**804147**
431	Animal Or Vegetable Fats And Oils Processed; Waxes And Inedible Mixtures	77	559	891	1450	-331
	Av IITBi and Totals	**3**	**86448**	**5830**	**92278**	**80619**
532	Dyeing And Tanning Extracts, And Synthetic Tanning Materials	81	76	112	189	-36
572	Polymers Of Styrene, In Primary Forms	49	670	2037	2707	-1367
575	Plastics, N.E.S., In Primary Forms	47	2160	6979	9140	-4819
579	Waste, Parings And Scrap, Of Plastics	22	4338	548	4887	3790
533	Pigments, Paints, Varnishes And Related Materials	20	1204	10676	11880	-9472
598	Miscellaneous Chemical Products, N.E.S.	20	1448	13333	14781	-11885
542	Medicaments (Including Veterinary Medicaments)	18	1213	12338	13550	-11125
522	Inorganic Chemical Elements, Oxides And Halogen Salts	16	844	9723	10566	-8879
541	Medicinal And Pharmaceutical Products, Other Than Medicaments (Of Group 542)	13	1439	20251	21690	-18813
514	Nitrogen-Function Compounds	11	2549	43398	45947	-40849
	Av IITBi and Totals	**8**	**146665**	**386085**	**532750**	**-239420**
613	Furskins, Tanned Or Dressed	72	443	791	1234	-347
641	Paper And Paperboard	64	29050	61959	91009	-32910
634	Veneers, Plywood, Particle Board, And Other Wood, Worked, N.E.S.	48	22109	7033	29142	15076
654	Woven Fabrics Of Textile Materials	39	986	4013	4999	-3027
692	Metal Containers For Storage Or Transport	37	2117	9424	11541	-7307
664	Glass	29	4464	26111	30575	-21646

SITC	Description	IITBi	Export (X)	Import (M)	Total Trade (X+M)	Trade Balance (X-M)
655	Knitted Or Crocheted Fabrics	25	624	4366	4990	-3743
629	Articles Of Rubber, N.E.S.	18	1090	11143	12234	-10053
651	Textile Yarn	12	1379	21525	22904	-20146
642	Paper And Paperboard, Cut To Size Or Shape, And Articles Of Paper Or Paperboard	11	2668	45262	47930	-42594
	Av IITBi and Totals	**11**	**81425**	**954895**	**1036320**	**-873470**
718	Power Generating Machinery And Parts Thereof, N.E.S.	99	3558	3510	7068	48
776	Thermionic, Cold Cathode Or Photocathode Valve	89	22552	28114	50666	-5563
733	Machine Tools For Working Metal, Sintered Metal Carbides Or Cermets	72	2310	4103	6413	-1793
721	Agricultural Machinery (Excluding Tractors) And Parts Thereof	55	7277	19407	26684	-12129
728	Machinery And Equipment Specialized For Particular Industries	53	10940	30177	41117	-19237
745	Nonelectrical Machinery, Tools And Mechanical Apparatus	38	7637	33083	40720	-25446
774	Electro-Diagnostic Apparatus For Medical, Surgical, Dental	36	417	1905	2322	-1488
744	Mechanical Handling Equipment, And Parts Thereof, N.E.S.	32	5964	31735	37699	-25771
724	Textile And Leather Machinery, And Parts Thereof, N.E.S.	28	631	3855	4487	-3224
772	Electrical Apparatus For Switching Or Protecting Electrical Circuits	19	5774	56516	62291	-50742
784	Parts And Accessories For Tractors, Motor Cars And Other Motor Vehicles	18	2582	26677	29260	-24095
716	Rotating Electric Plant And Parts Thereof, N.E.S.	13	1310	18588	19898	-17278
	Av IITBi and Totals	**7**	**84872**	**2385348**	**2470220**	**-2300477**
872	Instruments And Appliances	89	12068	14947	27015	-2879
874	Measuring, Checking, Analysing And Controlling Instruments And Apparatus, N.E.S.	25	4048	28625	32673	-24577
896	Works Of Art, Collectors' Pieces And Antiques	24	171	1232	1403	-1061
873	Meters And Counters, N.E.S.	19	218	2119	2337	-1901
891	Arms And Ammunition	14	82	1127	1208	-1045
	Av IITBi and Totals	**2**	**25104**	**2110457**	**2135561**	**-2085353**
931	Special Transactions And Commodities Not Classified According To Kind	63	156679	72326	229005	84353
961	Coin (Other Than Gold Coin), Not Being Legal Tender	24	2	0	2	2
	Av IITBi and Totals	**63**	**156681**	**72326**	**229007**	**84354**

