The Export Growth and Revealed Comparative Advantage of the New Zealand Kiwifruit Industry

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Abstract

This paper investigates the growth of New Zealand's Kiwifruit production and exports between 1981 and 2011. It analyses the industry's history, current status, and its future prospects and challenges. It includes a statistical analysis of the development of the industry. Export volumes by market are reported for the relevant period. Revealed comparative advantage methodology is used to determine whether New Zealand has a comparative advantage in Kiwifruit. Econometric analysis is employed to identify the key determinants of Kiwifruit exports. The analysis shows that New Zealand Kiwifruit has been an export success during the last three decades. This success has been accompanied by fluctuations and challenges characteristic of many markets. The estimates of revealed comparative advantage demonstrate that New Zealand has very high degree of comparative advantage in Kiwifruit. Empirical analysis suggests that domestic and trading partners' incomes, market size and seasonality are key determinants of Kiwifruit exports.

Keywords: Kiwifruit, Zespri, Exports, Revealed Comparative Advantage, Horticulture

1. Introduction

In the 30 years from 1981 to 2011 the New Zealand Kiwifruit industry developed from a marginal activity to a major export industry. By the 1990s, Kiwifruit was being sold to multiple markets that included Western Europe, North America and Asia. Subsequently the growth has continued as the commercialisation of a new variety provided new opportunities.

This paper examines the evolution of New Zealand's Kiwifruit industry over time. It discusses the determinants of Kiwifruit export growth and the major challenges that confront the industry, particularly in the export market. The revealed comparative advantage methodology developed by Balassa (1965) is used to establish whether New Zealand has comparative advantage in Kiwifruit production and export. Finally, using selected hypotheses drawn from trade and international business theories, regression analysis is used to identify the key determinants of New Zealand Kiwifruit exports.

2. The Beginning of the Kiwifruit Industry in New Zealand

Kiwifruit is a high-quality fruit known for its taste and health attributes. Sliced Kiwifruit has long been used as dessert fruit. In many markets Kiwifruit is now consumed both as a breakfast fruit and a lunch fruit. It has been suggested that the fruit's health characteristics have been critical in its acceptance by consumers.

Understanding the contemporary kiwifruit industry in New Zealand requires consideration of its origins.

The New Zealand Kiwifruit industry originated from a historic import from China. The Kiwifruit is native to the Yangtze River valley of northern China and Zhejiang Province on the coast of Eastern China. The Kiwifruit seeds

were originally brought to New Zealand from China in 1904 by Isabel Fraser, a missionary and educator. Subsequently in 1925, Hayward Wright, a New Zealand horticulturalist, produced the well-known green Kiwifruit which came to be known as the Hayward variety (Zespri, 2007). Initially there was only private production and consumption. However, in the 1940s the first commercial orchard started producing Kiwifruit for the domestic market and small domestic markets emerged. This was followed by an initial exploration of the international market.

The number of exporting firms rose from four in 1964 to fourteen in 1974 (Zwart and Moore, 1990). By 1976 the exported crop exceeded local consumption for the first time. It was during this period that the name 'Kiwifruit' started being used primarily as an attempt to minimise duties in export marketing. The name change was initiated by an American importer, Norman Sondag of the Ziel Company in San Francisco. Turners and Growers, who were leading exporters of the day, had sent him the berries under the novel name 'melonettes', which for his business was even worse than calling them 'Chinese gooseberries', as both melons and berries attracted high import tariffs at the time. So at a company meeting in Sir Harvey Turner's office in June 1959, Jack Turner came up with the name 'kiwifruit' which was accepted. So, in 1959 the name Chinese gooseberry was changed becoming kiwifruit, after New Zealand's national bird, the kiwi – small, brown and furry, like the fruit (Wikipedia, 2007).

