FORECASTING NEW ZEALAND's PATTERNS OF COMPARATIVE ADVANTAGE

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Abstract

One of the major themes in New Zealand economic development thinking has been concerned with the balance of trade, industry and infrastructure policy that should accompany entrepreneurial activity. A new era of export development began in the early 1980's with the introduction of a 'more market' approach. However, this did not mean the end of economic development thinking. There were concerns at the time that the non-food manufacturing sector would be decimated by the large reductions in rates of protection. This concern with the breadth of non-food manufacturing has run deep in the New Zealand psyche since the economy opened to trade early in the 19th century. New Zealand's economic development thinking has focused on attempting to transform a very small economy, without major natural resource endowments, and distant from large foreign markets, into a nation with broadly based opportunities. This thinking was multifaceted in terms of the dispersion of output, employment, entrepreneurial and commercial opportunities. Economic development also had an international trade aim that might be glibly referred to as trying to move beyond the tyranny of distance and ruminants. The rapidly changing global trade environment over the last 20 years provides an opportunity to examine changing patterns of comparative advantage in `free trade' New Zealand. The case of New Zealand is interesting because it has always had economic features that differ significantly from most OECD countries – a very small domestic market, a manufacturing sector which shows some "hollowed-out" characteristics, distant from major importers, a very strong comparative advantage in agriculture and recent comprehensive unilateral trade policy reforms. This paper reviews some trade aspects of economic development with a view to identifying promising export developments.

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Introduction

New Zealand economic development thinking and action has always been a variant of a private-public partnership. One of the major themes in this thinking has been concerned with the balance of trade, industry and infrastructure policy that should accompany entrepreneurial activity. It has been a constrained optimisation problem subject to the economy performing at least as well as the United Kingdom (or more recently, Australia), Hawke and Lattimore (1999). The development of the market for New Zealand livestock products in England in the 1880s was a private sector affair with state support. Non-food manufacturing development from 1938-84, based on import protection, export incentives, 'think big' investments and regulatory policy, was more state directed.

A new era of export development began in the early 1980s. It may be dated from 1983 with the signing of ANZCERTA, or 1984 with the major economic reform programme, or 1993 when the last import licenses were removed, or 1997 when the 25% MFN tariff on motor vehicles was abolished (one of the larger, important remaining tariffs at the time).

The 'more market' approach introduced in 1984, however, did not mean the end of economic development thinking. There were concerns at the time that the non-food manufacturing sector would be decimated by the large reductions in nominal protection rates. This concern with the breadth of non-food manufacturing has run deep in the New Zealand psyche since the economy opened to trade early in the 19th century. New Zealand's economic development thinking has focused on attempting to transform a very small economy, without major natural resource endowments, and distant from large foreign markets, into a nation with broadly based opportunities and, as mentioned above, always subject to living standards being at least as high as those in economies with which New Zealanders were familiar. This thinking was multifaceted in terms of the dispersion of output, employment, entrepreneurial and commercial opportunities. Economic development also had an international trade aim that might be glibly referred to as trying to move beyond the tyranny of distance and ruminants.

This paper reviews some trade aspects of economic development over the last twenty years with a view to identifying promising export developments. It is a particularly interesting period to review New Zealand trade performance because the global trade environment itself has changed so dramatically in recent decades as globalisation processes have tended to accelerate since the Second World War.

This paper is organised as follows. The second section focuses on the background to non-food manufacturing development in New Zealand. Section three reviews some of the literature relevant to the paper. Section four examines changes in the global trade environment followed by a review of selected aspects of New Zealand export development. The final section is devoted to a summary and conclusions.

Figure 1. GDP per capita, 1990 international Geary-Khamis dollars
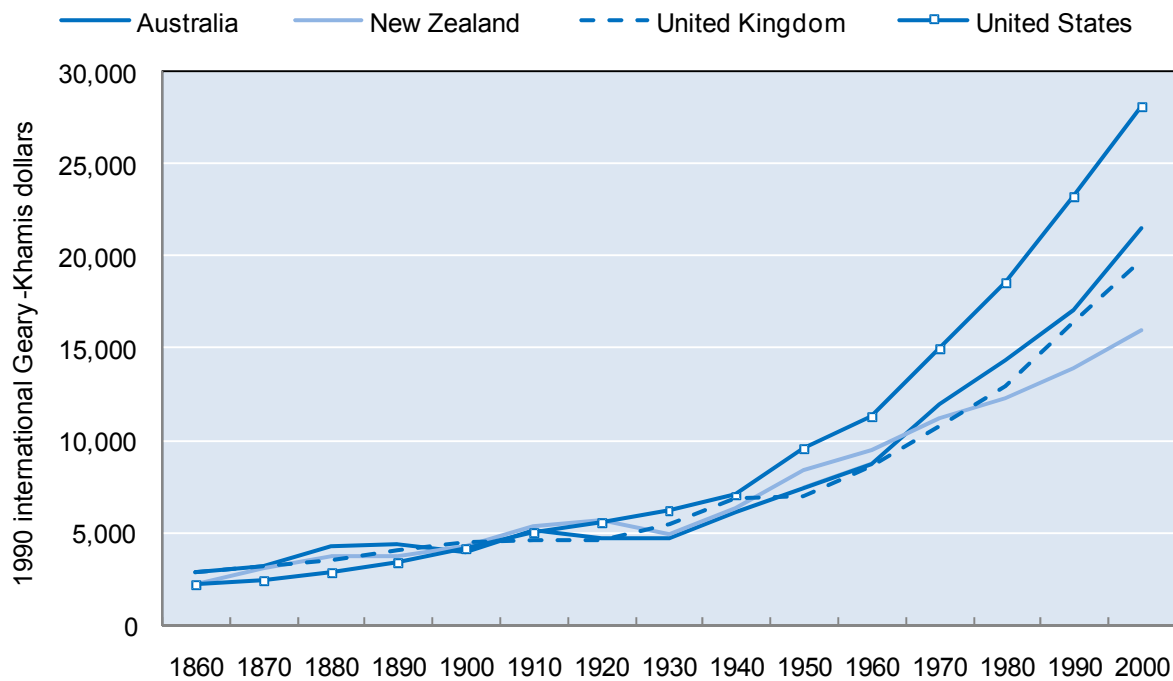
Source: *Maddison, Angus (2003).*

Background

From colonial times in the early part of the 19th century, New Zealand's exports tended to be concentrated on "exploitables" (native timber, gold, kauri gum and flax). However, there were pockets of vegetable and wheat production for export even as the first major sustainable export industry began – wool production from sheep. With wool, the major export growth pole of the economy settled in agriculture and while there were ancillary farm machinery exports, development thinking became focused on the issue raised earlier – how to create diversity of economic opportunity to underpin a developed society?

In 1882, ship-borne refrigeration technology was introduced into New Zealand and this reinforced the need to think about economic development issues. On the demand side, South-Eastern England had become the residence of a burgeoning middle class with a pent-up demand for 'proper' meat and dairy products (as opposed to offal and lard). New Zealand's natural grazing land on the East coast was already devoted to sheep production for wool. It was relatively easy to modify the sheep breeds towards meat production. It was also reasonably easy to expand the domestically oriented dairy herd and add butter production to the dairy company menu. Refrigeration created the vital link to the large group of higher income consumers and the New Zealand economy was transformed – but not in the direction of development as we describe it. However, it did help relax the relative income constraint with the UK. Early efforts to measure relative living standards tended to favour New Zealand over the UK, but this may have been reversed in the 1880's. However, according to Maddison (2003), real per capita incomes in New Zealand passed the UK soon after 1900, Figure 1.

Political thinking focused on modest import protection for the non-food manufacturing sector from the late 19th century in the form of tariffs; tariffs that were partially offset by agricultural input subsidies. After the First World War world markets underwent periods of volatility and rising concerns with the monopsonistic

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threats of the international meat trusts. In this environment, policy thinking focused not just on development issues but protection from market forces operating in global agricultural and food markets. There were failed attempts to regulate the food export trade in New Zealand in the 1920's. In 1935 the first labour government was elected and when it had to respond to a balance of payments problem in 1938 these two strands of economic policy thinking (manufacturing development and farm export market regulation) were brought together into a trade and industry policy strategy. Comprehensive import licensing and high tariffs were introduced on the importable side and the agricultural sector was compensated to a much lesser extent on the exportable side.

Table 1. Rates of Assistance, Tradable Sector

	NRA agric.	NRA non-agric.	RRA %
1955-59	1.8	21.3	-16.1
1960-64	1.8	24.0	-17.8
1965-69	1.9	34.3	-24.1
1970-74	5.0	30.0	-19.0
1975-79	14.4	21.7	-6.0
1980-84	20.2	20.3	-0.1
1985-89	15.2	16.6	-1.3
1990-94	3.0	10.8	-7.1
1995-99	2.1	6.5	-4.1
2000-03	2.2	3.7	-1.5

Note: The Relative Rate of Assistance, RRA = $100[(1+NRAag/100)/(1+NRAnonag/100)-1]$ where NRAag and NRAnonag are the average percentage nominal rates, NRA's, for the tradable parts of the agricultural and non-agricultural sectors, respectively.
Source: *Anderson et al (2007).*

This import substitution (IS) policy was continued through the Second World War. Like many other founding GATT members New Zealand sidestepped the 1947 GATT agreement. Over the period 1955-59 the relative rate of agricultural to non-agricultural assistance (RRA) was around minus 16%, Table 1. Agricultural and food exports were of the order of 80% of merchandise trade at the time so the implicit export tax was around 16%. Over the period 1955-74, the RRA rose slightly to average minus 20%. Tariff compensation programmes were gradually increased after 1945 (especially from 1964) but they were not large or extensive enough to significantly alter this wedge until the 1970s.

An initiative to use revaluation to rebalance exportables and nontradables was frustrated when the New Zealand economy 'hit the wall' in 1973 with Britain joining the EEC and the first oil shock. In an attempt to offset these events (or at least to buy time till oil prices fell as was favoured by international thinking about "recycling" petrodollars) the government instituted major agricultural and export subsidy programmes until 1984. These actions coupled with the trade policy liberalisation programme from 1984 reduced the RRA significantly so that the implicit export tax essentially disappeared. In recent years it has averaged around 1%.

The export tax did two things. It reduced exports relative to what they would have been and it skewed the composition of exports towards agricultural products up till the mid 1960's[2]. Agricultural products had the highest degree of comparative advantage and were accordingly less affected by the export tax. Once export subsidy programmes were introduced in the mid-1960's on non-agricultural products, the anti-export bias

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[2] The broad sectoral composition of exports was influenced not only by the trade policy balance but also by the market pressures underlying Engel's Law. Accordingly, it is being argued here that agricultural exports would have fallen faster than they did before the mid-1960's were it not for the IS programme.

was reduced and the share of agricultural products in total trade began to decline and reached a low of around 40% of merchandise trade. Not surprisingly, the proportion of agricultural exports recovered somewhat following the 1984 trade reform programme. It is currently back in the 50-60% range.

The non-food manufacturing sector did not fare well in the IS environment – generally speaking. Some industries like TCF actually began to shrink under high import protection rates in terms of both value added and employment. Productivity growth in many protected sectors was very low. However, there is anecdotal evidence that some of these industries or parts of industries were 'infants' who not only survived the trade reforms but have since flourished. We will explore the recent evidence to see if they can be identified in the export statistics.

As just mentioned, real per capita incomes in New Zealand rose above those of the UK early in the 20th century. Over the anti-globalisation period to the end of the Second World War, real per capita incomes in New Zealand, the UK, US and Australia matched each other, Figure 1. Around 1950, the US began to grow faster than the rest and around 1960, Australia too, accelerated ahead of New Zealand and the UK. The UK joined the EEC in 1973 and following the difficult decade of the 1970s (for New Zealand), real per capita incomes in the UK also rose consistently above those in New Zealand. In this recent environment, economic growth and underpinning export growth have assumed a higher policy priority on the relative income test. Low growth and struggling exports were two of the factors behind decisions to radically reform trade policy from the early 1980's and they continue to be important issues in many areas of government – research and development, the Economic Transformation agenda, export development and education policy, (Skilling, 2007).

