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What's wrong with being an agricultural economy?

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What's wrong with being an agricultural economy?¹

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Abstract

Commentators have suggested over the years, and still do, that the NZ economy should restructure more rapidly towards sophisticated manufacturing and services so as to avoid remaining an agricultural economy. This paper reviews some relevant theory and empirical analyses, in a search for evidence that agricultural economies grow more slowly than others and for approaches that may be helpful for further research. The evidence is mixed, but appears not to strongly support the hypothesis that NZ would grow faster through a lesser focus on agriculture.

Introduction

New Zealand is relatively rich in certain natural resources – including farm land and a temperate climate to support an agri-food² sector that is dominant in some global markets and contributed over 9 per cent to GDP in 2012 and 63 per cent of merchandise exports in 2013. There is a strand of economic thought that explores whether countries that are natural-resource rich grow more slowly than others that are relatively less-rich. New Zealand has a strong comparative advantage in agri-food, and industries with such a strong comparative advantage are likely to decline more slowly than those with weaker, or no, comparative advantage. Therefore, in the absence of policy interventions to constrain agricultural growth – perhaps environmentally driven - is New Zealand likely to remain an agriculture-dominant exporter with slower growth into the future?

To help set the scene, I present some simple graphs that correlate agriculture and growth. Figure 1 contains the GDP shares of farming, food processing including beverages and tobacco (defined as agri-food), all other manufacturing and services. Over the 24 years from 1988, the share of agri-food in GDP declined marginally, from 10.6 per cent to nine per cent. Figure 2 shows the share of agri-food in total merchandise exports, increasing from 58 per cent in 1996 to just over 63 per cent in 2013. The recent increase in this share is influenced by the rapid increase in dairy product exports.

Trends in New Zealand's comparative advantages are presented in NZIER (2009) and Lattimore et al. (2009). There has been strong growth in comparative advantage in high value added foods (specialty sausages, bakery goods and wine are given as examples) and some non-agri-food products with an agricultural base such as textiles and clothing, relative to basic agricultural products. But high growth

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² Includes farming, food processing (excluding fish) and beverages and tobacco, and excludes the indirect contributions of other sectors which service agriculture such as transport.

in New Zealand's comparative advantages has not been restricted to agricultural-based goods, some examples being machinery and electrical goods. There has been a tendency to develop comparative advantage in a product group allied to the country's current productive base such as the examples given above plus fertiliser and machinery and some of the newly emerging, fast growth export products include those connected to primary products. For example the fastest growing export products among the processed food group include products such as wine, infant food preparations, fresh and chilled meats, natural milk products and various other food preparations. This observation is important in relation to the literature to be reviewed later.

Figure 3 shows the evolution of New Zealand's revealed comparative advantage in agri-food, disaggregated into primary, semi-processed and processed foods.³ Comparative advantage is stronger, the higher the level of processing, although each category possesses comparative advantage in all years shown ($RCA > 1$). That of processed foods climbed rapidly up till around 2005 when the index appears to have stabilised. It may be noted that global trade in processed foods has been growing more rapidly than that in semi-processed foods or primary bulk commodities (Liapis 2007).

Growth and resource-rich countries

Early contributions to this literature attempted to show empirically that natural-resource rich economies tend to grow more slowly than others. Sachs and Warner (1995, 1997, 2001) conducted much of the early research into this hypothesis. They found that countries with high ratios of natural resource exports (agriculture⁴, minerals and fuel) to GDP in 1971 had experienced lower growth rates over the following couple of decades than did other countries, after controlling for other relevant variables. They used cross-country regressions in the spirit of Barro (1991). Their country sample included developed economies such as USA, New Zealand and Australia. Among their controlling variables, they concluded that an open trade policy matters enormously to growth, that falling transport costs through time may mean that the domestic availability of natural resources may not be as crucial to growth as in earlier periods, and they warn against the subsidisation of non-resource sectors.