In the late 1970s, research was undertaken seeking to develop new varieties of Kiwifruit. Progress was slow but there was some success with the *Zespri*® *Gold* production moving from limited trials to exports commencing in 1998. The industry thus evolved from a one-fruit industry to a two-fruit industry.

Figure 1 shows that export value has increased over time, although there were fluctuations and a period of stagnation in the 1990s. Significant export growth occurred between 1981 and 1990, when the volume increased from 10 million to more than 60 million trays. Strong growth also occurred between 2003 and 2008.

Despite the importance of this industry to the New Zealand economy there has little economic analysis of it performance and success. Government and industry analysts have written numerous reports with many of them focusing on current production and market conditions and the legislation and regulations governing export of kiwifruit. Yerex and Haines, (1983) wrote a history of the industry and Kilgour et. al. (2009) presented industry and commentator perceptions of success factors underpinning the industry's growth.

3. Global Development of Kiwifruit Markets

New Zealand Kiwifruit production should be considered in its global context. Kiwifruit is consumed around the world with the majority of production consumed after export from its country of production.

The import demand for Kiwifruit remains strong in the EU with the strongest growth being registered in Italy and Spain. As incomes in many countries increased, imports (especially from new emerging markets) also increased, particularly in Asia. In Asia, growth in Kiwifruit sales has been particularly strong in South Korea, Taiwan and Hong Kong. Strong growth was also experienced in Japan, New Zealand's oldest Asian market, in the years 2004, 2005 and in 2009.   However, heavy reliance on a few major markets is expected to remain, with the top ten importing countries consistently taking in almost 70 per cent of total world imports. (see Table 1). The OECD countries accounted for about 85% of world imports of Kiwifruit (World Kiwifruit Review, 2006, 2010 and 2011).

World Kiwifruit production is concentrated amongst a few countries, with the top ten producing countries contributing over 95 per cent of world production. Table 2 shows the volume and ranking of the major producing countries since 1993. Traditionally, Italy, New Zealand and Chile have been the largest exporters and have also dominated world Kiwifruit production. However, China joined these three countries as a major producer since 2005 (World Kiwifruit Review, 2011).

All countries in the top ten in 2008-2011 (with the exception of France, Japan and the United States) increased production compared to the 2003-2005 period. Portugal dropped out of the top ten despite modest increases in production, while Iran has increased production to move up to 8th in 2008-2011.

World demand for Kiwifruit increased significantly between 1984 and 2009. World imports of Kiwifruit averaged only 16 300 metric tonnes in 1982-1984, but exceeded 1.1 million metric tonnes in 2009. However, imports of three competing tropical fruits - fresh mangoes, fresh papaya and fresh pineapples - increased even more dramatically over the period. (World Kiwifruit Review, 2006, 2010, 2011). For instance US imports of pineapples have increased 6.5 times, mango and guava 2.4 times, and papaya 4.7 times, between1995 and 2010, and together they now total 1.4 million MT. In value terms the import of these three fruits increased from USD 300 million in 1995 to over USD 1.3 billion in 2010. Similarly in the EU, pineapples imports have increased 3.7 times, mangoes and guava 4.2 times and papaya 3.4 times in the same period and now total nearly 1.8 million MT. The import values increased from 353 to 1298 million Euros, (World Kiwifruit Review, 2011, pp. 20-21).

4. New Zealand Kiwifruit Exports

New Zealand's world market share in Kiwifruit sales has varied over time. With an estimated share of total world exports in 1990 of over three-quarters, New Zealand had a dominant market position. However, by 2000 this share had fallen to under a third due to rapid production growth elsewhere. In 2009, this value was approximately 31% (World Kiwifruit Review, 2006, 2011).

Kiwifruit exports earned $987 million dollars in 2009, making up over 30 percent of New Zealand's total horticultural export earnings (Statistics New Zealand 2011). This value comes from the production of 360,000 MT of (World Kiwifruit Reviw, 2011) which were supplied by 2,754 Kiwifruit growers (Zespri, 2011).