Source

UN Comtrade Database. Author's calculations.

Table 4(b). NZ IIT with China at 3-Digit SITC, 1990 (in US$ Thousand)

SITC	Description	IITBi	Export (X)	Import (M)	Total Trade (X+M)	Trade Balance (X-M)
061	sugars, molasses, and honey	76	13	21	34	-8
035	fish, dried, sltd r in brine; smkd fish; flours, meals n pellets r fish, fit f human consumptn	75	47	28	75	18
036	crustaceans molluscs,aqutcinvrtbrtsfrshchsltdetc	58	22	53	75	-32
058	fruit preserved, and fruit preparations	1	3	655	658	-652
	Av IITBi and Totals	**16**	**84**	**758**	**842**	**-673**
112	alcoholic beverages	23	7	52	58	-45
	Av IITBi and Totals	**23**	**7**	**52**	**58**	**-45**
278	crude minerals, n.e.s.	60	625	1449	2073	-824
291	crude animal materials, n.e.s.	30	2881	502	3383	2379
287	ores and concentrates of base metals, n.e.s.	12	130	9	138	121
292	crude vegetable materials, n.e.s.	8	12	281	293	-269
211	hides and skins (except furskins), raw	5	208	5	214	203
268	wool and other animal hair (including wool tops)	3	42123	630	42753	41494
247	wood in the rough or roughly squared	0.4	13736	28	13763	13708
	Av IITBi and Totals	**6**	**59715**	**2903**	**62618**	**56812**
592	starches, inulin and wheat gluten; albuminoidal substances; glues	51	150	52	202	98
522	inorganic chemical elements, oxides and halogen salts	44	316	1110	1426	-794
541	medicinal and pharmaceutical products, other than medicaments (of group 542)	18	39	391	429	-352
554	soap, cleansing and polishing preparations	6	488	15	503	473
593	explosives and pyrotechnic products	4	18	849	866	-831
575	plastics, n.e.s., in primary forms	3	58	1	59	57
553	perfumery, cosmetics, or toilet preparations, excluding soaps	2	2	138	140	-137
	Av IITBi and Totals	**23**	**1070**	**2556**	**3626**	**-1486**
693	wire products (excluding insulated electrical wiring) and fencing grills	85	659	886	1545	-227
611	leather	8	574	25	598	549
651	textile yarn	8	4	110	114	-105
641	paper and paperboard	5	1744	42	1787	1702
699	manufactures of base metal, n.e.s.	4	14	765	779	-751
653	woven fabrics of manmade textile materials	1	25	3669	3694	-3644
642	paper and paperboard, cut to size or shape, and articles of paper or paperboard	1	1	320	321	-318
695	tools for use in the hand or in machines	0.5	1	597	598	-596
	Av IITBi and Totals	**16**	**3023**	**6412**	**9435**	**-3390**
724	textile and leather machinery, and parts thereof, n.e.s.	95	14	15	29	-2
771	electric power machinery	85	3	2	6	1
742	pumps for liquids	76	16	27	43	-10
741	heating and cooling equipment	63	68	31	99	37
773	equipment for distributing electricity, n.e.s.	63	633	289	921	344