Since the appearance of the above findings, efforts have attempted to explain the resource curse, or to provide reasons for its non-existence. Many of these are summarised in Torres et al. (2013). Early explanations included declining terms of trade for primary commodities relative to manufacturing, resource price volatility, and limited linkages between primary sectors and the rest of the economy (Hirschman 1958). Anderson (1998) disagrees with several of the common explanations of slow growth in resource-rich economies, such as declining commodity prices, that manufacturing possesses more growth-inducing externalities than primary sectors and higher protectionist barriers facing primary product exporters. He points to evidence that agricultural total factor productivity has been growing faster than that of manufacturing globally and could be a reason for resource-rich economies to grow faster, not slower, than others. However many resource-rich countries have or

³ This classification is based on that of Regmi et al. (2005).

⁴ Their definition includes live animals, food (fresh and processed), beverages, tobacco and animal and vegetable oils and fats.

do protect their manufacturing sectors thus discriminating against primary industries, leading to lower growth.

Some put forward a 'Dutch Disease' explanation through real exchange rate appreciation and the primary sector's absorption of production factors. However empirical evidence in favour of this explanation is not strong (Auty 2001). Rent-seeking behaviour (Torvik 2002) has been suggested as a cause as less effort may be devoted to running productive firms. More recent literature shows growing recognition of good institutions and policies (Hartford and Klein 2005; Auty 2001; and Mehlum et al. 2006). Without such, Atkinson and Hamilton (2003) refer to the inability of governments to sometimes effectively manage large resource revenues. Van der Ploeg (2010) found that low economic growth was exacerbated by poor quality institutions and bad rule of law – a resource boom was seen to reinforce rent-grabbing especially in the presence of bad institutions, policies and corruption. He showed that institutions and policies were more likely related to the resource curse than was 'Dutch disease' and noted that countries like Norway, Canada and Australia had shown it was possible to be resource-rich but to escape the 'curse'. Leite and Weidmann found that natural resource abundance had no impact on economic growth, but it had an indirect effect on increasing corruption and thus lower growth.

Recent work has shown that the estimation techniques used by Sachs and Warner were suspect. Equations that include initial income as an explanatory variable have been shown to suffer from endogeneity – Alexeev and Conrad (2009) showed that removal of the endogeneity resulted in the disappearance of the 'resource curse'. A similar result was found when panel studies (rather than single equation models) with fixed effects were applied to the Sachs and Warner data (Manzano and Rigobon 2006) implying that results of cross-section studies may be inconsistent. As regards data, commonly used dependent variables have been natural resource exports relative to either total exports or GDP. First, natural resource exports are flows, but stocks of natural resources pose measurement difficulties. Both natural resource exports and total exports may also be endogenous to underlying structural factors (Brunnschweiler and Bulte 2008). One study that did employ resource stock data (Lederman and Maloney (2008) concluded with a dismissal of the resource curse.

So if New Zealand's growth has been slower than it might have been, can a 'resource curse' resulting from New Zealand's relative abundance of agricultural resources be blamed? Much of the above evidence would suggest not. The country would score relatively well on any listing of nations in terms of law and order and (especially since the 1980s reforms) the quality of institutions and macro and micro policies. New Zealand firms have the opportunity to cope with international price volatility with the help of financial institutions, rent-seeking is less-prevalent than in earlier times when New Zealand was more of a closed economy, the agricultural sector enjoys linkages to food manufacturing and other value-adding industries, protectionism of manufacturing is largely absent and hence so are biases against agriculture, the Uruguay Round trade agreement reduced the levels of agricultural protectionism especially in developed countries, and being an open economy means that New Zealand's agricultural productivity growth (which exceeds that in manufacturing) contributes to economic growth.

Some other research into the structure of exports and growth

So much for the resource curse. The evidence supports the notion that resource-rich economies need not be burdened with a slow-growth future. It does not support the notion that, to continue to grow, resource-based nations must move away from resource-based production. To advance the discussion, I now turn to the new trade/growth literature – in particular to two streams of research – to explore (i) what tend to be the export patterns of rich countries and (ii) how do these export patterns change with economic growth?