This significant growth in export value is not common for horticultural products where there is significant competition from other fruits as well as competition from alternative suppliers of the same fruit.

Table 3 reports export growth in five market destinations for New Zealand's Kiwifruit exports for the period 1984-2009. It is clear from this table that Europe and Asia has been the key to industry growth. The European market has sustained itself (although declined in relative importance). Key Asian markets, (Japan, China, Hong Kong, South Korea and Taiwan), have in aggregate grown significantly as shown in Figure 2. The United States market showed minimal annual growth and seems to have just survived. It should be noted that the poor performance in the American market was largely as a result of New Zealand - United States trade dispute in the early 1990's. Californian growers successfully brought an anti-dumping case against New Zealand exports. The case resulted from a late diversion of a shipment of NZ kiwifruit to Japan which was redirected to California and which adversely impacted market prices. This displaced NZ Kiwifruuit for nearly a decade. The Australian market has progressed, but is still relatively small and other markets consist of low demand nations which have provided fluctuating revenues. Given the importance of Asian markets further comment is appropriate.

Although New Zealand kiwifruit is exported to many countries in Asia, only five are important. Figure 2 shows the declining relative importance of Japan (although it is still dominant) as China, Hong Kong, Korea and Taiwan have emerged as important markets. Figure 3 shows that Taiwan remains an important export market, but is now only the third biggest market in Asia due to the dramatic rise of Korea since 2000. Hong Kong and China have also emerged as significant markets, but each still comprises only about 4 percent of New Zealand kiwifruit exports to key Asian markets.

It is also important to consider the speed as well as the fluctuations of market growth, as shown in Figure 3. During the last decade, China experienced declines during 2001, 2002 and 2003, as did Hong Kong in 1998, 1999, 2002 and 2003, Japan in 2001, 2003 and 2005, Korea in 1998 and 2005, and Taiwan in 1998, 1998, 2003 and 2004. By contrast, China experienced more than 50 percent growth in 1998, 2005 and 2006, as did Hong Kong in 2000 and 2001, Japan in 2004, and Korea in 2001 and 2004. These fluctuations provide challenges and opportunities to kiwifruit exporters as shown in Figure 3.

5. Challenges

Kiwifruit exporting from New Zealand has faced numerous challenges during the last three decades. New Zealand exporters complement the production from the northern hemisphere as a result of the different seasons and weather conditions in the two hemispheres. Providing the product to consumers every week of the year is a continuing challenge for the producers. New Zealand Kiwifruit competes with another significant southern producer, Chile, which has lower costs but is arguably not able to provide the same level of quality. This seems to be the case as higher prices are paid for New Zealand kiwifruit vis a vis Chilean kiwifruit in Asian and other markets. (World Kiwifruit Review 2011, p. 43)

China has also emerged as a significant new player growing the market within China, competing against other Kiwifruit exporters to China and potentially becomes an exporter to other markets.

New Zealand has faced the challenge of introducing a new product to the international market - Zespri gold in 1998. Although the product had consumer appeal, it required different handling systems. The marketing challenge was for the new variety to add international market share rather than cannibalise (adversely affect) the market for green Kiwifruit and for the new product to support the Zespri brand. New Zealand was relatively successful in this. Evidence suggests that both varieties have grown simultaneously. During the period 2001 – 2010 gold Kiwifruit exports nearly tripled from 7.3 million trays to 22.4 million trays while at the same time green Kiwifruit exports increased from 56.5 million trays to 79.8 million trays.

World trade in Kiwifruit faces various trade barriers, tariff as well as non-tariff. One of the most widely used trade policy measures falls under the classification "Sanitary and Phytosanitary" (SPS) negotiated by the World Trade Organization (WTO) at Uruguay round of General Agreement on Tariffs and Trade (GATT) and entered into force

with the establishment of WTO in 1995. This important agreement elaborates rules of GATT 1994, particularly provisions of article XX (b) and intends to help governments implement appropriate measures to protect their domestic animal and plant health and food safety (World Trade Organisation 2005). The 14 articles of the WTO's SPS agreement help prevent substandard Kiwifruits (as well as other products) from entering markets that are conscious of health, environmental and safety considerations.