SITC	Description	IITBi	Export (X)	Import (M)	Total Trade (X+M)	Trade Balance (X-M)
772	electrical apparatus for switching or protecting electrical circuits	44	11	37	48	-27
721	agricultural machinery (excluding tractors) and parts thereof	36	124	27	151	96
745	nonelectrical machinery, tools and mechanical apparatus	30	12	66	78	-54
751	office machines	14	19	246	265	-227
759	parts and accessories	9	95	4	100	91
728	machinery and equipment specialized for particular industries	7	5	134	139	-129
778	electrical machinery and apparatus, n.e.s.	4	8	430	438	-422
752	automatic data processing machines and units thereof	1	320	2	322	318
	Av IITBi and Totals	**33**	**1327**	**1312**	**2639**	**16**
874	measuring, checking, analysing and controlling instruments and apparatus, n.e.s.	36	26	119	144	-93
873	meters and counters, n.e.s.	27	41	6	47	34
898	musical instruments	5	17	608	625	-591
844	women's or girls' coats, capes, jackets, suits, trousers, dresses, underwear, etc.	4	33	1723	1756	-1690
892	printed matter	1	1	212	213	-211
841	men's or boys' coats, jackets, suits, trousers, shirts, underwear etc.	1	11	2639	2650	-2628
842	women's or girls' coats, capes, jackets, suits, trousers, dresses, skirts, underwear, etc.	1	7	2368	2375	-2360
845	articles of apparel, of textile fabrics, whether or not knitted or crocheted, n.e.s.	1	22	7754	7775	-7732
851	footwear	0.3	9	6775	6783	-6766
821	furniture and parts	0.2	4	3199	3203	-3195
893	articles, n.e.s. of plastics	0.2	3	2259	2262	-2257
	Av IITBi and Totals	**1**	**172**	**27662**	**27834**	**-27489**

Table 4(c). NZ - China Intra-Industry Trade (IIT): Hi and Low Side by Side 1990 and 2012

	1990			2012	
SITC	**Description**	**IITBi**	**SITC**	**Description**	**IITBi**
	High IITBi			**High IITBi**	
061	sugars, molasses, and honey	75.6	061	sugars, molasses, and honey	98.5
	Low IITBi			**Low IITBi**	
058	fruit preserved, and fruit preparations	1.0	024	cheese and curd	0.0
	Low IITBi			**Low IITBi**	
112	alcoholic beverages	22.8	111	nonalcoholic beverages, n.e.s.	39.3
			112	alcoholic beverages	7.6
	High IITBi			**High IITBi**	
278	crude minerals, n.e.s.	60.3	292	crude vegetable materials, n.e.s.	98.9
	Low IITBi			**Low IITBi**	
211	hides and skins (except furskins), raw	5.0	287	ores and concentrates of base metals, n.e.s.	15.3
268	wool and other animal hair (including wool tops)	2.9	248	wood, simply worked and railway sleepers of wood	4.5
247	wood in the rough or roughly squared	0.4	268	wool and other animal hair (including wool tops)	4.2
	High IITBi			**High IITBi**	
592	starches, inulin and wheat gluten; albuminoidal substances; glues	51.3	542	medicaments (including veterinary medicaments)	63.6
	Low IITBi			**Low IITBi**	
541	medicinal and pharmaceutical products, other than medicaments (of group 542)	17.9	554	soap, cleansing and polishing preparations	3.4
554	soap, cleansing and polishing preparations	6.1	581	tubes, pipes and hoses of plastics	1.9
593	explosives and pyrotechnic products	4.1	531	synthetic organic coloring matter and color lakes and preparations based thereon	1.7
575	plastics, n.e.s., in primary forms	3.2	551	essential oils, perfume and flavor materials	1.5
553	perfumery, cosmetics, or toilet preparations, excluding soaps	2.3	553	perfumery, cosmetics, or toilet preparations, excluding soaps	1.3
	High IITBi			**High IITBi**	
693	wire products (excluding insulated electrical wiring) and fencing grills	85.3	613	furskins, tanned or dressed	44.2
	Low IITBi			**Low IITBi**	
611	leather	8.3	658	made-up articles, wholly or chiefly of textile materials, n.e.s.	0.7
651	textile yarn	7.5	662	clay construction materials and refractory construction materials	0.4
641	paper and paperboard	4.7	665	glassware	0.4
699	manufactures of base metal, n.e.s.	3.6	679	iron and steel tubes, pipes and hollow profiles, fittings for tubes and pipes	0.3
653	woven fabrics of manmade textile materials	1.3	621	materials of rubber, including pastes, plates, sheets, rods, thread, tubes, etc.	0.2
642	paper and paperboard, cut to size or shape, and articles of paper or paperboard	0.7	612	manufactures of leather or composition leather, n.e.s.; saddlery and harness	0.1
695	tools for use in the hand or in machines	0.5	693	wire products (excluding insulated electrical wiring) and fencing grills	0.1