Lall (2000) and Lall et al. (2005) pose the question “what are the export patterns of successful countries”? The first of these papers considers products along a low skill/low technology – high skill/high technology spectrum. It notes that while resource-based products tend to be at the low end of this spectrum, processed foods can be capital-, scale- and skill-intensive. Data analysis shows that the technology-intensive products had grown fastest in international trade and were characterised by high income elasticities. Lall (2005) suggests that classifying export products on the basis of technological intensity faces substantial data challenges, so proposes instead an index that assumes that the more ‘sophisticated’ a product the higher the income of its exporter. This is based on the idea that the income level of a country captures such factors as its technologies, endowments and marketing capabilities and therefore national income is a proxy measure of such factors. Any export product can have computed a score, or “sophistication index” that is a weighted average of each exporting country’s per capita income, where the weights are that country’s share of world trade in the product. The empirical application to export products at the SITC 3-digit level revealed a positive but relatively weak correlation between a country’s sophistication score and subsequent export growth.

Hausmann et al. (2007) assert that the mix of goods produced by a country can have important implications for economic growth. While the fundamental natural resource endowments play an important role, so too do other factors such as the number of entrepreneurs who can be stimulated into cost discovery in the modern sectors of the economy who if successful lead to knowledge spillovers to other entrepreneurs. Thus an economy can produce more sophisticated goods as entrepreneurs explore the cost structure of the economy and are induced into new activities. Hausmann et al. construct an ‘income/productivity’ index for a good based on the notion that some traded goods have higher productivity levels than others, and that such goods may be associated with higher income economies. Their index PRODY is a weighted average of per capita GDPs of the countries exporting a particular good, where the weights are those countries revealed comparative advantages in the good in question. A country index, EXPY, is then computed as the weighted average of the PRODY values for a country’s export basket, where the weights are each good’s value share in that country’s total exports. The authors describe the EXPY index as the ‘income/productivity level’ of that country’s exports, and they then show that it significantly predicts economic growth by regressing 1992-2003 growth on initial EXPY. EXPY was also highly correlated with per capita GDP, indicating that rich countries export products that tend to be exported by other rich countries, and EXPY was also positively correlated with the level of human capital.

Of relevance in the case of New Zealand is the question that Hausmann et al. raise – do all natural resource exporting countries have low scores for EXPY? Although several in Latin America do, New Zealand scores relatively highly when compared with Norway, Canada, Australia and Chile, being

second in this group to Canada. In 2001, Luxemburg showed the highest EXPY value of over 24,000, Switzerland scored 19,000 and New Zealand came in at around 15,000. The lowest scores in the sample were for some African countries at below 3,000. This could indicate that, at the least up to the early 2000s, New Zealand included in its export basket goods that were relatively sophisticated including products processed from agricultural raw materials. But it should be borne in mind that over the sample period the rich countries of North America and the EU were employing export subsidies to gain market share for several agricultural products which would have increased the revealed comparative advantages and Hausmann et al. indices for such countries.

Hausmann and Klinger (2007) and Hidalgo et al. (2007) introduce the idea of a 'product space' and how it might inform the evolution of a country's comparative advantage across products. A basic notion is that of 'proximity' – if two goods are related because they require similar physical factors, technology, institutions and infrastructure they tend to be produced in tandem, whereas dissimilar goods are less likely to be produced contemporaneously. Thus goods may be mapped (and given a network representation in Hidalgo et al.) according to their proximity or otherwise. Some parts of the resulting space are sparse while others are relatively dense with highly inter-connected products.⁵

A finding is that countries tend to change their export mix by moving towards nearby (related) products rather than those that are more distant in the product space. An implication then is that a country's current location in the product space affects its opportunities for future productive transformation and the denser is that location then the easier (less costly) it is for firms to develop new related (connected) products and capture benefits of inter-industry spillovers. So structural transformation favours nearby products: for example human capital may be more easily deployed to connected products.