The significance of international trade rules cannot be understated given the challenges that New Zealand has experienced in the USA market and the potential impact of the trade agreements that Chile is negotiating with various countries. In addition, a Free Trade Agreement between New Zealand and China (signed in 2008) is expected to have a positive impact on NZ exports to the China market and perhaps some imports into the NZ market depending on consumers demand, tastes and preferences.

6. Revealed Comparative Advantage of New Zealand Kiwifruit

Analysts, governments and businesses are concerned about future export prospects. One window on future prospects is Revealed Comparative Advantage (RCA).

Balassa (1965) developed an approach to measure revealed comparative advantage. He assumed that a country's comparative advantage is revealed in its exports to the world market. As such, RCA of exports is represented by a country's commodity composition of exports compared with that of the world. The RCA index is defined as:

$$RCA_{ki} = (X_{ki} / X_{ti}) / (X_{kw} / X_{tw})$$

Where; X_{ki} represents the value of country *i*'s exports of commodity *k*

X_{ti} represents the value of country *i*'s total exports

X_{kw} represents the value of world exports of commodity *k*

X_{tw} represents the value of total world exports (of all commodities)

The RCA of country *i* in the trade of product *k* is measured by that item's share in country's exports relative to its share in the world exports. The first term in the equation represents commodity *k's* share in country *i's* exports, while the second term represents commodity *k's* share in world exports.

If the value of the RCA index is less than unity (indicating that the share of commodity *k* in *i's* exports is less than the corresponding world share), it means that country *i* does not have revealed comparative advantage in commodity *k*. Similarly, if the value of this index exceeds unity, it implies that the country has revealed comparative advantage in that product.

Export data is measured in US dollars and have been taken from UN COMTRADE, the United Nations Commodity trade website. Global exports of Kiwifruit for each year are proxied by the sum of the value of exports from the top ten countries. This should be relatively accurate, as these countries account for 98% of global Kiwifruit production (World Kiwifruit Review 2006 and 2010).

The ten countries in Table 4 represent the major exporters of Kiwifruit. Of these ten countries, six exhibit an RCA value equal to or greater than one in the production of Kiwifruit. New Zealand has a very high RCA in Kiwifruit, with values ranging from 206 in 2000 to 151 in 2005 and increased to 183 in 2007. The 2009 RCA value of 178 falls roughly midway in this range. This reflects the fact that Kiwifruit makes up a significant share of New Zealand's total exports and that the majority of New Zealand's Kiwifruit production is exported. Chile, Greece, and Italy also have strong RCAs in Kiwifruit production and exports, with values in 2009 of 19, 17 and 8, respectively. The strength of the RCA in Kiwifruit has dropped for Chile since 2000 while Greece remained relatively constant prior to 2009. Values for France and Portugal hover around unity, indicating no real advantage or disadvantage. Values for Iran fluctuated highly between 2000 and 2005. Kiwifruit and total export data are unavailable for 2007 and 2009. RCA values for the US, Japan and China are well below one, indicating that although these countries are significant producers of Kiwifruit, it makes up only a small proportion of their national exports.

In summary, the analysis above indicates that the five major Kiwifruit exporters have a RCA in the production and export of Kiwifruit. Some of the smaller countries such as New Zealand, Chile and Greece have the highest levels of RCA for Kiwifruit while larger nations such as the US, China and to some extent Japan have a very low RCA. This is consistent with larger countries often being more diversified economies.

7. Determinants of Demand for Kiwifruit

Testing of selected country-specific hypotheses can provide insight regarding New Zealand Kiwifruit markets. The first two of these hypotheses are based on Linder's demand similarity model (Linder, 1961).

