**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

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## 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 |
| *Sources*IMF World Economic Outlook Database (April 2013) and IMF Direction of Trade and Statistics Yearbooks, various issues. Author’s calculation. |

 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’.Horizontalintra-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. Verticalintra-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 (*TIIij,*) for both exports and imports is calculated using the following formulas:

$XII\_{ij}=(X\_{ij}/X\_{i})/[M\_{j}/(M\_{w}-M\_{i})] MII\_{ij}=(M\_{ij}/M\_{i})/[X\_{j}/(X\_{w}-X\_{i})]$ (1a, 1b)

where:

*Xij* = country *i* exports to country *j Mij* = country *i imports* to country *j*

*Xi* = total exports of country i *Mi* = total imports of country *i*

*Mj* = total imports of country *j Xj* = total exports of country *j*

*Mw* = total world imports *Xw* = total world exports

*XIIij*  = export intensity index *MIIij* = import intensity index

 *Xij/Xi,* 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. *Mj/(Mw-Mi),* 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 (*XIIij*)*.* Conversely, a country with diverse markets that is not reliant on any one country for their imports will have low trade intensity (*XIIij*)*.* 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:

  (2)

where:

*aij* = exports of country *i* (NZ) to partner *j* (China)
*aji =* 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:

  (3)

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

  (4)

By further substitution,

  (5)

Since a country cannot export to itself,

  (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]](#footnote-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 (IITBi), 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:

 $IITB\_{i}=\frac{(X\_{i}+M\_{i})-\left|X\_{i}-M\_{i}\right|}{X\_{i}+M\_{i}}×100$ (7)

where *Xi* and *Mi* 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 *IITBi*, the weight being the share of each industry in the country's total trade. The Grubel-Lloyd summary measure is therefore:

  (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. IITBi 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 IITBi 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):

  (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:

   (10)

 The derived values for exports (*Xie*) and imports (*Mie*) are applied to the Grubel-Lloyd measures in equations (3) and (4) to arrive at the corresponding measures of IITQi at the industry level and IITQ for total trade. The Aquino measure is represented by the following equation:

  (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

 *Sources:* IMF Direction of Trade and Statistics Yearbooks, various Issues. Author’s calculations.

 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**

 *Source:* UN Comtrade Database. Author’s calculations.

 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  |
| 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 Containing Cocoa, N.E.S. | 30  | 263  | 1477  | 1740  | -1214  |
| 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  |
| 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  |
| 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**  |

*Source*

UN Comtrade Database. Author’s calculations.

**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  |
| 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*

IITB*i* = 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 |

*Source*

IMF Direction of Trade Statistics, various issues. Author’s estimates.

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. [↑](#footnote-ref-1)