	High IITBi				High IITBi	
724	textile and leather machinery, and parts thereof, n.e.s.	94.9		776	thermionic, cold cathode or photocathode valve	99.4
771	electric power machinery	85.0		733	machine tools for working metal, sintered metal carbides or cermets	86.0
742	pumps for liquids	76.3		728	machinery and equipment specialized for particular industries	56.7
741	heating and cooling equipment	63.1		718	power generating machinery and parts thereof, n.e.s.	51.0
	Low IITBi				Low IITBi	
745	nonelectrical machinery, tools and mechanical apparatus	30.2		764	telecommunications equipment	1.1
751	office machines	14.4		785	motorcycles	0.5
759	parts and accessories	8.9		752	automatic data processing machines and units thereof	0.4
728	machinery and equipment specialized for particular industries	7.3		761	tv receivers	0.2
778	electrical machinery and apparatus, n.e.s.	3.6		775	household type electrical and nonelectrical equipment, n.e.s.	0.2
752	automatic data processing machines and units thereof	1.4		751	office machines	0.2
	High IITBi				High IITBi	
				872	instruments and appliances	94.6
				896	works of art, collectors' pieces and antiques	90.1
	Low IITBi				Low IITBi	
898	musical instruments	5.4		885	watches and clocks	0.2
844	women's or girls' coats, capes, jackets, suits, trousers, dresses, underwear, etc.	3.7		841	men's or boys' coats, jackets, suits, trousers, shirts, underwear etc.	0.1
892	printed matter	0.9		842	women's or girls' coats, capes, jackets, suits, trousers, dresses, skirts, underwear, etc.	0.1
841	men's or boys' coats, jackets, suits, trousers, shirts, underwear etc.	0.8		846	clothing accessories, of textile fabrics	0.1
842	women's or girls' coats, capes, jackets, suits, trousers, dresses, skirts, underwear, etc.	0.6		884	optical goods, n.e.s.	0.1
845	articles of apparel, of textile fabrics, whether or not knitted or crocheted, n.e.s.	0.6		897	jewellery	0.1
851	footwear	0.3		831	trunks, suitcases, vanity cases, binocular and camera cases, handbags, wallets, etc.	0.1
821	furniture and parts	0.2		812	sanitary, plumbing and heating fixtures and fittings, n.e.s.	0.1
893	articles, n.e.s. of plastics	0.2		891	arms and ammunition	0.0
	High IITBi				High IITBi	
				931	special transactions and commodities not classified according to kind	64.3