According to Linder (1961), high income generates demand for high quality differentiated products. The argument is that the higher the income, the larger will be the demand for highly quality goods, leading to higher production; large scale production in turn tends to lower per unit costs of production, which generates economies of scale. Higher income tends to increase consumption, but not equally for every product. Demand for inferior and normal goods is expected to decline or increase respectively as a proportion of income. Conversely, the demand for luxury or "super" goods is expected to go up more proportionally as income rises.

Kiwifruit is a product that displays characteristics of a luxury good, so demand is expected to increase with income growth in trading partners. In addition, developed and emerging countries' populations are rapidly increasing their consumption of nutritious food as they modify their eating habits from cheaper products like cereals to products with higher nutritional value such as meat, seafood, vegetables, and fruits such as Kiwifruit.

Testing of country-specific and industry specific hypotheses can provide insight regarding New Zealand Kiwifruit markets. The first two of these hypotheses are based on Linder's (1961) demand and income similarity based model. *Hypothesis 1* states that Kiwifruit export *(KWFX)* is an increasing function of the average level of development (ALD_{ij}) of the trading partners, measured as the average per capita incomes of the two countries, *i,* home/reporting country and *j,* trading partner.

$$\delta KWFX_{ij} / \delta ALD_{ij} > 0$$

Hypothesis 2 states that Kiwifruit export *(KWFX)* is an increasing function of the average market size (AMS_{ij}) of the trading partners, measured by average GDP of trading partners, or average population of trading partners.

$$\delta KWFX_{ij} / \delta AMS_{ij} > 0$$

Statistics New Zealand data identified 43 trading partners to which New Zealand exported Kiwifruit in 2008. For the purposes of this model, New Zealand is the home/exporting country and each of the partner countries provides an observation in the regressions. The dependent variable used in each case is the value of New Zealand's exports to each importing trading partner in 2008 US dollars. These values are based on 2008 Statistics New Zealand export values to trading partners, converted into US dollars. Population is taken from the World Development Indicators database and is measured in thousands. GDP, which is also sourced from the World Development Indicators database, is measured in millions of US dollars. Distance is also included in the models, as this is a common variable used in econometric 'gravity' models. Distance is measured in kilometres and is the straight-line distance between the capital in the home country and the capital of the partner country. The model is estimated in logarithmic form of the same variables to determine if a better fit can be found. The following four regressions are used:

$$(1)\ X(Kiwifruit)_{ij} = a + \beta_1 log(Average\ GDP_{ij}) + \beta_2 log(Distance)_{ij} + \beta_3 FTA_{ij}$$

$$(2)\ X(Kiwifruit)_{ij} = a + \beta_1 log(Average\ Pop_{ij}) + \beta_2 log(Distance)_{ij} + \beta_3 FTA_{ij}$$

$$(3)\ X(Kiwifruit)_{ij} = a + \beta_1 log(Average\ GDP_{ij}/Pop_{ij}) + \beta_2 log(Distance)_{ij} + \beta_3 FTA_{ij}$$

$$(4)\ X(Kiwifruit)_{ij} = a\ + \beta_1 log(Average\ GDP_{ij}) + \beta_2 log(Average\ GDP_{ij}/Pop_{ij}) +$$
$$\beta_3 log(Distance)_{ij} + \beta_4 FTA_{ij}.$$

The log of the distance between the trading partners is included in each regression, as well as a dummy variable which indicates whether there is a free trade agreement (FTA) between the countries. The results are presented in Table 5.

In regression 1, the log of average GDP of the two trading partners has a strong statistically significant and positive effect on the level of exports of Kiwifruit from New Zealand: an increase in average GDP of one percent tends to increase the export of Kiwifruit by 1.18%. The distance and FTA variables also have statistically significant and positive coefficients at the 1% and 5% levels respectively.