They use trade data at the SITC-4 level and find that the densest part of the space tends to be dominated by manufactured products while the sparsest goods tend to be unprocessed agricultural goods (e.g. live animals, jute, and cork) and some metals. However broad SITC categories were not a determinant of location in the product space as some members of almost every SITC category can be found in both the 50 most and 50 least connected products. They also found that richer countries tend to specialise (possess comparative advantage) in dense rather than sparse parts of the product space. In a graph of the average centrality of all products in which a country has comparative advantage against per capita GDP, New Zealand is shown to be located near the upper end of his curve and alongside Australia and Canada. After controlling for income they do note that some countries that specialise in natural resources, but particularly oil producers, have export baskets in sparser disconnected parts of the product space.

These studies of Hausmann and Klinger, and Hidalgo et al. do not, however, address the issue as to whether countries that are specialised in a denser part of the product space exhibit faster long-run growth. While specific results for New Zealand cannot be gleaned from these publications, what can be found would not appear to place this country in a 'dead end' with few connected products to which the country could evolve its comparative advantage. Indeed, its transition from comparative

⁵ Porter (1998) explored the emergence of successful clusters of firms whose outputs need not conform to standard industrial classifications. His linkages were observed in particular geographic locations, while a wider view of connectedness is implied by Hausmann and Klinger.

advantage in primary and semi-processed agriculture to processed agricultural products and even more sophisticated foods can be interpreted as a movement towards related but more capital- and knowledge-intensive products located in denser parts of the product space.

Conclusions

New Zealand has a strong comparative advantage in the export of processed foods, and this is unlikely to change significantly in the foreseeable future. Indeed, completion of global or regional free trade agreements that include effective lowering of trade barriers facing these products could well strengthen New Zealand's market shares and comparative advantage.

The notion that natural resource –based countries will inevitably experience slower growth than other countries would appear to have been laid to rest. One of the reviewed studies showed that as a country's exports became more 'sophisticated' in terms of employing technologies, endowments and marketing capabilities found in high-income countries, growth in overall exports followed. Some agricultural goods including processed foods can be 'sophisticated' given the capital, scale and skill intensities employed.

Another reviewed paper further developed the idea of a 'sophistication index' by recognising that some traded goods have higher productivity levels than others, and that such goods may be associated with higher income economies. It concluded that their country-level index significantly predicted economic growth was also positively correlated with the level of human capital. Furthermore, not all natural resource-exporting countries had low sophistication scores. Indeed, New Zealand was second only to Canada among a list of such countries, suggesting New Zealand includes in its export basket some relatively-sophisticated goods processed from agricultural raw materials.

The idea that export goods may be mapped in a product space in terms of their 'relatedness' is intriguing. The reviewed research offered explanations as to why patterns of comparative advantage and export structure changed the way they have. Some goods are related in terms of their employment of similar technologies, endowments and institutions for example, and entrepreneurs may find it less costly to move to closer, rather than more distant, products in this space. New Zealand was shown to be located in a relatively 'dense' region of the product space (which included some food products), implying its firms would find it less-costly to develop new related products than if the country was located in a more sparse region of that space.

It could be argued that the development of successful processed food exports from earlier semi-processing activities is an example of the above theory at work, such as exports of fresh and chilled meats compared with frozen carcasses in past years. Other examples abound, such as more recent export successes in infant food preparations, dietary supplements and some pharmaceutical products based on agricultural or fish raw materials. These are examples of the agricultural and food processing sectors stimulating new export successes in 'related' products.

From a policy perspective, what might government do to continue and hasten such developments within New Zealand's 'product space'? The usual suspects come to mind, such as education and immigration policies to promote accumulation of the necessary human capital and skills, a greater

focus on the organisation and funding of R&D, more well-targeted foreign investment to augment domestic sources, and continuing improvements to infrastructure for the transport of both physical and digital products. Continuing efforts to seek reductions in foreign trade barriers that confront many New Zealand exports of agricultural and agricultural-related goods remain a high priority, not only to ensure greater market access, but to reduce tariff escalation whereby further-processed and value-added goods face higher tariffs than their raw material ingredients⁶, and to bring down agricultural tariffs closer to the levels faced by many of New Zealand's manufactured exports.