1990			2012		
SITC	Description	IITBi	SITC	Description	IITBi
	High IITBi			**High IITBi**	
061	Sugars, Molasses, And Honey	75.6	017	Meat And Edible Meat Offal, Prepared Or Preserved N.E.S.	89.0
	Low IITBi			**Low IITBi**	
058	Fruit Preserved, And Fruit Preparations	1.0	062	Sugar Confectionery	0.6
	High IITBi			**High IITBi**	
			111	Nonalcoholic Beverages, N.E.S.	61.8
	Low IITBi			**Low IITBi**	
112	Alcoholic Beverages	22.8	112	Alcoholic Beverages	8.0
	High IITBi			**High IITBi**	
278	Crude Minerals, N.E.S.	60.3	287	Ores And Concentrates Of Base Metals, N.E.S.	93
	Low IITBi			**Low IITBi**	
291	Crude Animal Materials, N.E.S.	29.7	278	Crude Minerals, N.E.S.	43
287	Ores And Concentrates Of Base Metals, N.E.S.	12.4	248	Wood, Simply Worked And Railway Sleepers Of Wood	4
292	Crude Vegetable Materials, N.E.S.	8.2	268	Wool And Other Animal Hair (Including Wool Tops)	2
211	Hides And Skins (Except Furskins), Raw	5.0	246	Wood In Chips Or Particles And Wood Waste	2
268	Wool And Other Animal Hair (Including Wool Tops)	2.9	285	Aluminum Ores And Concentrates (Including Alumina)	1
247	wood in the rough or roughly squared	0.4	291	Crude Animal Materials, N.E.S.	1
	High IITBi			**High IITBi**	
592	Starches, Inulin And Wheat Gluten; Albuminoidal Substances; Glues	51.3	532	Dyeing And Tanning Extracts, And Synthetic Tanning Materials	81
	Low IITBi			**Low IITBi**	
522	#N/A	44.4	598	Miscellaneous Chemical Products, N.E.S.	20
541	Medicinal And Pharmaceutical Products, Other Than Medicaments (Of Group 542)	17.9	542	Medicaments (Including Veterinary Medicaments)	18
554	Soap, Cleansing And Polishing Preparations	6.1	522	Inorganic Chemical Elements, Oxides And Halogen Salts	16
593	Explosives And Pyrotechnic Products	4.1	541	Medicinal And Pharmaceutical Products, Other Than Medicaments (Of Group 542)	13
575	Plastics, N.E.S., In Primary Forms	3.2	514	Nitrogen-Function Compounds	11
553	Perfumery, Cosmetics, Or Toilet Preparations, Excluding Soaps	2.3	523	Metallic Salts And Peroxysalts Of Inorganic Acids	8
	High IITBi			**High IITBi**	
693	Wire Products (Excluding Insulated Electrical Wiring) And Fencing Grills	85.3	613	Furskins, Tanned Or Dressed	72
	Low IITBi			**Low IITBi**	
611	Leather	8.3	664	Glass	29
651	Textile Yarn	7.5	655	Knitted Or Crocheted Fabrics	25
641	Paper And Paperboard	4.7	629	Articles Of Rubber, N.E.S.	18
699	Manufactures Of Base Metal, N.E.S.	3.6	651	Textile Yarn	12