Regression 2 uses log population as an explanatory variable. This results in a positive and strong statistically significant coefficient of 0.69. Therefore, an increase in population of 1% tends to increase the export of Kiwifruit by 0.69%. The FTA and distance variables remain statistically significant and positive. The explanatory power of regression 1 is higher than that of regression 2: 49% compared to 38%.

Regression 3 tests the significance of log average GDP per capita as an explanatory variable. This regression shows a strong positive coefficient 3.32, meaning that an increase in GDP per capita of 1% tends to increase the export of Kiwifruit by 3.32%.

Regression 4 uses the log of average GDP per capita as well as average GDP, distance and the FTA dummy variable. Average GDP per capita is not found to be statistically significant in this regression but all other variables are. The regression has a moderately strong explanatory power, with an adjusted r^2 value of 51%.

The results from the log-log regressions carried out above tend to support both hypotheses one and two. The average level of development does seem to have a positive effect on the export of Kiwifruit between New Zealand and its trading partners. However, when both market size and level of development variables are included together in the same regression, the average level of development variable loses its statistical significance. This may suggest a degree of multi-collinearity of the variables. The average market size variable is statistically significant in regressions (1) and (2) from Table 5 and appears to be stronger than development indicators such as GDP per capita as a factor in Kiwifruit exports from New Zealand. The positive and statistically significant coefficient on the dummy variable for free trade agreements is unsurprising, given that the removal of trade barriers in theory should foster higher levels of trade. However, the positive and statistically significant coefficient on distance was somewhat of a surprise. In the context of a gravity model of trade, distance is normally expected to have a negative impact on trade. The coefficients on distance in Table 5 may be explained partially by the fact that the dataset was limited solely to New Zealand exports. The impact from several countries importing a large share of New Zealand's Kiwifruit exports may have influenced this result. However, further regressions using a wider dataset produced either positive or statistically insignificant coefficients for distance. This suggests that distance may not be a significant determinant with regard to the export of luxury goods such as Kiwifruit.

8. Conclusion

During the last three decades, New Zealand's Kiwifruit industry has established itself as a significant exporter. This success has been accompanied by fluctuations and challenges characteristic of many markets. We particularly note the following opportunities and threats to New Zealand's Kiwifruit industry, some of which may need further study:

• The significance of Chile as a southern hemisphere competitor.

• The continuing importance of the Japanese and European markets.

• The growing importance of China, Hong Kong, Korea and Taiwan as market and the

• The emerging Indian market is expected to provide further opportunity for Kiwifruit exporters

RCA estimates and analysis suggest continuing success for the New Zealand Kiwifruit industry but highlights the importance of Chile and Greece who also have significant revealed competitive advantage. However, the RCA analysis does not identify the importance of China where Kiwifruit production growth has been large but still remains a small part of the total economy. It seems China's domestic market is large so there is no significant export growth and share in the world market.

Empirical analysis highlights the importance of per capita income growth, the value of Free Trade Agreements and distance as important determinants of export prospects. The suggest the importance of New Zealand Kiwifruit exporting remaining focused on high income markets with additional efforts being focused on emerging high income markets of significant size such as Brazil, Russia and India.

Distance does not usually show up positive in such models but does so in this case primarily because it is an indication of seasonality. New Zealand Kiwifruit is most valuable in the Northern Hemisphere when there are no fresh local Kiwifruit. An alternative explanation is that it reflects New Zealand's 'clean and green' profile.

In interpreting the results of this study, it is important to be cognizant of product life cycles. The parameters estimated are likely to be sensitive to the emergence (or non-emergence) of new varieties of Kiwifruit and other fresh fruits. Likewise, disease and political variables have the potential to impact future New Zealand production and production from other countries. Changes in incomes and consumer preferences continue to be important, especially in Europe and East Asia. The New Zealand China FTA may also have positive impact on NZ Kiwifruit market share in China's market.