Literature Review

New Zealand currently has low levels of import protection. Accordingly, the economy is intimately connected to world markets and the globalising processes impinging on them. Globalising processes may be viewed as the interaction of demand growth, technological advances, firm re-organisation (particularly for MNE's) and government policy action, Dicken (2003). This matrix of influences has been in play in the current period of globalisation since the Second World War. It was in the 1950s that the significance of intra-industry trade was recognised, and it was realised that the conventional picture of the exchange of food and raw materials for manufactures was no longer appropriate (although journalists and commentators have yet to fully catch up). Vernon (1966) was amongst the first to alert us to the rising importance of codified knowledge (via Arrow's learning by doing) and key skills as a platform for the product cycle, outsourcing, off shoring and franchising. Product cycles initially began with relatively simple products but soon progressed from sports shoes and fast-food menus to car and aircraft assembly and computer chip design. Just as important, codified knowledge together with specialised human skills have been able to make use of IT technology to transform firm and organisational systems for multi-national purposes. The importance of government policy support is particularly clear in the case of China. A very large enthusiastic workforce was made available to firms who were prepared to operate in the export zones of the Pearl River delta. MNE's were most welcome to apply. The rest is history.

The China phenomenon has focused minds on comparative advantage dynamics because the growth and diversity of tradable goods output in China has been so great that people can be forgiven for thinking that China is developing a comparative advantage in everything – from Christmas decorations to wide-bodied aircraft maintenance! The China phenomenon is an acceleration of production specialisation trends and is intensifying their impact within production processes relative to the exchange of products between economies. These off-shoring (out-sourcing, trading in tasks or product cycle) processes are guided by technological possibilities. The drivers are basically `learning by doing', either codified and embodied in manuals and menus, or embodied in experienced managers who are internationally mobile. Particular production stages can then be out-sourced or off-shored. The basic economic frameworks describing this

dynamic are those popularised by Coase (1937), Arrow (1960) and Vernon (1966). What began by Adidas off-shoring sport shoe assembly based on German components in South Korea has, of course, become more complex in recent decades - enabled by faster, higher quality communications.

The current equivalent of the Adidas metaphor might be – Intel contracts out the design of a new computer chip to a Swedish firm of engineers and then has the chips manufactured by a subsidiary in an export zone in Malaysia. The chips are imported by a Dell subsidiary in a Pearl River delta export zone. The resulting computers are marketed globally over the internet by Dell US with after sales service provided on contract by a Mumbai call centre. All FDI is protected by unilateral (mainly) or bilateral investment and tax agreements and no tariffs are paid as a result of unilateral (usually) trade policy adjustments, regional trade agreements (RTA's) or the WTO Information Technology Agreement (ITA)[3].

Figure 2. Striding towards the core of the network

Evolution of BRIICS centrality indices (1980 -2005)
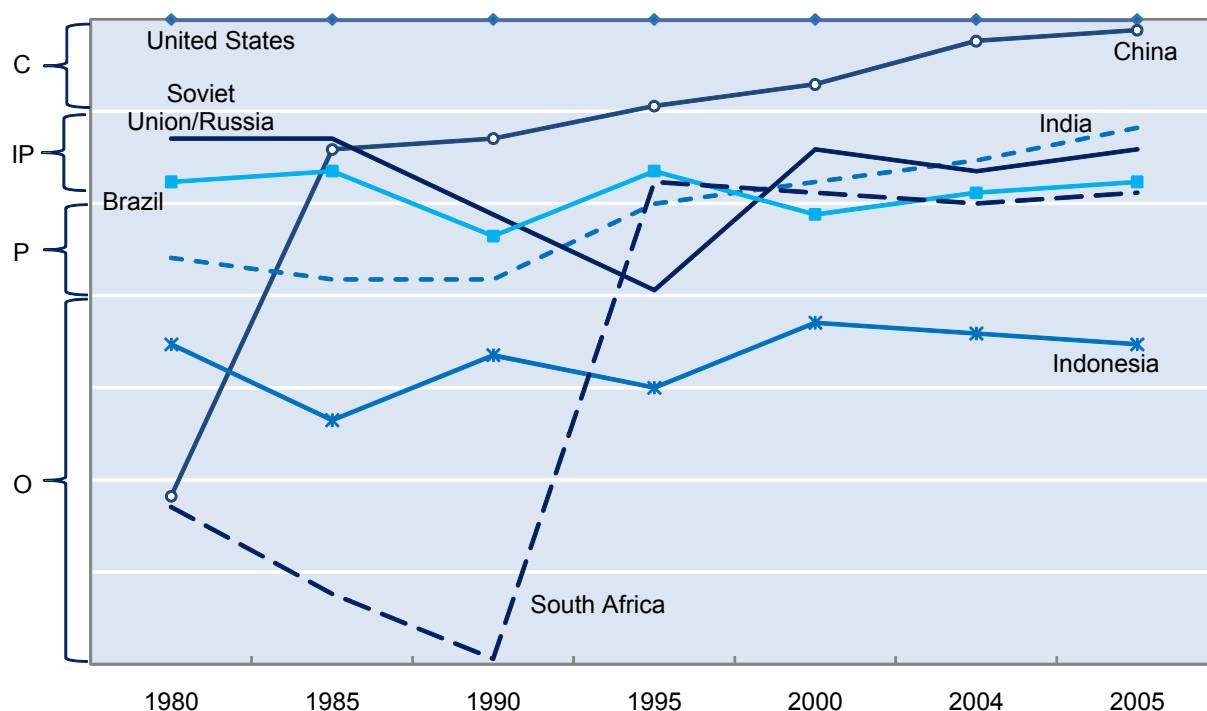
Source: Reyes, Garcia and Lattimore (2008).

The question of what slices of the supply chain of product X would move internationally, how they would be financed and where they would move to can then, in principle, be predicted by factor proportions theory, first mover advantages (strategic trade theory) and policy interventions. The most important factors to consider are those associated with human capital and its drivers because this factor is the major beneficiary.

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[3]   Thousands of bilateral investment agreements and hundreds of RTA's have been negotiated in recent decades.

Who gains and who loses from globalisation depends on what type of technology is developed[4], who develops and controls the technology and who receives the residual returns. Antras (2005) and Acemoglu (2003) have produced very interesting work in this area recently. The setting analysed is usually one in which OECD countries (the North) devote more resources to R&D and accordingly develop technological advances that are biased towards the use of abundant OECD capital and skilled labour. The intellectual property is often presumed to belong to Northern firms so that the North also will capture the residual returns.

These are particularly interesting questions in a New Zealand context because for over a century the central direction of New Zealand activity – whether banking, shipping, or agriculturally-based pharmaceutical and food manufacturing, has shifted overseas in a way which resembles the international discussion of "hollowing out"[5]. The strong import substitution policies from 1938-84 reinforced these effects.

New Zealand has wage/rental ratios that are more or less typical of the North so the question addressed here is, how can New Zealand firms and governments plan future trade capabilities in this global environment? Firms and governments have to make hiring, education, training, enterprise selection and research plans that will affect New Zealand's factor proportions in the future. These plans need to be based on assessments of the biases embedded in current and emerging technologies. In trade terms the assessments have to be made relative to other trading partners. These are not simple matters; they involve difficult forecasts. To quote Leamer's analogy on the subject, "is a computer a forklift or a microphone[6]?", Leamer (2007). In this vein Hausmann, Rodrik and others at the Kennedy School of Government have some interesting ideas on identifying `almost' firm-level comparative advantage traits using 6-digit trade data.

There is a long literature that has been concerned with the long term growth prospects of natural resource based exporters. This is related to the idea that countries with world market power may face declining terms of trade. In the extreme, immiserising growth could occur. Concerns with such possibilities have arisen in New Zealand from time to time but there is little evidence of declining terms of trade unless one happens to choose a commodity boom like 1950 as the beginning observation. Recent empirical work in this area has been conducted by Lederman and Maloney (2007). They have surveyed a number of natural resource based exporters and conclude that "natural resources are neither curse nor destiny". For example, they describe the extreme case of Finland which developed from primarily a forestry product exporter to an electronics exporter based on investment diversification by the same companies.

Global Trade Environment

Over the period 1996-2006, the nominal USD value of global merchandise exports grew by 120%. China's exports grew by 540% over the same period. High rates of trade growth were shared by a range of other emerging economies and trade growth in these economies has been accompanied by both high rates of economic growth and promising rates of poverty reduction. As Leamer (2007) expressed it cogently, "The globe is not shrinking, Economic activity is dispersing."

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[4]   Meaning, how the factor saving biases embedded in the technology suit particular economies.

[5]   Examples include the National Bank, directed from London, taking over the Bank of Otago, the Shaw Savill takeover of Union and the movement of Glaxo from Palmerston North to the UK.

[6]   He characterises a forklift as an example of a technology that tends to equalise differences between workers and a microphone as one that does not equalise people's singing abilities (at least, not in the opinion of consumers!)

The rapid insertion of larger emerging economies (India, China and South Africa, for example) into the architecture of the world trade network after 1978 is illustrated in Figure 2. The Figure presents a measure of the centrality[7] of some emerging economies in the world trade network for merchandise goods over the period 1980-2005. In 1980, after Deng Xiaoping took over leadership responsibilities in China, the economy was outside the periphery of the world trade network[8]. By 1995, China was within the 95th percentile on this index or what we call the core of the trade network – the traditional domain of the G3 economies. Similar improvements in the centrality of India and South Africa are also noticeable related to policy events.

The comparative advantage evidence for China points to a strong position in the assembly and exports of final consumer and capital goods, Athukorala (2007). China does not appear to have a comparative advantage in the design and manufacture of parts and components in its very large machinery and equipment industries. Given the size and diversity of the economy it undoubtedly has comparative advantages in a range of industries across the tradable sector that are relatively intensive in their use of unskilled labour. This will even include labour intensive agricultural products – for example, selected fruits, vegetables, fish and ornamental plants.

NZ has a moderate network ranking in the world trade architecture. It does have a *node degree*[9] around the middle of the OECD showing a good spread of trade especially in raw material exports. However, it is ranked generally in the 70th and 80th percentiles on *node intensity* and *clustering* (on a par with smaller OECD and middle income countries - with Finland, Greece, Slovak Republic and Iceland). However, it is ranked in the 92nd percentile on *centrality* to world trade chains in intermediate products. This ranking is at bottom of the OECD (on a par with Spain, Turkey, Canada and Switzerland but below China, Australia and the G3)

The view of world trade through selected groups of 6-digit products (HS6 of Comtrade) provides an opportunity to more closely relate changes in trade to market and firm level changes in innovation, strategy and performance, and in relation to government policy changes that are often implemented at this micro level (e.g. with trade policy settings). Hausmann and Rodrik (2003) have promoted this approach as a potentially effective predictive tool for identifying comparative advantage. This is because, at this level of disaggregation, countries with identical patterns of gross factor proportions (unskilled labour, agricultural land and capital ratios, for example) have quite different export product specialties. In part, this is due to difficulties in disaggregating factors of production finely enough, but it is also due to the impacts of past decisions by domestic and foreign firms to successfully specialise in particular products in particular global locations. Accordingly, micro trade categories might prove to be a valuable complement to factor proportions theory in understanding changes in comparative advantage.

There are approximately 6500 HS6 (6 digit) product codes. The top 25 export (import) products for individual countries are highly likely to comprise the set in which the country has a very high level of comparative advantage (disadvantage). Credence is given to this view by the fact that a surprisingly high proportion of world and country exports are encompassed by the top 25 HS6 products. It is conceivable however, that government support policy is an important driver of export supply and/or import demand.

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[7] Random Walk Betweenness Centrality – a measure of the number of world trade chains that a country is associated with, Reyes, Garcia and Lattimore (2008).

[8] Arbitrarily defined as below the 85th percentile of the index where the 100th percentile is defined as that of the highest ranking country (usually the US, Germany or Japan).

[9] Node degree, node strength and clustering are alternate measures of integration in the world trade network. Respectively, they measure the relative number of trading partners, the trade value of those connections and the presence of a country in triangular trade networks (completed triplets).

Nevertheless, it is likely that given the firm structure of the tradable industries, a product in the top 25 products would exhibit a comparative advantage without government support.