Code	Description	Value	Code	Description	Value
653	Woven Fabrics Of Manmade Textile Materials	1.3	642	Paper And Paperboard, Cut To Size Or Shape, And Articles Of Paper Or Paperboard	11
642	Paper And Paperboard, Cut To Size Or Shape, And Articles Of Paper Or Paperboard	0.7	633	Cork Manufactures	10
695	Tools For Use In The Hand Or In Machines	0.5	652	Cotton Fabrics, Woven (Not Including Narrow Or Special Fabrics)	7
High IITBi			**High IITBi**		
724	Textile And Leather Machinery, And Parts Thereof, N.E.S.	94.9	718	Power Generating Machinery And Parts Thereof, N.E.S.	99
771	Electric Power Machinery	85.0	776	Thermionic, Cold Cathode Or Photocathode Valve	89
742	Pumps For Liquids	76.3	733	Machine Tools For Working Metal, Sintered Metal Carbides Or Cermets	72
741	Heating And Cooling Equipment	63.1	721	Agricultural Machinery (Excluding Tractors) And Parts Thereof	55
Low IITBi			**Low IITBi**		
772	Electrical Apparatus For Switching Or Protecting Electrical Circuits	44.1	772	Electrical Apparatus For Switching Or Protecting Electrical Circuits	19
721	Agricultural Machinery (Excluding Tractors) And Parts Thereof	36.4	784	Parts And Accessories For Tractors, Motor Cars And Other Motor Vehicles	18
745	Nonelectrical Machinery, Tools And Mechanical Apparatus	30.2	716	Rotating Electric Plant And Parts Thereof, N.E.S.	13
751	Office Machines	14.4	793	Ships, Boats And Floating Structures	11
759	Parts And Accessories	8.9	749	Nonelectric Parts And Accessories Of Machinery, N.E.S.	8
728	Machinery And Equipment Specialized For Particular Industries	7.3	771	Electric Power Machinery	7
778	Electrical Machinery And Apparatus, N.E.S.	3.6	743	Pumps (Not For Liquids), Air Or Gas Compressors And Fans	6
752	Automatic Data Processing Machines And Units Thereof	1.4	725	Paper Mill And Pulp Mill Machinery, Paper Cutting Machines	6
High IITBi			**High IITBi**		
			872	Instruments And Appliances	89
Low IITBi			**Low IITBi**		
874	Measuring, Checking, Analysing and Controlling Instruments and Apparatus, N.E.S.	35.8	874	Measuring, Checking, Analysing And Controlling Instruments And Apparatus, N.E.S.	25
873	Meters And Counters, N.E.S.	26.7	896	Works Of Art, Collectors' Pieces And Antiques	24
898	Musical Instruments	5.4	873	Meters And Counters, N.E.S.	19
844	Women'S Or Girls' Coats, Capes, Jackets, Suits, Trousers, Dresses, Underwear, Etc.	3.7	891	Arms And Ammunition	14
892	Printed Matter	0.9	893	Articles, N.E.S. Of Plastics	4

841	Men'S Or Boys' Coats, Jackets, Suits, Trousers, Shirts, Underwear Etc.	0.8	848	Articles Of Apparel And Clothing Accessories	2
842	Women'S Or Girls' Coats, Capes, Jackets, Suits, Trousers, Dresses, Skirts, Underwear, Etc.	0.6	899	Miscellaneous Manufactured Articles, N.E.S.	2
845	Articles Of Apparel, Of Textile Fabrics, Whether Or Not Knitted Or Crocheted, N.E.S.	0.6	821	Furniture And Parts	2
851	Footwear	0.3	813	Lighting Fixtures And Fittings, N.E.S.	1
821	Furniture And Parts	0.2	892	Printed Matter	1
893	Articles, N.E.S. Of Plastics	0.2	898	Musical Instruments	1
High IITBi			**High IITBi**		
			931	Special Transactions And Commodities Not Classified According To Kind	63

Source: UN Comtrade Database. Authors Calculation

Table 4 (d). Intra-Industry Trade of New Zealand with China 1990–2011
SITC 3-Digit Summary Values of IIT indices;
Grubel-Lloyd and Aquino IIT Indicators

Year	IITB	IITC	IITQ
1990	3.60	4.06	3.68
1991	1.95	1.95	1.95
1992	2.77	3.12	2.70
1993	3.29	3.92	3.38
1994	3.71	3.99	3.83
1995	3.58	4.32	3.86
1996	4.89	6.09	5.31
1997	4.03	5.52	4.56
1998	3.70	4.93	3.85
1999	4.76	7.83	5.21
2000	3.91	5.99	4.21
2001	6.47	8.52	6.31
2002	6.18	8.71	6.64
2003	6.48	9.97	6.98
2004	6.17	9.07	6.43
2005	6.63	11.85	7.72
2006	6.91	12.62	7.85
2007	6.65	12.84	7.99
2008	6.42	11.33	7.60
2009	5.42	7.29	5.97
2010	5.41	6.50	5.64
2011	5.89	6.61	5.94
2012	5.79	6.16	5.86

Source: UN Comtrade Database. Author's calculation

Notes

IITBi = Grubel and Lloyd Single Industry IIT Index/ indicator

IITB = Grubel Lloyd average IIT Index/ indicator

IITC = Grubel Lloyd trade imbalance adjusted IIT Index/ Indicator

IITQ = Aquino trade imbalance adjusted IIT Index/ indicator.