However the industry and other analysts need to be aware that past patterns do not necessarily continue into the future. Exogenous shocks such as disease can potentially have devastating effects. The *e. coli* poisonings in Europe during June 2011 severely disrupted horticultural trade. Currently the outbreak of *Pseudomonas syringae pv. Actinidiae* (PSA) in NZ Kiwifruit orchards has generated considerable industry anxiety as efforts are made to control its spread and reduce its impact.

This study highlights the value of future research modeling Kiwifruit production and trade patterns under different economic growth scenarios in individual countries. Such modeling if associated with different assumptions about demand elasticities for Kiwifruit and cross–elasticities with other fruit could provide significant guidance for exporters seeking to determine optimal export volumes and placements. It also provides a platform for consideration of dynamic comparative advantage along with the traditional RCA measures used in this paper.

Acknowledgement

References

Kilgour, M., Saunders, C., Scrimgeour, F., & Zellman, E. (2008). The key elements of success and failure in the New Zealand kiwifruit industry. (Research report No. 311). Canterbury, New Zealand: Kilgour, Agribusiness and Economic Research Unit of Lincoln University.

Balassa, B. (1965). Trade liberalization and "revealed" comparative advantage. *The Manchester School of Economics and Social Studies, 33,* 99-123. http://dx.doi.org/10.1111/j.1467-9957.1965.tb00050.x

Belrose Inc. (2011). *World Kiwifruit Review.* Pullman, WA.

Belrose Inc. (2010). *World Kiwifruit Review.* Pullman, WA.

Belrose Inc. (2006). *World Kiwifruit Review*. Pullman, WA.

Kiwifruit. (2007). In *Wikipedia online*. Retrieved from http://www.zesprikiwi.com/kiwi_name.htm

Linder, S. B. (1961). *An essay on trade and transformation*. New York, NY: John Wily & Sons.

Statistics New Zealand. (2010). *Infoshare database*. Retrieved from http://www.stats.govt.nz/infoshare/

United Nations Statistics Division. (2010). *COMTRADE Database*. Retrieved from http://comtrade.un.org/pb/readmeITSY2010VolI.aspx

World Trade Organisation. (2005). *Sanitary and phytosanitary measures*. Retrieved from http://www.wto.org/English/traop_e/sps_e/sps_e.htm

Yerex, D., & Haines, W. (1983). *The kiwifruit story.* Masterton, New Zealand: Agricultural Publishing Associates.

Zespri Group Limited. (2006). *Annual Report.* (2005-2006).

Zespri New Zealand Kiwifruit. (2007). Retrieved from http://www.zespri.com

Zwart, T., & Moore, W. (1990). Marketing and Processing. In Sandrey, R., & Reynolds, R. (Eds.), *Farming without subsidies: The New Zealand experience*. Wellington, New Zealand: G.P. Books.

Table 1. Top Ten Kiwifruit Importing Countries 2009

Country	Volume(mt)
Spain	137,615
Belgium	133,193
Germany	120,104
Netherlands	65,142
Russian Federation	64,910
France	63,134
Japan	58,501
Italy	54,747
USA	53,550
United Kingdom	37,055
Top Ten Importing Countries	787,951
World	1,189,930
Top Ten (% of world imports)	**66%**

Source: UN COMTRADE Database

Table 2. Top Ten Kiwifruit Producing Countries

Rank	Country	Volume (mt)
1993 - 1995		
1	Italy	322 730
2	New Zealand	224 000
3	Chile	125 333
4	France	77 570
5	Japan	51 267
6	Greece	41 681
7	United States	38 213
8	China	23 167
9	Portugal	9 394
10	South Korea	8 787
2003 - 2005		
1	Italy	401 622
2	China	341 000
3	New Zealand	303 000
4	Chile	151 667
5	France	76 157
6	Greece	50 000
7	Japan	38 100
8	United States	28 335
9	Iran	20 333
10	South Korea	12 000
2008 – 2011		
1	China	491 667
2	Italy	429 885
3	New Zealand	385 049
4	Chile	186 667
5	Greece	79 433
6	France	66 890
7	Japan	37 467
8	Iran	30 000
9	United States	25 371
10	South Korea	15 833