Table 2. World Merchandise Exports, 2006

Code	Product name	Value in billion USD	Rank	Percentage of trade
	Total Trade	**11042.4**		**100**
270900	Petroleum oils and oils obtained fr	527.9	1	4.8
271000	Petroleum oils, etc, (excl. crude);	401.5	2	3.6
854211	Monolithic integrated circuits, dig	203.8	3	1.8
847330	Parts and accessories of automatic	203.1	4	1.8
870323	Automobiles with reciprocating pist	200.4	5	1.8
300490	Other medicaments of mixed or unmix	186.2	6	1.7
852520	Transmission apparatus, for radiote	185.7	7	1.7
870324	Automobiles with reciprocating pist	125.4	8	1.1
271121	Natural gas in gaseous state	121.6	9	1.1
852990	Parts suitable for use solely or pr	97.8	10	0.9
870332	Automobiles with diesel engine disp	97.2	11	0.9
870899	Motor vehicle parts nes	95.2	12	0.9
854219	Monolithic integrated circuits, nes	90.0	13	0.8
880240	Aircraft nes of an unladen weight e	85.2	14	0.8
847120	Digital auto data process mach cntg	78.8	15	0.7
852810	Television receivers including vide	75.1	16	0.7
847192	Input or output units, whether or n	69.8	17	0.6
847193	Storage units, whether or not prese	59.9	18	0.5
870322	Automobiles with reciprocating pist	49.9	19	0.5
847191	Digital process units whether or no	46.1	20	0.4
870829	Parts and accessories of bodies nes	44.1	21	0.4
270112	Bituminous coal, not agglomerated	43.5	22	0.4
880330	Aircraft parts nes	43.4	23	0.4
740311	Copper cathodes and sections of cat	41.0	24	0.4
847989	Machines & mechanical appliances ne	40.5	25	0.4
	Sub-Total of the 25 first products			**29.1**

Source: Authors calculations

The top 25 HS6 products traded globally in 2006 encompass only a few markets and they comprised 29% of world merchandise exports (Table 2). They included:

- energy products (oil, gas and coal), 10% of world trade,

- consumer electronics goods and their components, 11%,

- pharmaceuticals, 2%,

- cars and components, 6%,

- aircraft components, 0.4%.

If focus is shifted to the top 50 HS6 products a number of additional markets come into view. Other key groupings include other minerals (diamonds, gold and copper), jewellery products, other machinery and equipment (ships, trucks, excavators and valves), plastic products and chemicals. No agricultural or food products are currently in this top 50 grouping.

If we look at the top 25 products in terms of percentage growth over the period 1996-2006, then the composition is quite different from the top value 2006 grouping. The fastest growing list includes many specialty metals and chemicals important in new technology products. However. agriculture and food products are not included in this list either.

The composition of world exports has changed over time with products entering and exiting the markets and with the dispersion of certain types of economic activity. Consumer electronics and pharmaceuticals have had a rising share of exports over the last decade while motor vehicles have had a declining share. Petrol powered motor vehicles have lost trade shares to diesel powered vehicles. Recycled materials are rising in importance. Oil exports appear to have become more diversified with investments in oil refineries, whether the country is endowed with crude oil supplies or not.

Table 3. China Value Exports 1996, Top 25 HS6

USD Thousands

Rank	Code	Product Name	1996	2006
		Total Trade	**151.0**	**968.9**
1	270900	Petroleum oils and oils obtained from crude	2.8	2.7
2	847192	Input or output units	2.0	25.7
3	640399	Footwear with rubber soles, leather uppers	1.9	5.6
4	640299	Footwear, nes, not covering the ankle	1.8	5.3
5	950390	Toys nes	1.7	2.9
6	847330	Parts and accessories of automatic DP	1.6	32.6
7	420310	Articles of apparel of leather	1.4	1.6
8	420212	Trunks, suit-cases	1.4	4.5
9	852731	Radio broad receivers	1.3	1.1
10	392690	Other articles of plastics, nes	1.3	3.5
11	610910	T-shirts, singlets and other vests,	1.1	5.1
12	847193	Storage units	1.1	11.9
13	620342	Men's or boys' trousers, breeches,	1.1	3.2
14	860900	Cargo containers	1.1	6.0
15	270112	Bituminous coal, not agglomerated	0.9	3.3
16	852290	Parts and accessories of apparatus, elect.	0.9	3.9
17	950341	Stuffed toys representing animals	0.9	1.6
18	890190	Cargo vessels nes and other vessels	0.9	5.1
19	851710	Telephone sets	0.9	2.3
20	240220	Cigarettes containing tobacco	0.8	0.2
21	841451	Fans: table,roof etc with a self-co	0.8	2.2
22	852990	Parts suitable for television sets	0.8	24.0
23	640419	Other footwear,with rubber or plast	0.8	1.9
24	620193	Men's or boys' anoraks, wind-cheate	0.8	2.1
25	711319	Art. of jewellery and pts thereof	0.8	1.8

Share of total exports (%)	20

The changing composition of trade is well illustrated by the China case. China's merchandise exports have grown at nearly five times the world average over the last ten years and now represent 9% of world exports. As previously mentioned, this has been achieved through very large increases in imports of parts and components and the increased availability of workers to the export sector.

China's top 25 HS6 exports comprised only 20% of its total exports in 1996, Table 3. This low figure points to high diversification of export products at the time (and more diversified than Germany's, for example). Only 8 products are associated with consumer electronics goods. There are a number of toys, textiles, clothing and footwear products (TCF) in the list, as well as cigarettes, ships, cargo containers and jewellery. China's export success from 1996 is illustrated by the change in the value of exports of particular items over the period to 2006. Exports of "parts and accessories of automatic data processing machines" rose from USD 1.6 billion to USD 32.6 billion ten years later. Exports of cigarettes fell from USD 832 million to USD 244 million in 2006.

Table 4. China, Top 25 Export Products, 2006

USD billion

Rank	Code	Product Name	1996	2006
	Total	**Total Trade**	**151.0**	**968.9**
1	847120	Digital auto data process mach cntg	0.1	43.4
2	852520	Transmission apparatus, for radiotelephones	0.5	35.8
3	847330	Parts and accessories of automatic	1.6	32.6
4	847192	Input or output units	2.0	25.7
5	852990	Parts suitable for televisions	0.8	24.0
6	854211	Monolithic integrated circuits, digital	0.1	18.4
7	901380	Optical devices, appliances	0.2	13.2
8	852810	Television receivers including videos	0.6	12.8
9	847193	Storage units	1.1	11.9
10	852190	Video recording or reproducing	0.1	7.7
11	853400	Printed circuits	0.5	7.6
12	271000	Petroleum oils, etc, (excl. crude)	0.0	7.0
13	852110	Video recording or reproducing	0.3	7.0
14	847191	Digital process units	0.3	6.9
15	850440	Static converters, nes	0.6	6.9
16	611030	Jerseys, pullovers, etc, of man-mad	0.7	6.0
17	860900	Cargo containers	1.1	6.0
18	851999	Sound reproducing apparatus	0.4	5.9
19	640399	Footwear with rubber	1.9	5.6
20	851740	Apparatus, for carrier-current line	0.0	5.4
21	640299	Footwear, nes, not covering the ankle	1.8	5.3
22	610910	T-shirts, singlets and other vests,	1.1	5.1
23	847199	Automatic data processing machines	0.1	5.1
24	950410	Video games	0.2	5.1

25	890190	Cargo vessels nes and other vessels	0.9	5.1
		Share of total exports (%)		**33**

The composition of China's exports in 2006 shows much change, Table 4. Eighteen of the top 25 are now consumer electronics products including 14 or the top 15 products. Ships and containers remain in the list but TCF products are reduced to 3. As before, the rate of value change of particular export products is very impressive. The top export product in 2006 (847120) earned USD 43 billion but only USD 137 million in 1996. "Apparatus for carrier current line" (851740) increased in export value from USD 11 million in 1996 to USD 5 billion in 2006. These changes in export composition also led to increased export concentration. In 2006, the top 25 products represented 33% of China's total merchandise exports (from 20% in 1996).

The top 25 import products in 2006 (not shown) also contain many parts and components associated with consumer electronics products. They represent nearly 50% of total Chinese merchandise imports. These patterns point to China in the classic "product cycle" role outlined by Vernon (1966).

Table 5. China's Star Performers in Electrical and Electronic Equipment, 2006

HS4	Product	Export share % M. Exports	Imports/exports %
8525	television cameras	4.6	14
8529	television parts	2.6	78
8528	television receivers	1.3	1
8534	printed circuits	0.8	114
8544	insulated wire	0.7	48
8541	diodes, transistors	0.6	214
8519	turntables	0.6	2
8539	filament lamps	0.3	52
8543	electrical mach. & appliances	0.2	119
8523	tapes	0.2	133
8531	bells, siren, alarms	0.2	31
8526	radar apparatus	0.1	26
8502	electric generators	0.1	77
8537	boards and panels	0.1	241
8503	parts, electrical equipment	0.1	137
8520	mag tape recorders	0.1	16
8515	laser/photon/plasma arc soldering	0.0	277
8514	ind/lab furnaces	0.0	759
8530	electric signalling equip.	0.0	517

It is highly likely that China currently has a very strong comparative advantage in electrical and electronic goods, HS chapter 85. In 2006, there were 19 HS4 sectors in China that were star performers, according to the International Trade Centre. Star performers are defined as an export product where world market growth is above average and the country's world market share is increasing. These 19 sectors then are very likely to represent the pinnacle of China's comparative adavantage set. They are listed in Table 5 together with the ratio of imports to exports in these parts, components and final products. China is not self-sufficient in nearly half of these 4 digit sectors – imports are greater than exports. This is further evidence in support of Athukorala (2007) that China is intimately coupled with global trade through importing raw

materials and components from OECD and non-OECD countries and exporting final goods everywhere but particularly to OECD countries. Furthermore, China appears to be self-suffcent (import/export ratio less than 100) in final products like televisions and television cameras and less than self-sufficient in parts and components like transistors and printed circuits. Furthermore, China tends to be less than self-sufficient in what appear to be the higher technology products – the last three items in Table 5 plus circuits and transistors. This coupled trade pattern was designed in this fashion by virtue of FDI. The Chinese Government reports that the EU alone has invested USD 54 billion in China and has subsidiaries of 27,000 EU firms active in China, Deming (2008).

Changing New Zealand Export Patterns

Now for something completely different in terms of scale – New Zealand's export performance.

The Distance Factor

Trade distance is a very important determinant of economic prosperity in terms of real per capita incomes. The distance elasticity in international trade is of the order of -0.9 (doubling the distance reduces trade by 90%), Leamer (2007). This effect, in turn, means that there is a clear negative effect of distance from world markets on GDP per capita. New Zealand is an outlier to this rule. Over a long period of time, New Zealand (and Australia) has counteracted the "tyranny of distance" to some degree. They sit visibly above Leamer's regression line. In recent years they have been joined by Singapore and China, Taipei, Leamer (2007). These are the only four countries where the rule does not seem to apply.

In New Zealand's case this is largely due to the influence of technology (refrigeration) in enabling the development of markets in meat and dairy products in the United Kingdom from 1882. Some other primary products contributed to this success including wool, but up till the 1960's the export mix was very narrowly based on these farm and food products. The agricultural export mix has broadened out both in terms of markets, products and degree of processing since that time but agricultural and food products remain around 50% of merchandise exports. The distance travelled is impressive. The major markets for New Zealand food and agricultural products are at least 8000km away in Asia and up to 18,000km away in NAFTA and the EU. Compare these distances with Leamer's contention that countries that are more than 5000km away from the global centre of economic activity are unlikely to have a 'decent' per capita GDP, Leamer (2007).