Table 5. NZ-China IIT by Industry in Selected Years

2012: NZ-China IIT by Industry 3-Digit Summary Values

Industry		Av-IITB	Av-IITC	Av-IITQ
0	Food and Live Animals	3.8	43.1	18.4
1	Beverage and Tobacco	11.5	38.6	25.9
2	Crude materials inedible except fuels	1.8	32.6	13.2
3	Mineral Fuels Lubricants and related materials	0.0	0.0	0.0
4	Animal and Vegetable Oils and fats	2.8	22.3	12.2
5	Chemicals	8.0	15.0	12.4
6	Manufactured Goods Classified chiefly by materials	10.2	67.8	23.8
7	Machinery and Transport equipment	6.8	99.9	26.7
8	Miscellaneous Manufactured Articles	2.3	100.0	29.4
9	Commodities and Transactions not classified	63.2	100.0	100.0

2009: NZ-China IIT by Industry 3-Digit Summary Values

Industry		Av-IITB	Av-IITC	Av-IITQ
0	Food and Live Animals	5.7	35.9	26.3
1	Beverage and Tobacco	4.8	12.2	9.7
2	Crude materials inedible except fuels	2.9	42.2	12.1
4	Animal and Vegetable Oils and fats	1.8	23.5	21.8
5	Chemicals	9.4	15.2	12.1
6	Manufactured Goods Classified chiefly by materials	11.7	51.2	18.8
7	Machinery and Transport equipment	5.7	94.9	26.8
8	Miscellaneous Manufactured Articles	1.9	99.9	35.5
9	Commodities and Transactions not classified	32.4	100.0	100.0

2006: NZ-China IIT by Industry 3-Digit Summary Values

Industry		Av-IITB	Av-IITC	Av-IITQ
0	Food and Live Animals	14.08	49.23	25.09
1	Beverage and Tobacco	18.98	22.48	21.24
2	Crude materials inedible except fuels	8.51	80.78	27.27
3	Mineral Fuels Lubricants and related materials	12.57	100.00	100.00
4	Animal and Vegetable Oils and fats	0.11	2.01	1.06
5	Chemicals	12.27	25.95	19.06
6	Manufactured Goods Classified chiefly by materials	14.89	51.71	18.56
7	Machinery and Transport equipment	7.88	92.79	28.87
8	Miscellaneous Manufactured Articles	0.57	100.00	44.97
9	Commodities and Transactions not classified	27.25	100.00	100.00

2004 NZ-China IIT by Industry 3-Digit Summary Values

Industry		Av-IITB	Av-IITC	Av-IITQ
0	Food and Live Animals	12.21	60.60	19.44
1	Beverage and Tobacco	35.26	53.56	26.38
2	Crude materials inedible except fuels	7.11	71.76	23.71
4	Animal and Vegetable Oils and fats	0.03	2.19	0.46
5	Chemicals	10.12	27.52	19.77
6	Manufactured Goods Classified chiefly by materials	12.21	32.45	13.48
7	Machinery and Transport equipment	8.93	41.54	18.56
8	Miscellaneous Manufactured Articles	0.74	100.00	32.78

2000 NZ-China IIT by Industry 3-Digit Summary Values

Industry		Av-IITB	Av-IITC	Av-IITQ
0	Food and Live Animals	20.15	50.67	23.52
1	Beverage and Tobacco	85.27	100.00	93.91
2	Crude materials inedible except fuels	6.68	24.87	11.44
5	Chemicals	7.69	7.84	7.73
6	Manufactured Goods Classified chiefly by materials	6.58	9.92	6.39
7	Machinery and Transport equipment	13.31	94.71	37.90
8	Miscellaneous Manufactured Articles	0.48	98.52	28.96