Source: Anon. (2006, 2010 and 2011)

Table 3. NZ Kiwifruit Export Growth 1984 to 2009

Partner market	Increase in value (USDm)	Average annual growth (%)
Europe	248.5	8.2
Key Asian markets	286.1	11.4
United States market	15.0	4.5
Australian market	18.2	8.8
Other markets	14.2	9.6
Total	**582.0**	**8.2**

Source: Authors' analysis of Statistics NZ data

Table 4. Revealed Comparative Advantage (RCA) – Index Values for Kiwifruit

Country	RCA (2000)	RCA (2005)	RCA (2007)	RCA (2009)
New Zealand	205.8	150.9	183.3	178.2
Chile	35.3	20.4	17.3	18.7
Greece	14.1	11.4	12.1	17.4
Italy	7.5	5.5	7.0	7.8
France	1.0	0.7	0.8	0.7
Iran	1.0	23.3	N/A	N/A
Portugal	0.2	0.5	0.7	0.6
United States	0.2	0.1	0.2	0.1
China	0.0	0.0	0.0	0.0
Japan	-	0.0	0.0	0.0

Source: Data from UN COMTRADE Database. RCA values are authors' estimates

Table 5. Kiwifruit Model Estimation Results

Dependent Variable: log (Export of Kiwifruit from NZ, 2008 USD)

Regressor	(1)	(2)	(3)	(4)
Log(Av. GDP$_{ij}$)	1.18***			0.97***
	(4.09)			(3.12)
Log(Av. Pop$_{ij}$)		0.69**		
		(2.68)		
Log(Av. GDP/Pop$_{ij}$)			3.32***	1.81
			(2.87)	(1.57)
Log(Distance)	1.71***	2.02***	2.00***	1.51**
	(2.76)	(2.98)	(2.98)	(2.42)
FTA (dummy)	2.29**	2.43**	2.68**	2.19**
	(2.18)	(2.09)	(2.38)	(2.12)
Intercept	-17.53***	-12.36**	-38.88***	-31.26***
	(-3.17)	(-2.10)	(-3.33)	(-3.04)
Summary Statistics				
Adjusted r^2	0.49	0.38	0.39	0.51
n	43	43	43	43

Note: * indicates level of statistical significance. * = 10%, ** = 5%, *** = 1%.
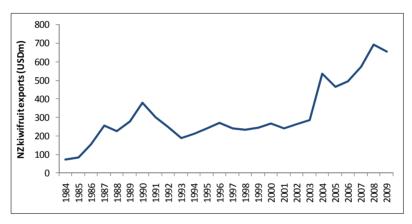

Figure 1. New Zealand Kiwifruit Exports to World

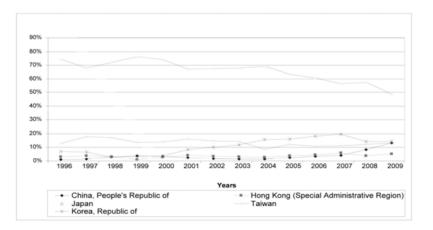*Source: Statistics NZ INFOS database*

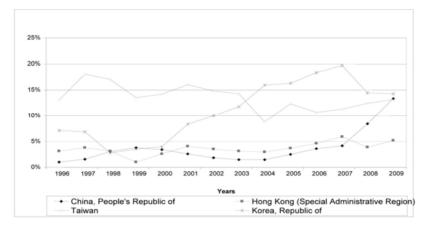Figure 2. NZ Kiwifruit Exports to Key Asian Markets, Percent of Exports to Asia

Figure 3. NZ Kiwifruit Exports to Key Asian Markets, Percent of Kiwifruit Exports