However, bucking the distance trend line has come at a cost. The OECD thinks that distance still matters to New Zealand in terms of lower GDP growth and lower labour productivity. They estimate that New Zealand's remoteness lowers its GDP by 10%, OECD (2008).
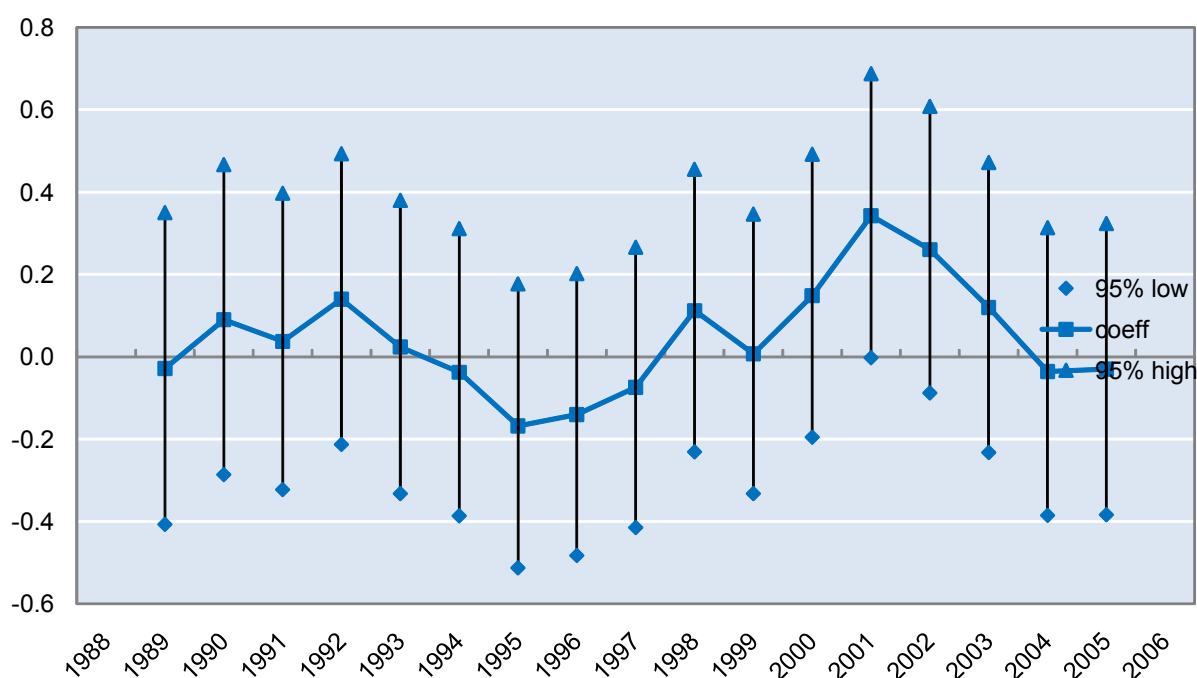
Figure 3. Year fixed effects
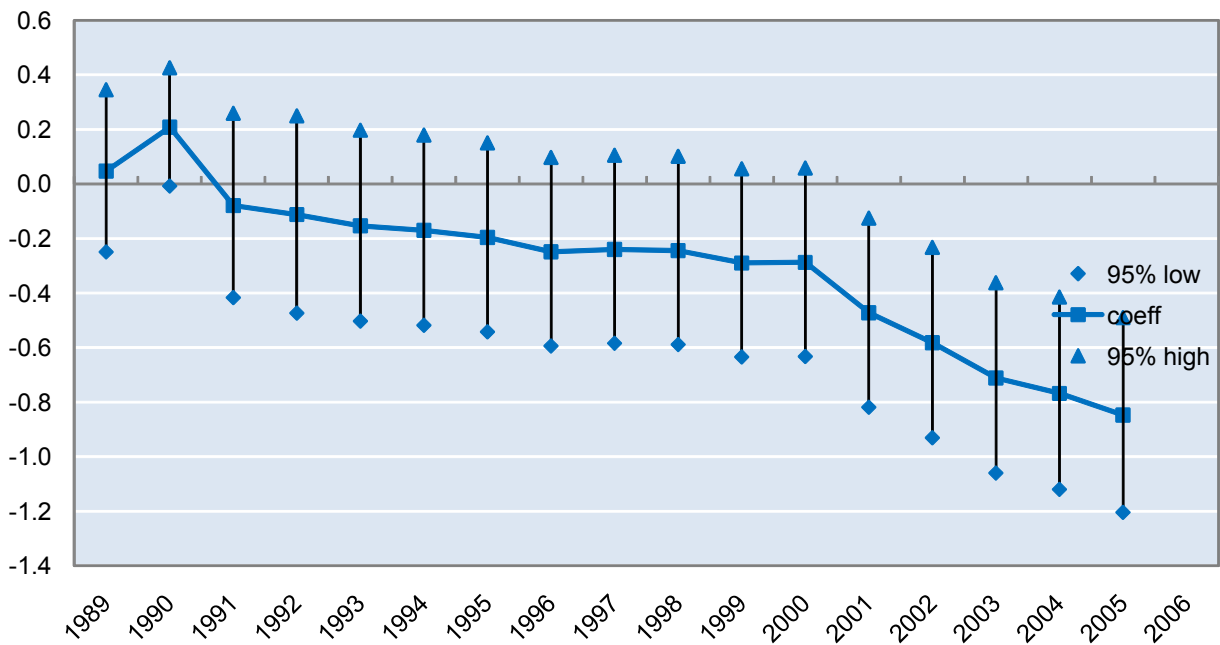
Source: Authors calculations

Figure 4. Time Varying Fixed Effects of BRIICS as Exporters
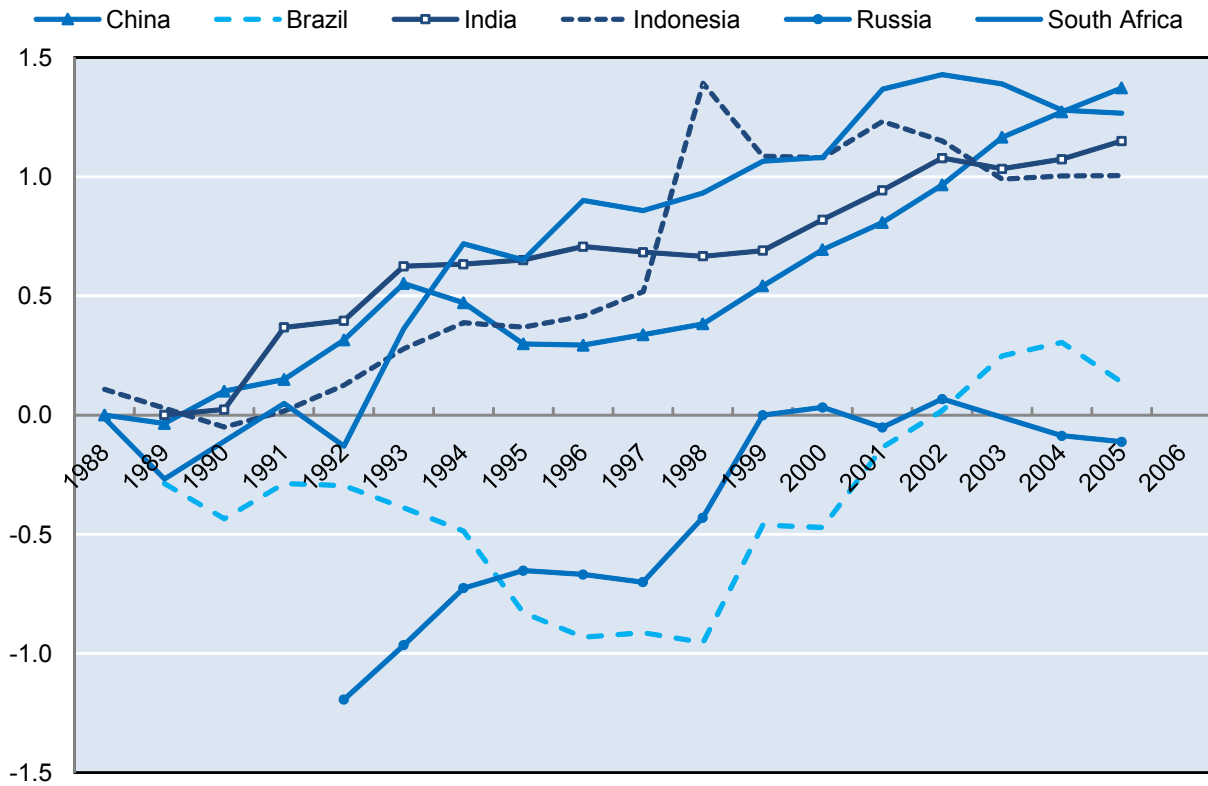
Source: Authors calculations

Figure 5. Country time-varying fixed effects for New Zealand as an exporter

Source: Authors calculations

Gravity Model Results

A gravity model has been developed to decompose New Zealand's bilateral and directional trade trends using a fixed effects model[10]. The analysis of the model here focuses on New Zealand's trade performance in relation to the other OECD countries, some emerging economies (the BRIICS, Brazil, Russia, India, Indonesia, China and South Africa) and a group of countries that trade intensively with the BRIICS[11]. The 46 country dataset generally encompasses the period 1985-2006. The model is estimated for total merchandise exports and imports and for capital goods, consumption goods, raw materials and intermediate goods as defined in the World Integrated Trade Solution (WITS) database.

We start from the version of the gravity model developed by Anderson & Van Wincoop (2003, 2004).

$$(1)\ \log(X_{ij}) = \log(Y_j) + \log(Y_i) - \log(Y) + (1-\sigma)\log(t_{ij}) - (1-\sigma)\log(P_j) - (1-\sigma)\log(\Pi_i) + e_{ij}$$

where time subscripts are excluded for the time being to save on notation and:
X_{ij} = exports from country i to country j
Y_i = GDP of country i
Y_j = GDP of country j
Y = aggregate (world) GDP
σ = elasticity of substitution
t_{ij} = trade costs facing exports from country i to country j

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[10]   The full derivation of the model is described in Kowalski (2008).

[11]   Chile, China- Hong Kong, Singapore, Thailand, China-Taipei, Malaysia, Phillipines, Venezuela, Israel, Columbia and Argentina.

$$P_j^{1-s} = \sum_{i=1}^{N} \Pi_i^{s-1} w_i t_{ij}^{1-s}$$

$$\Pi_i^{1-s} = \sum_{j=1}^{N} P_j^{s-1} w_j t_{ij}^{1-s}$$

ω_i = country i's expenditure share

ε_{ij} = random error term

While in principle it is possible to estimate (4) directly using non-linear methods (Anderson & Van Wincoop, 2003), it is far simpler to use exporter and importer fixed effects. Such an approach still produces consistent and unbiased estimates and this is the approach taken here, leading to equation (5) (with the deltas indicating fixed effects):

$$(2)\ \log\left(\frac{X_{ijt}}{Y_{it}Y_{jt}}\right) = m + \sum_{t=1}^{T} l_t + \sum_{i=1}^{N} d_i + \sum_{j=N+1}^{2N} d_j + \sum_{p=1}^{(N^2-N)/2} d_{ij} + \sum_{i=1}^{N} d_{it} + \sum_{j=N+1}^{2N} d_{jt} + e_{ijt}$$

Specified in this way, the model allows one to distinguish between various types of factors underlying trade. $\sum_{t=1}^{T} l_t$ terms isolate the time effects that are common to all trading country pairs. One example might be the worldwide dip in trading intensity observed after 9/11 or inventions on a global scale that affect trade such as for example the development of the internet.

$\sum_{i=1}^{N} d_i$ and $\sum_{j=N+1}^{2N} d_j$ pick up time-invariant fixed effects for exporting and importing countries, respectively.

$\sum_{p=1}^{(N^2-N)} d_{ij}$ are country pair-specific time-invariant fixed effects that account for factors such as the time-invariant bilateral trading costs (i.e. those associated with bilateral distance) or long-standing cultural or political ties.

$\sum_{i=1}^{N} d_{it}$ and $\sum_{j=N+1}^{2N} d_{jt}$ are the time-variant importer and exporter-specific fixed effects that pick up the GDP and country-specific price effects along with time-varying factors specific to an exporting or importing country such as opening up to trade on an MFN basis or country-specific reforms and policies. These types of fixed effects tell us how the propensity of a country to export or import has been evolving over time. Additionally, their magnitude relative to the magnitude of other time-invariant fixed effects may be indicative of the permanent and evolving factors underlying trading relations.

e_{ijt} is the error term which picks up all trade unexplained by the previously mentioned factors, including bilateral and time-varying trade policies and random factors affecting trade. In particular, none of the above specified fixed effects captures bilateral effects that vary over time.

Ordinary least squares with Huber/White heteroskedasticity adjusted standard errors are used to estimate (2) for total trade and a similar specification for the disaggregated commodities. The estimated fixed effect models explain over 90% of the variation in trade flows in adjusted terms.