1990 NZ-China IIT by Industry 3-Digit Summary Values

Industry		Av-IITB	Av-IITC	Av-IITQ
0	Food and Live Animals	15.66	77.65	16.99
1	Beverage and Tobacco	23.73	100.00	100.00
2	Crude materials inedible except fuels	5.78	62.36	28.94
5	Chemicals	31.24	40.13	37.78
6	Manufactured Goods Classified chiefly by materials	15.93	25.00	15.63
7	Machinery and Transport equipment	42.48	46.42	40.16
8	Miscellaneous Manufactured Articles	1.08	50.00	22.89

Source

UN Comtrade Database. Author's calculations.

**Table 6. Exports (XII) and Imports intensity Indexes (MII) of NZ
to Australia, China, Japan and the United States**

Year	Export Intensity (XII)				Import Intensity (MII)			
	Australia	China	Japan	United States	Australia	China	Japan	United States
1980	11.2	2.9	1.7	1.0	15.3	0.7	11.8	11.6
1981	10.8	2.0	1.8	0.9	16.4	0.6	15.1	15.7
1982	9.3	1.9	1.8	1.0	15.2	0.6	14.4	12.8
1983	10.9	1.7	2.1	0.9	15.9	0.5	15.0	12.9
1984	11.4	1.7	2.1	0.8	15.5	0.5	15.8	11.8
1985	12.1	1.1	2.2	0.8	14.2	0.7	16.8	13.2
1986	12.7	1.7	2.4	0.9	14.7	0.6	19.0	15.8
1987	13.1	1.5	2.7	0.9	18.4	0.9	16.9	14.1
1988	13.5	2.4	2.7	0.8	18.1	1.0	14.3	13.9
1989	13.0	1.0	2.6	0.8	16.5	0.9	14.6	12.9
1990	14.8	0.6	2.3	0.9	17.4	1.0	13.3	15.4
1991	16.0	0.9	2.4	0.9	18.3	1.6	13.0	13.9
1992	15.8	1.0	2.6	0.9	18.5	2.3	12.9	17.2
1993	16.1	0.7	2.3	0.7	18.6	2.6	14.1	15.7
1994	16.5	1.0	2.4	0.7	19.2	2.9	13.7	17.1
1995	16.5	1.0	2.5	0.7	20.6	3.3	13.3	17.9
1996	16.0	1.0	2.3	0.6	21.2	3.3	12.5	14.6
1997	16.2	1.1	2.4	0.7	21.9	4.0	10.3	15.6
1998	17.2	1.1	2.6	0.8	21.0	4.8	10.9	18.3
1999	17.5	0.9	2.3	0.8	24.1	5.3	12.4	16.8
2000	17.8	0.9	2.4	0.8	22.1	6.2	11.2	17.3
2001	17.8	1.0	2.3	0.8	21.1	6.7	10.6	15.5
2002	17.4	1.0	2.2	0.8	21.7	7.9	11.8	13.4
2003	17.9	0.9	2.2	0.9	23.5	9.5	12.4	12.5
2004	17.2	0.9	2.3	0.9	23.6	10.3	11.8	12.0
2005	17.5	0.8	2.2	0.9	20.6	10.7	10.9	10.9
2006	17.2	0.8	2.2	0.8	20.1	12.1	9.0	11.6
2007	17.9	0.8	2.1	0.8	20.2	13.1	9.3	9.5
2008	18.1	0.8	1.8	0.8	15.6	11.4	7.1	8.2
2009	16.7	1.2	1.6	0.8	14.8	12.1	5.8	8.4
2010	16.5	1.2	1.7	0.7	12.7	11.2	5.2	7.4
2011	15.5	1.3	1.5	0.7	10.4	10.5	4.1	6.8
2012	14.0	1.5	1.5	0.7	10.5	11.3	4.5	6.5