The estimated fixed effects here are coefficients on binary variables. To take the example of exporter fixed effects - one out of forty six effects needs to be dropped. One of the years also needs to be dropped. We choose to drop a binary variable for the first year in the database (1988) and chose the United States to be the reference exporter and importer for fixed effects that are constant in time and for exporter and importer fixed effects that vary in time. This implies that the values of estimated fixed effects capture differences in the intercept relevative to the country that is dropped, that is the US. Because of the common benchmark, the results can be compared across all the non-reference countries in the sample.

Estimation results for terms that isolate the specific increases in US total trade $\hat{l}_t$ are presented graphically in Figure 3, including the range of the estimated 95% confidence intervals. In all figures that follow the scale of the vertical axis measures the logarithm of relative trade value. Missing fixed effects should be interpreted as those dropped from the estimation because of missing observations. The estimated US fixed effects in Figure 3 suggests that, despite the gently negative trend in point estimates, on average US's trade with its trading partners was not significantly different between 1988 and 2001. In 2001 a significant and gradually falling trend most likely reflecting the slowdown in US commerce following 11th September 2001 events.

As noted earlier $\hat{d}^E_{it}$ is the time-varying fixed effects for exporting countries that picks up the relative price effects along with time-varying factors specific to an exporting country such as the opening up to trade on an MFN basis or trade effects of country-specific reforms and policies (e.g. product and factor market reforms). Because differences in these fixed effects with respect to time are indicators of average change in relative exports or imports of a given country across all trading partners (net of the equivalent change for the US) they can be compared across countries as a measure of export *performance over time*. However, if we want to say something about the state of trade integration (relative to the US) this fixed effects has to be taken into account together with the time-invariant fixed effect $\hat{d}^E_i$ discussed above.

Figure 4 shows that some of the BRIICS have been expanding their total exports much faster than the US. More surprisingly, while China's estimated strong performance is in line with newspaper headlines concerning its increasing `domination' of world markets, countries like India, South Africa, Indonesia and Russia have been performing equally as well or even better.

Table 6. Summary of average annual change in exporter and importer fixed effects

	New Zealand	China	Brazil	India	Indonesia	Russia	South Africa
Exporter							
Total trade	0	8	3	7	7	11	6
Consumption goods	8	6	2	9	6	11	12
Raw materials	3	0	8	7	7	9	8
Capital goods	5	22	7	13	28	3	11
Intermediate goods	3	5	1	6	7	12	9
Importer							
Total trade	-1	1	6	3	-7	1	4
Consumption goods	-1	3	12	4	-2	-2	4
Raw materials	3	6	2	5	0	-4	1
Capital goods	1	9	9	7	-9	2	5
Intermediate goods	-1	-1	6	5	-6	8	0

Note: based on point estimates of fixed effects.
Source: Authors calculations based on estimation results.

New Zealand's performance as an exporter (total goods) is shown graphically in Figure 5. All the New Zealand results are given in numerical form in Table 6. These include the results as an exporter and as an importer for total trade and the four disaggregated sets of products. These latter results are expressed as the average percentage changes in fixed effects, relative to the US, over the period 1985-2006. The results for New Zealand are summarised as follows:

- It is important to view New Zealand's trade performance within the context of the OECD as a whole. Over the accelerated globalisation period of the last two decades, trade in goods and services relative to world GDP has grown from 39% in 1992 to 52% in 2005. Over the same period the OECD share of world trade in goods and services has fallen from 73% to 64%. However, the trade shares almost certainly do not reflect value added shares. The patterns of innovation ownership (IPR), product design, component and final goods manufacture probably favour OECD countries.

- For total trade, fixed effects for New Zealand as an exporter that vary over time are not significantly different from zero over the whole period. In other words, New Zealand has performed on a par with the US. There is also some evidence of a declining trend after 2001 that may be related to the current account position. New Zealand is not in the same league as the emerging economies shown in Figure 4 on this measure – but then almost nobody else is either!

- New Zealand's export performance with consumer goods shows an 8% growth rate in fixed effects. This is the country's best performing niche and it is on a par with India and China, Table 6.

- The second best niche for exporter performance is in capital goods which averaged 5% growth in fixed effects over the period. Export performance in raw materials and intermediate products is lower at 3 percentage points above the US reference level.

- New Zealand's performance as an importer overall is slightly lower than the US. This is a good result because the US was a very strong importer over the period. Unsurprisingly, the strongest import performance is in raw materials where New Zealand has important shortfalls in factor endowments.

- Overall then, New Zealand trade performance mirrors that of the US – somewhat stronger performance in exporting and slightly weaker in importing. The US performance is a reasonable standard here relative to the G3 – the US performance is on a par with Germany and better than Japan. New Zealand is also performing on a par with Australia. However, none of the OECD countries can compare with the best of the emerging economies on this measure.

Exposure to Globalisation Pressures

In a recent paper, Rae and Sollie (2008) produce a range of indicators based on an international dataset of over 1000 product categories and 11 services. They ask the question, which OECD countries are most exposed to globalisation pressures? On this question they measure the rank correlation of revealed comparative advantage indices (RCA) between New Zealand and two groups of countries – 'Dynamic Asia'[12] and the BRIC countries[13]. In both cases the coefficients are around zero – New Zealand is more exposed than the US, Canada, Germany, France, Australia, Finland and the UK but less exposed than Japan, Italy, Korea and new accession countries to the EU. New Zealand is more exposed to globalisation in the sense than New Zealand has an export mix in which its RCA indices are not correlated with the growth rate of the 500 most trade international products. On the other side, New Zealand is amongst the

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[12]   Comprising China, India, Chinese Taipei, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore and Thailand.

[13]   Brazil, Russia, India and China.

top group of countries where the RCA index is correlated with global product profit margins. New Zealand's performance is due to its heavy reliance on exports of natural resource based products and a relatively small proportion of high growth products and services like engineering and pharmaceutical products and services.

Rae and Sollie (2008) then compute indices to address the question, which countries are best equipped to cope with globalisation challenges? New Zealand scores reasonably well. Its overall score places it between Japan and the UK – not as high as Sweden, the US and Finland but higher than Germany, Korea, France, Ireland and the Southern and Eastern European countries. The strengths that give rise to this placing are educational attainment, flexible product markets, high labour mobility and low housing transactions costs. The biggest New Zealand weakness on the coping front is relatively low innovation activity.

New Zealand Big Winner from Chindia Growth

In the recent book "Dancing with Giants", Dimaranan, Ianchovichina and Martin (2007) project the welfare gains associated with forecast world economic growth over the period 2005-2020. China and India are forecast to grow at 6.6% and 5.5% per annum respectively. New Zealand (and Australia) is expected to benefit from this expansion of China and India relative to other high income countries – with welfare gains of 70% over the period relative to 48% for all high income countries. This is unsurprising given relative factor endowments in New Zealand vis a vis China. They also predict that China and India expansions in the near term will tend to strengthen New Zealand's comparative advantage in agricultural, forestry products and coal but their results are mixed for the non-food manufacturing industries. In other words, will the dispersion of global economic activity create market pressures that conflict with New Zealand's economic development objectives?

Mighty oaks, from little acorns, might grow

New Zealand's top 25 HS6 export products in 2006 are given in Table 7. Again this approach follows the logic of Haussman and Rodrik (2003). Most of the products are derived from primary sector ingredients and eighteen are processed agricultural and food products. The exception to the primary sector origin rule is large second hand aircraft. The top 25 products represent nearly 50% of the value of merchandise trade. This high concentration of exports for New Zealand compares with 29% for the world as a whole and 33% for China, in 2006.

Trade in agricultural and food products comprises less than 10% of global merchandise trade and it has grown more slowly over the last twenty years than merchandise trade as a whole, Liapis (2007). This is consistent with New Zealand total export growth of 59% over the period 1996-2006, only half the growth in world merchandise trade. Liapis estimates that the fastest growing category of world agricultural exports is in processed products as compared to bulk, horticultural and semi-processed products. All of the agricultural and food products in the New Zealand top 25 are processed products. One of the dampening factors affecting trade in agricultural and food products is that they attract much higher tariffs than non-agricultural products with tariffs on processed agricultural products the highest of all.

Table 7. New Zealand, Highest Valued HS6 Exports, 2006

Rank	Code	Product	Export value in million USD	Growth 1996-2006
		Total Merchandise Trade	**22,409**	**59**
1	040221	Milk and cream in solid forms of >15% fat	1,395	93
2	020230	Frozen boneless bovine meat	935	75
3	020442	Frozen unboned meat of sheep	791	82
4	760110	Aluminium unwrought, not alloyed	724	54
5	040500	Butter and other fats and oils derived from milk	699	9
6	040210	Milk and cream in solid forms of =< 15% fat	657	64
7	040690	Cheese, nes	572	24
8	440710	Coniferous wood, sawn or chipped	522	90
9	081090	Other fruit, fresh, nes	498	98
10	220421	Wine (not sparkling)	378	526
11	440320	Untreated coniferous wood in the round	356	-14
12	210690	Other food preparations, nes	314	812
13	270900	Petroleum oils and oils obtained from crude	314	39
14	880240	Aircraft nes of an unladen weight, over 15t	313	409
15	040490	Products consisting of natural milk	304	2,166
16	510121	Degreased shorn wool	302	-21
17	020422	Fresh or chilled unboned meat of sheep	297	176
18	020443	Frozen boned meat of sheep	292	60
19	350110	Casein	287	20
20	080810	Apples, fresh	209	20
21	350190	Caseinates and other casein derivatives	198	18
22	470321	Semi-bleached or bleached coniferous	196	135
23	190190	Other food preparations of flour, malt, starch or mil	191	759
24	710812	Gold in unwrought forms non-monetary	185	67
25	020890	Other fresh, chilled or frozen meat and edible offal	171	64
		Share Total Merchandise Exports %	**50**	

Source: Authors calculations

Given the relatively slow rate of New Zealand export growth, it is natural to focus on the faster growing items. Four products stand out in the last column of Table 7 – wine, other food preparations n.e.s., natural milk products and other food preparations of flour, malt and starch. Exports of these products have grown at least ten times as fast as exports overall. In addition, there are a number of other agricultural and forestry products where exports have grow by around 100%.

The export mix represented by the top 25 HS6 products in terms of total export value in 2006 basically illustrates past export `winners' for New Zealand. The major industries producing these exports have achieved production scale and they have developed beach-heads to capture global marketing scale. It is the export market performance of these firms that gives New Zealand its relatively high centrality index in the architecture of world merchandise trade. These industries are also moving with market changes. The natural milk product group includes a set of dairy products with very high income elasticities of demand even in high income country markets. Some industries are gaining export prominence by developing a niche – the rapid growth of New Zealand wine exports is an example. Wine is not a rapidly growing world export product but New Zealand has been able to carve out a significant market share. New Zealand Sauvignon Blanc has a distinctive flavour that has leveraged off wine consumers demand for variety - with spectacular results. Like the livestock products market breakthrough in the 1880's, South-Eastern England was the original target market. There was no great technological breakthrough like refrigeration involved.

The breakthrough for recent wine market growth did, however, need Ernie Hunter to invest in a marketing trip to London to show off the distinctive wines he and his wife had developed in Marlborough to his friends and contacts in the City in the 1980's.

Two of the 4 fastest growing larger exports in Table 7 are food preparations. There will be a number of products in these two groupings and they leverage off the large agricultural, horticultural, fishing and allied processing sectors of the economy. They are part of the fast growing (by agricultural standards) processed food group identified by Liapis (2007). These products do not have the benefit of a fast growing world market by non-food market standards, but they have demonstrated the capacity to grow through niches, in the same way that wine has succeeded. [As an aside, it may be worth noting that Haussman and Klinger (2006) have developed an approach to try to forecast what export products might be developed from specific existing capacity by measuring, what might be called, the network distance between tradable industries. In the New Zealand case such an approach would clearly indicate that the existence of the relatively large primary agricultural and processing sector has a high probability of stimulating new export industries in both services and products allied to agriculture, fishing, forestry, aluminium and steel.]

The remainder of the paper focuses on marginal export products – products that are not a large proportion of the total but are increasing in importance in one way or another. There are a number of ways of getting at the marginal products. Three approaches are adopted here.

Candidates for Export Awards I

The first marginal approach focuses on growth in the value of exports. A slightly different list of growth export products is obtained by looking at the top 25 value growth export products over the period 1996-2006, Table 8. Five products appear that were not in Table 7, fresh or chilled beef and sheepmeat, dishwashers, infant preparations and semi-chemical wood pulp. They are all towards the bottom of the list. Aside from the agricultural and food products, the other export products that make up Table 7 and 8 are aluminium, gold and forestry products.

Table 8. New Zealand: Top 25 Dollar Growth Exports, 1996-2006

Rank	Code	Product name
1	40221	Milk and cream in solid forms, without sugar
2	760110	Aluminium unwrought, not alloyed
3	20230	Frozen boneless bovine meat
4	220421	Wine (not sparkling)
5	20442	Frozen unboned meat of sheep
6	40490	Products consisting of natural milk
7	40210	Milk and cream in solid forms of =<15% fat
8	210690	Other food preparations, nes
9	880240	Aircraft nes of an unladen weight >15t
10	440710	Coniferous wood sawn or chipped
11	81090	Other fruit, fresh, nes
12	20422	Fresh or chilled unboned meat of sheep
13	190190	Other food preparations of flour
14	40690	Cheese, nes
15	470321	Semi-bleached or bleached coniferous
16	20443	Frozen boned meat of sheep
17	270900	Petroleum oils and oils obtained fr
18	20130	Fresh or chilled boneless beef
19	20423	Fresh or chilled boneless sheepmeat
20	40500	Butter and other fats and oils
21	350110	Casein
22	20890	Fresh, chilled or frozen meat, edible offal
23	842211	Dish washing machines of the HH type
24	190110	Preparations for infant use
25	470500	Semi-chemical wood pulp

Source: Authors calculations

Dishwashers can be considered a former infants who has grown up. The dishwashers are produced by the whiteware industry that was heavily protected from imports until just after 1984. The aluminium smelter project was a classic public-private partnership project from an earlier age than the Think Big era. The gold and wine industries are amongst the oldest industries in New Zealand. Both have experienced resurgence in recent decades without major government support.

The dishwasher (product 842211, Table 8) success is associated with the established home appliance manufacturer, Fisher and Paykel. The firm has a research and development arm that is comprised of around 50 engineers in Dunedin. This group developed the two drawer household dishwasher that found an important niche in kosher kitchens. [It had other energy saving attributes as well.] This is a significant achievement for Fisher and Paykel given the size of other industries whose products appear in Table 8. In April this year, Fisher and Paykel announced that dishwasher assembly would be moved offshore to a lower cost environment. This move is consistent with product cycle behaviour once the process technology has been codified to the point that manufacture is transportable. The next step for a firm is to then find new research projects to build on the accumulated expertise and build another product cycle. In the meantime, we would normally expect to see final good exports from New Zealand replaced by exports of some parts and components and repatriated wages, profits or fees.

Table 9. Largest decreases in value of New Zealand exports, 1996-2006

Rank	Code	Product Name
1	470311	Unbleached coniferous chemical wood
2	40229	Milk and cream in solid forms
3	410520	Sheep or lamb skin leather, prepare
4	870870	Wheels including parts and accessories
5	10410	Live sheep
6	410121	Whole hides and skins of cattle
7	510111	Greasy shorn wool, not carded
8	50790	Tortoise-shell, whalebone and whale
9	760429	Bars, rods and other profiles, aluminium
10	430219	Tanned or dressed whole furskins
11	510129	Degreased wool (excl. shorn)
12	410439	Bovine and equine leather, prepared
13	151610	Animal fats and oils and fractions
14	470100	Mechanical wood pulp
15	710813	Gold in oth semi-manufactured forms
16	50690	Bones and horn-cores (excl. ossein.
17	80810	Apples, fresh
18	270112	Bituminous coal, not agglomerated
19	30420	Frozen fish fillets
20	440320	Untreated coniferous logs
21	20430	Frozen lamb carcasses and half carc
22	410221	Pickled skins of sheep or lambs
23	480100	Newsprint, in rolls or sheets
24	510121	Degreased shorn wool, not carbonise
25	290511	Methanol (methyl alcohol)

Source: Authors calculations

The products representing the largest decreases in the value of exports are also useful in identifying change, Table 9. The largest reduction in export revenue over the period 1996-2006 was in methanol. This resulted from the moth-balling of the Taranaki plant (another think big project) after natural gas prices rose relative to export prices of methanol. However, it has recently been announced that the plant will be re-opened after the recent rise in methanol prices.

Most of the products in Table 9 are agricultural and horticultural products. Many of these products represent a change in form of the export goods. For example, frozen lamb carcases in this list have been replaced in the faster growing lists by higher value-added products like chilled cuts. Frozen fish fillets may be in the same category. Some other products may represent a down-grading of domestic value added – other semi-manufactured gold and prepared bovine hides may fall into this category. Other entries in the list represent a simple change of form including non-agglomerated coal and untreated logs. Newsprint and (motor vehicle) wheels and wheel accessories are more likely to represent products that have suffered a significant loss in world market share.

Candidates for Export Awards II

The second marginal approach focuses on percentage growth. The fastest percentage growth will occur with products that were typically hardly exported at all in the base period but then sustain at least 100% growth rates for three years to get on the list. Products are selected on this criteria with a minimum dollar growth in exports over the period to exclude products that are tiny contributors to total exports. This analysis is conducted in two stages. First, the Top 25 fastest percentage growth products are selected over 4

year intervals from 1996 to 2006 subject to the 6 digit product growing by at least USD 5 million over the period. The Top 25 products are then classified into 15 product groups at the 2 digit level. The results are presented in Table 10 and the lists of 6 digit products are given in Annex Table 1.

Table 10. Top 25 Fast (%) Growth 6 digit Products, number

where the growth in value exceeded USD 5 million/period

Products	HS chapters	2000/1996	2001/1997	2002/1998	2003/1999	2004/2000	2005/2001	2006/2002
Livestock products	01-05	1	1	0	2	4	3	3
Vegetable products	06-15	0	0	0	1	1	1	0
Foodstuffs	16-24	2	6	6	3	1	1	1
Mineral products	25-27	1	0	1	1	1	2	0
Chemicals & allied	28-38	1	1	0	2	2	3	2
Plastics	39-40	1	0	1	1	0	1	2
Hides, leather	41-43	0	2	2	1	2	1	1
Forest products	44-49	2	2	4	3	2	1	3
Textiles/clothing	50-63	0	1	1	1	2	0	2
Footwear	64-67	0	0	0	0	0	0	0
Stone/glass	68-71	0	0	0	1	0	1	0
Metals	72-83	5	3	1	0	2	2	2
Machinery/electrical	84-85	7	6	5	3	6	5	6
Transport	86-89	5	3	1	4	1	3	2
Miscellaneous	90-97	0	0	3	2	1	1	1

Source: Authors calculations

The Top 25 percentage products represent a significant proportion of export growth over the 4 year periods. Over the period 1998-2002, the Top 25 products constituted around 17% of the total value of export growth. Over the period 2002-2006, the figure was around 8%.

The traditional exports products in Table 8 are livestock products and forestry products. Livestock products are conspicuous in these fastest percentage growth lists over the period 2003/1999 to 2006/2002 while hides and forestry products appear frequently throughout the whole period. The traditional exporting industries are accordingly adapting to changing market conditions on a regular basis. However, the 6 digit products that most frequently appear in these lists are not from these traditional exports sectors (77%). Foodstuffs, metals, machinery and electrical equipment and transport equipment have a higher incidence throughout the period 1996 to 2006. For selected periods, mineral products, chemicals, clothing and miscellaneous products (bedroom furniture, parts for direction finders, navigational instruments, breathing apparatus) also have more than one product in a Top 25 list. These traditional and non-traditional sectors probably define the range of comparative advantages in broad terms. The remaining sectors, vegetable products, plastics, footwear and stone and glass products probably encompass many areas of comparative disadvantage.

At the 6 digit level, the items that enter the Top 25 lists usually enter and exit the lists in one period. In other words, most of the 175 products in these lists represent `start-ups' that expand more modestly after an initial 4 year export spurt or they fade. The exceptions, though, represent a wide variety of products. Petroleum oils (except crude) were in 4 consecutive lists from 2002 to 2005, babies garments were there in 2003 and 2004, circular saw blades in 2000 and 2001, navigational instrument in three years (2002-2004), breathing apparatus in 2005 and 2006, and fishing vessels in 2004 and 2005, to mention a few.

Sustained growth over the whole 1996-2006 period is shown by the Top 25 products in Table 11. This list is restricted to the fastest percentage growth products where the export value in 2006 exceeded USD 10

million. The slowest rate of growth in this list was 1600% over the ten year period so many of these products were insignificant export items in 1996. The 25 items contributed just over 4% of merchandise exports in 2006. Like Table 10, this list is significantly different from the 2006 export shares and the Top 25 value growth products shown in Table 7 and Table 8.

Fifteen products are outside the traditional livestock, fish and forest products grouping. They encompass one beverage (water), two clothing products and eight elaborated manufactures from chapters 8 and 9 of the HS code. The latter group includes electronic products and machinery and equipment items of a diverse nature. Finally, there is one industrial chemical and a number of steel and aluminium products.

Table 11. Top 25 Percentage Growth Exports, 1996-2006

Highest percentage growth products where exports exceeded USD 10 million in 2006

Rank	Code	Product_Name	Export Value	% Total exports
1	30619	Frozen crustaceans,nes	10.7	0.05
2	721039	Flat rolled prod, plated	20.2	0.09
3	850450	Inductors, electric	11.6	0.05
4	470500	Semi-chemical wood pulp	61.8	0.28
5	480419	Kraftliner, uncoated	11.3	0.05
6	902000	Breathing appliances and gas masks	15.8	0.07
7	890790	Buoys, beacons, coffer-dams, pontoons	38.6	0.17
8	611120	Babies' garments, of cotton	13.4	0.06
9	230110	Flours, meals and pellets, of meat	49.8	0.22
10	721310	Concrete reinforcing bars	14.9	0.07
11	901480	Navigational instruments	43.5	0.19
12	760410	Bars, rods and profiles, aluminium,	20.0	0.09
13	620920	Babies' garments and clothing accessories	10.4	0.05
14	291819	Carboxylic acids with alcohol function	16.3	0.07
15	845090	Washing machine parts	21.4	0.10
16	720449	Ferrous waste and scrap, iron or steel	47.1	0.21
17	843680	Other agricultural machinery	39.9	0.18
18	40490	Products consisting of natural milk	304.4	1.36
19	410431	Othe bovine hides	29.4	0.13
20	731029	Cans, iron or steel, capacity <50 l	11.1	0.05
21	890392	Motorboats, other than outboards	45.9	0.20
22	220210	Waters (incl. mineral and aerated),	47.0	0.21
23	10210	Live pure-bred breeding bovine animals	29.4	0.13
24	852691	Radio navigational aid apparatus	10.6	0.05
25	480510	Semi-chemical corrugated paper	29.6	0.13
		Sub-Total %		**4.26**

Source: Authors calculations

Star Performers - Candidates for Export Awards III

The third marginal approach is more global in orientation. It is the idea of star performers. These are defined as New Zealand export products who meet two criteria - New Zealand's world market share is increasing and the world market growth of the product is above average. This is a fairly stringent criterion as it requires that a product has a comparative advantage in a rapidly growing global market. Star performers have been computed at various times in the past. The most recent New Zealand study is Ballingall (2004) which examines the period 1990-2001.

The International Trade Centre (ITC) has identified 116 HS4 New Zealand star performers over the period 2001-2006 in 40 HS2 sectors, Table 12. They represent nearly 6% of gross exports in 2006. The star performer list is somewhat volatile and products can enter and exit the list from one year to the next with some frequency. New Zealand is a net importer of many star performer export products, as is China.

Table 12. New Zealand Star Export Performers, 2002-2006

International Trade Centre, UNCTAD/WTO

Code	Product	No. 4 digit Star perfomers
4	dairy products	1
84	boilers, machinery	13
76	aluminium prods	2
8	edible fruit	2
85	electrical equipment	9
47	paper and pulp	1
72	iron and steel	11
39	plastics	4
90	optical, photo, medical app.	2
71	pearls, precious stones	2
73	art iron and steel	7
87	vehicles	2
30	pharmaceuticals	1
20	vegetables, fruit and nuts	1
38	misc chemical prods	2
74	copper and art.	6
40	rubber and art.	1
15	animal, vegetable oils	2
61	apparel	2
34	soaps, lubricants	1
29	organic chemicals	1
83	misc art base metals	2
64	footwear	1
26	ores, slag and ash	1
97	works of art	2
56	wadding, felt, yarns etc	1
25	non-metallic minerals	2
68	art cellulose fibre	2
70	glass and glassware	3
28	inorganic chemicals	1
78	lead and art.	4
42	art leather	1
86	metal equipment	4
96	misc manu arts.	2
80	tin and arts.	1
79	zinc prods	6
11	milling prod.	2
58	woven and tufted fabric	1
81	other base metals	6
9	tea, coffee etc	1
% Total Merchandise Exports		**5.97%**

The most impressive aspect of the full list of star performers in Annex Table 2 is the breadth of its coverage of non-food manufactured products. Many of the traditional fast growing, high technology sectors are included – machinery, pharmaceuticals, fashion clothing (and maybe footwear), recycling products and works of art. Most of these star performers are very small, however.

The star performers have a high frequency in the metal, machinery and equipment sectors – thirteen in chapter 84, eleven in chapter 72 and nine in chapter 85. These are all large global markets but they are relatively small groupings of New Zealand exports. There are a number of recycling products in the star performer list, especially metals like copper, zinc, tin and titanium waste that have been in increasing demand in recent years. New Zealand doesn't have a full range of reprocessing facilities so this trend is not surprising. Having said that, it does reveal that New Zealand has the recycling businesses to facilitate the trade. Traditional agricultural, forestry and food export products are noticeably absent from the complete list of 116 star performers given in Annex Table 2. Natural milk products (for example, yoghurts and soft cheeses) are there and of course, they are the largest star performer. (Chilled beef and sheep meat were in the 2005 list but have dropped out this period.)

There is no evidence in the star performer list that traditional New Zealand export firms are diversifying into unrelated but high growth manufactures in the Finnish tradition described by Lederman and Maloney (2007). Nor is there evidence that New Zealand's terms of trade have trended downwards since trade reform and the expansion of the primary export share. Natural resource based exporting firms and firms allied to such industries have diversified along the lines suggested by Haussman and Klinger (2006). Many years ago the precursor of Fonterra became the largest exporter of European dairy products (marketing services); Fonterra owns a number of foreign dairy subsidiaries (MNE activity) and Gallager's electric fencing has diversified in security systems. New Zealand farm expertise has increasingly been exported in the form of mode 4 natural persons in consulting, management activities and farm ownership in classical Vernon product cycle tradition (except that it often moves to OECD countries rather than LDC's).

Summary and Conclusions

The dispersion of economic and trade activity in recent years has caused a relative fall in the importance of trade by OECD countries. Comparative trade performance using a gravity model that includes China and other emerging economies can accordingly create an impression that OECD countries are not doing well in trade terms. However, New Zealand's merchandise trade performance over the last twenty years compares quite favourably against OECD comparators. It is especially meritorious in the light of the current account position in recent years.

Resource based exports (processed and unprocessed) are still the largest export earners for New Zealand. Their recent growth in exports has been boosted by rising resource product prices over the last year or two but they have not been treated so kindly over the last decade. There have been some significant adaptations amongst the traditional export industries to cater for changing markets.

The star performer list, however, demonstrates how a wide range of non-traditional exporters have been able to respond to the faster growing world markets. Most are very small at this stage but at least New Zealand appears to have had a "foot in the door" of the fastest growing world markets in the last decade. This indicates that the tradable sector is receiving, and responding to, world market price signals and the relatively liberal trade policy stance can take some of the credit.

The evidence is that many new export products are being developed continuously in New Zealand each year. Furthermore, the numbers suggest that domestic firms are not having difficulties initiating

manufacture in New Zealand and launching these new products on the world market. In many instances the manufacturing processes associated with new star performers can be expected to move offshore if the systems can be codified to suit. This can take the form of franchises or the establishment of subsidiaries in less developed countries. Most of the value added will still likely accrue to New Zealand via returns to the innovation, design, marketing and management. This includes high wage returns to workers employed in successful ventures. However, this product cycle approach does not involve continuous employment in particular firms unless companies can produce ongoing cycles of innovative products. In this sense there is an incentive for innovative firms to expand to be able to retain skilled workers from one innovation to the next.

Most of the industries producing the wide range of star export performers were directly or indirectly protected through the long IS programme or were the result of more specific industry subsidies in the "think big" projects. In this sense, there appear to be many "grown infants". Two conclusions suggest themselves. First, the non-traditional export manufacturing sector is well oriented to global market developments following trade liberalisation. Second, the diversity of the star performers points to the efficacy of generic export policies in the form of infrastructural support and other measures that do not favour one set of firms at the expense of others.

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Annex 1. Tables and Figures

Annex Table 1. Top 25 Percentage Growth Products, 6 digit

where the growth in export value exceeds USD 5 million

		2000/1996		2001/1997
Rank	Code	Product Name	Code	Product Name
1	845730	Multi-station transfer mach., working metal	570231	Pile floor coverings of wool..., wo
2	270799	Other oils and oil products, nes	850230	Electric generating sets, nes
3	721039	Flat rolled prod, i/nas, electro pl	720449	Ferrous waste and scrap, iron or st
4	870333	Automobiles with diesel engine disp	731029	Cans, iron or steel, capacity <50 l
5	230110	Flours, meats and pellets, of meat	854140	Photosensitive semiconductor device
6	350400	Peptones/protein substances and der	880520	Flight simulators and parts thereof
7	842840	Escalators and moving walkways	481820	Handkerchiefs and cleansing or faci
8	731029	Cans, iron or steel, capacity <50 l	180632	Chocolate, etc, containing cocoa in
9	220210	Waters (incl. mineral and aerated),	870323	Automobiles with reciprocating pist
10	392042	Plates..., of polymers of vinyl chl	820231	Circular saw blades with working pa
11	852910	Aerials and aerial reflectors of al	200551	Shelled beans, preserved other than
12	732111	Cooking appliances&plate warmers fo	210410	Soups and broths and preparations t
13	890392	Motorboats, other than outboard mot	890392	Motorboats, other than outboard mot
14	870323	Automobiles with reciprocating pist	190230	Other pasta, nes
15	480510	Semi-chemical fluting paper (corrug	230910	Dog or cat food, put up for retail
16	720449	Ferrous waste and scrap, iron or st	430390	Articles of furskin, nes
17	481820	Handkerchiefs and cleansing or faci	210390	Sauces and sauce preparations; mixe
18	890391	Sailboats, with or without auxiliar	842211	Dish washing machines of the HH typ
19	880220	Aircraft nes of an unladen weight n	851790	Parts of electrical apparatus for l
20	843680	Agri/hortic/forestry bee-keeping ma	480510	Semi-chemical fluting paper (corrug
21	820231	Circular saw blades with working pa	20621	Frozen bovine tongues
22	841821	Refrigerators, household type, comp	847990	Parts of machines & mechanical appl
23	846221	Bending folding stgting or flatteni	410512	Sheep, lamb skin leather, non-veg.
24	40620	Grated or powdered cheese	300310	Medicaments of penicillins... or st
25	854459	Electric conductors, for a voltage	847199	Automatic data processing machines

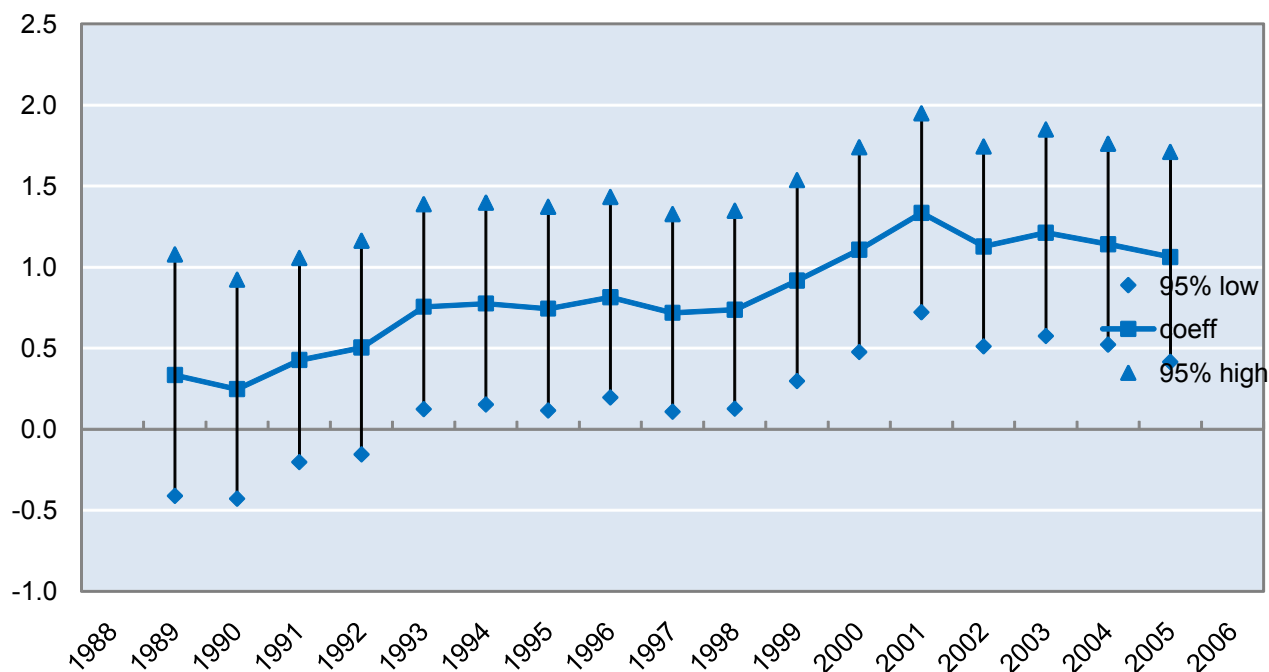| Rank	Code	2002/1998 Product Name	Code	2003/1999 Product Name
1	271000	Petroleum oils, etc, (excl. crude);	271000	Petroleum oils, etc, (excl. crude);
2	480419	Kraftliner, uncoated (excl. unbleac	441221	Plywood... >6mm non-coniferous oute
3	481099	Paper and paperboard, coated with k	890110	Cruise ships, excursion boats etc p
4	611120	Babies' garments, etc, of cotton, k	230110	Flours, meats and pellets, of meat
5	840690	Parts of steam and vapour turbines	21020	Meat of bovine animals, salted... o
6	820299	Stone cutting saw blades, friction	390190	Other polymers of ethylene, in prim
7	852691	Radio navigational aid apparatus	150590	Fatty substances of crude wool grea
8	410431	Full-grains, splits of bovine and e	681510	Non-electrical articles of graphite
9	220210	Waters (incl. mineral and aerated),	850619	Primary cells and primary batteries
10	481820	Handkerchiefs and cleansing or faci	890392	Motorboats, other than outboard mot
11	390120	Polyethylene having a specific grav	410431	Full-grains, splits of bovine and e
12	841311	Pumps with or w/o a meas device for	611120	Babies' garments, etc, of cotton, k
13	440810	Coniferous veneer sheets and sheets	854449	Electric conductors, for a voltage
14	854140	Photosensitive semiconductor device	901490	Parts & access for direction findin
15	870323	Automobiles with reciprocating pist	440810	Coniferous veneer sheets and sheets
16	230910	Dog or cat food, put up for retail	901480	Navigational instruments and applia
17	210410	Soups and broths and preparations t	300420	Medicaments of other antibiotics, f
18	230110	Flours, meats and pellets, of meat	845090	Parts of household or laundry-type
19	940350	Bedroom furniture, wooden, nes	350400	Peptones/protein substances and der
20	210390	Sauces and sauce preparations; mixe	442190	Articles of wood, nes
21	847990	Parts of machines & mechanical appl	870892	Mufflers and exhaust pipes for moto
22	180632	Chocolate, etc, containing cocoa in	210390	Sauces and sauce preparations; mixe
23	430390	Articles of furskin, nes	880330	Aircraft parts nes
24	901480	Navigational instruments and applia	10210	Live pure-bred breeding bovine anim
25	890391	Sailboats, with or without auxiliar	200410	Potatoes, preserved other than by v

Rank	|	2004/2000		|	2005/2001	
	|	Code	Product Name	|	Code	Product Name
1	|	271000	Petroleum oils, etc, (excl. crude);	|	271000	Petroleum oils, etc, (excl. crude);
2	|	760410	Bars, rods and profiles, aluminium,	|	291816	Gluconic acid, its salts and esters
3	|	480419	Kraftliner, uncoated (excl. unbleac	|	760410	Bars, rods and profiles, aluminium,
4	|	10210	Live pure-bred breeding bovine anim	|	283526	Phosphates of calcium, nes
5	|	21020	Meat of bovine animals, salted... o	|	902000	Breathing appliances and gas masks,
6	|	620920	Babies' garments and clothing acces	|	410129	Hides and skins of bovine animals,
7	|	130213	Hop extract	|	10210	Live pure-bred breeding bovine anim
8	|	611120	Babies' garments, etc, of cotton, k	|	850450	Inductors, electric
9	|	851521	Electric mach/app for resistance we	|	846299	Presses nes for working metal
10	|	851690	Parts of electro-thermic apparatus	|	401199	New pneumatic tyres, of rubber, nes
11	|	293792	Oestrogens and progestogens	|	842833	Cont-action elevators/conveyors for
12	|	850619	Primary cells and primary batteries	|	440920	Non-coniferous wood, continuously s
13	|	320890	Paints and varnishes, in a non-aque	|	843360	Machines for cleaning, sorting or g
14	|	890200	Fishing vessels and factory ships	|	880230	Aircraft nes of an unladen weight >
15	|	240310	Smoking tobacco with or without tob	|	261900	Slag, dross, etc, from the manufact
16	|	853400	Printed circuits	|	890200	Fishing vessels and factory ships
17	|	410431	Full-grains, splits of bovine and e	|	880240	Aircraft nes of an unladen weight e
18	|	440810	Coniferous veneer sheets and sheets	|	40490	Products consisting of natural milk
19	|	410210	Raw skins of sheep or lambs, with w	|	220429	Wine (not sparkling); grape must wi
20	|	721310	Bars & rods, i/nas, hr,in irreg wou	|	70200	Tomatoes, fresh or chilled
21	|	901480	Navigational instruments and applia	|	50690	Bones and horn-cores (excl. ossein.
22	|	40490	Products consisting of natural milk	|	710239	Diamonds non-industrial nes excludi
23	|	842833	Cont-action elevators/conveyors for	|	830990	Stoppers,caps,lids,seals and oth pa
24	|	841311	Pumps with or w/o a meas device for	|	851220	Lighting or visual signalling equip
25	|	50690	Bones and horn-cores (excl. ossein.	|	320890	Paints and varnishes, in a non-aque

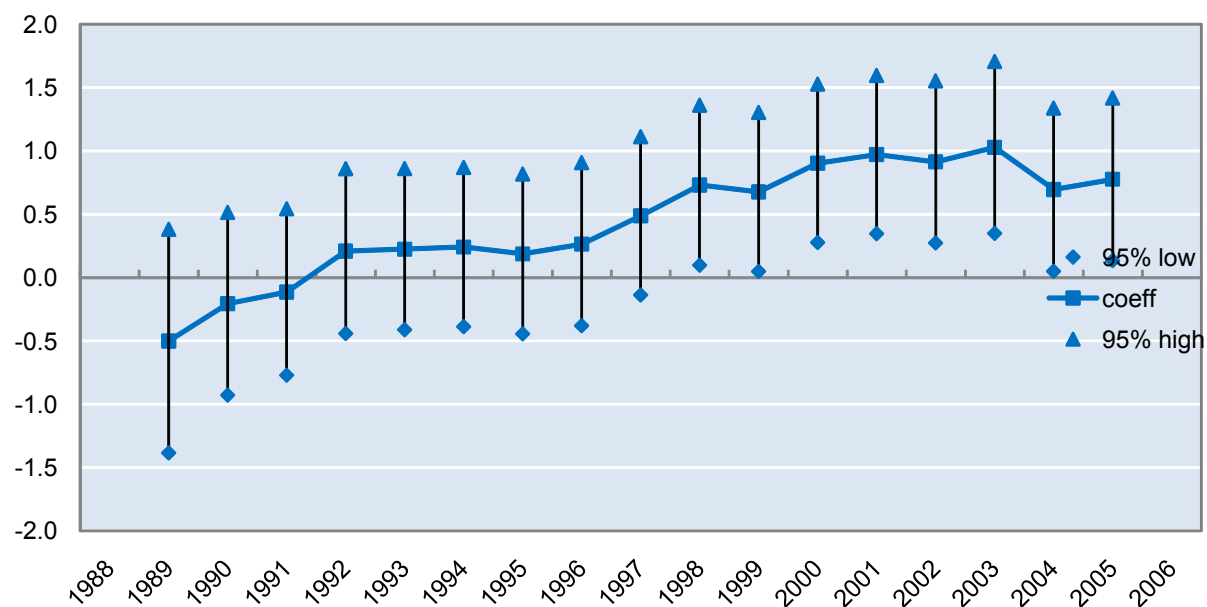|		**2006/2002**
Rank	Code	Product Name
1	470500	Semi-chemical wood pulp
2	845730	Multi-station transfer mach., working metal
3	441840	Shuttering for concrete construction
4	30619	Frozen crustaceans,nes
5	740322	Copper-tin base alloys, unwrought
6	294000	Sugars, pure (excl. glucose, etc);
7	283526	Phosphates of calcium, nes
8	10210	Live pure-bred breeding bovine anim
9	760410	Bars, rods and profiles, aluminium,
10	902000	Breathing appliances and gas masks,
11	890790	Buoys, beacons, coffer-dams, pontoons
12	390110	Polyethylene
13	410129	Hides and skins of bovine animals,
14	190110	Preparations for infant use, for re
15	590700	Textile fabrics otherwise impregnat
16	851430	Industrial & laboratory electric furnaces
17	40490	Products consisting of natural milk
18	845190	Pts of washing/cleaning/drying/iron
19	481830	Tablecloths and serviettes of paper
20	401199	New pneumatic tyres, of rubber, nes
21	842952	Shovels and excavators with a 360 radius
22	854459	Electric conductors, for a voltage
23	851690	Parts of electro-thermic apparatus
24	510620	Yarn of carded wool, not put up for
25	870332	Automobiles with diesel engine disp

Source: authors calculations

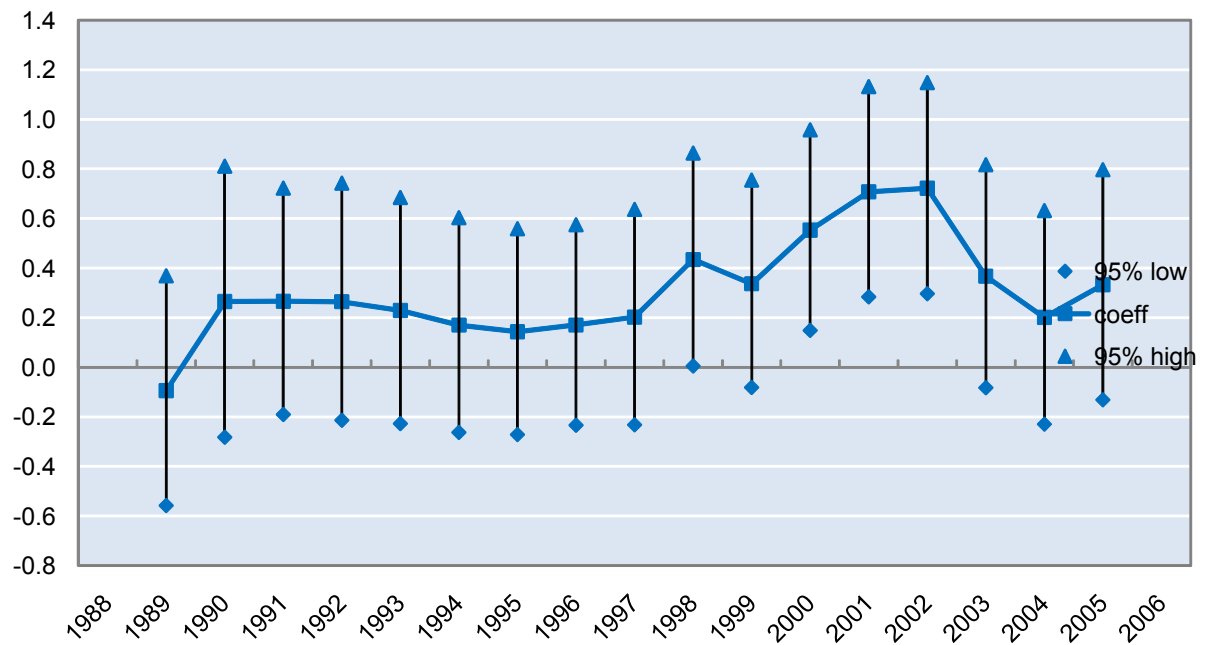**Annex Figure 1. Time Varying Fixed Effects for New Zealand as an Exporter of Capital Goods**

Annex Figure 2. Time Varying Fixed Effects for New Zealand as an Exporter of Consumption Goods

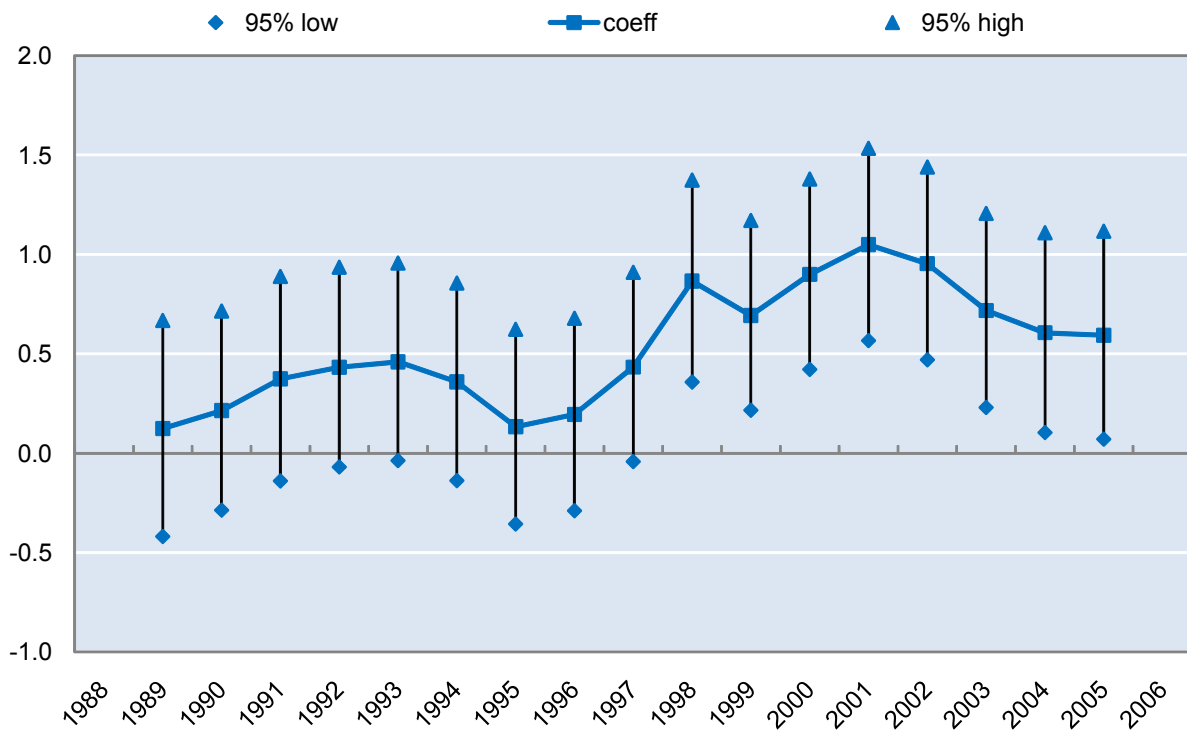**Annex Figure 3. Time Varying Fixed Effects for New Zealand as an Exporter of Intermediate Goods**

Annex Figure 4. Time Varying Fixed Effects for New Zealand as an Exporter of Raw Materials