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⁶ For example value-added timber products face tariff protection in China whereas exported raw logs do not.

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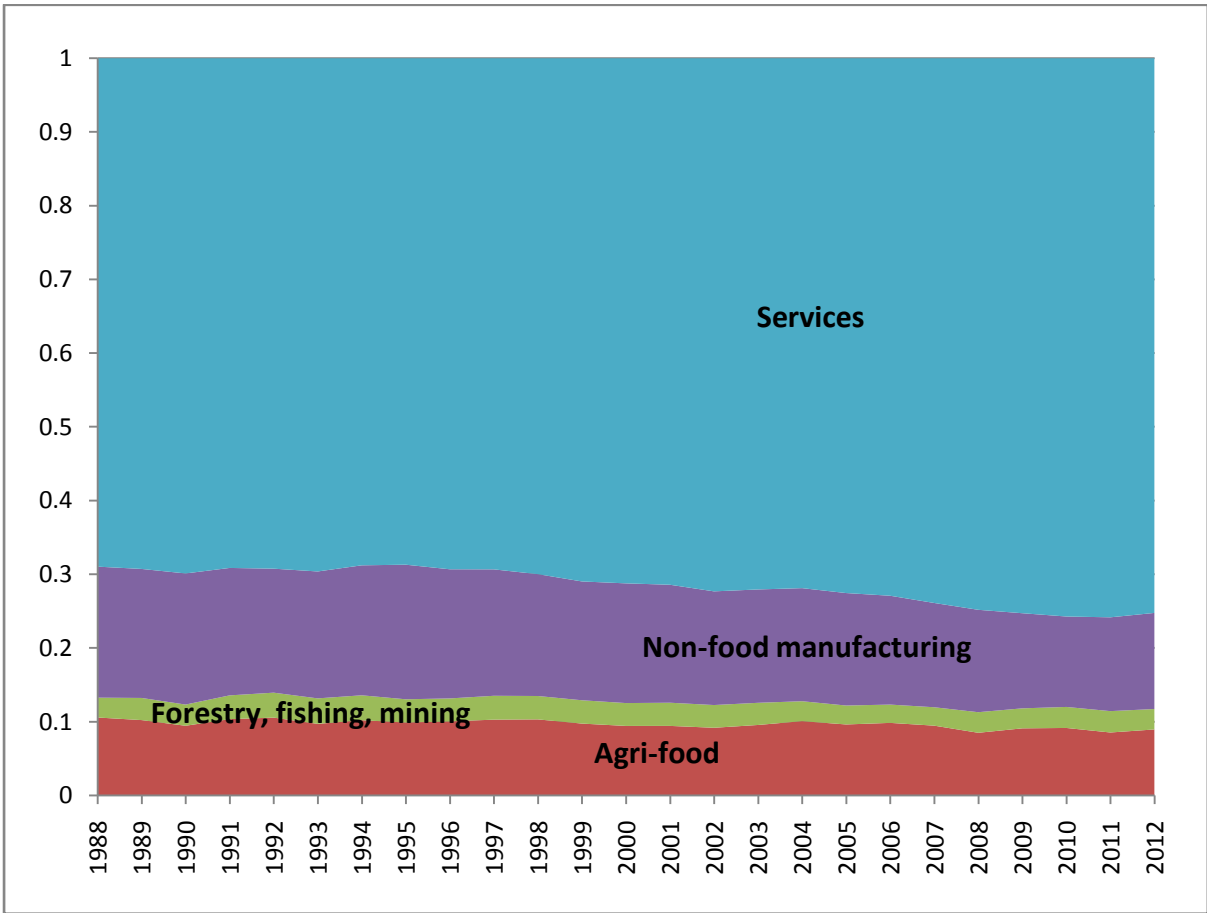


Figure 1. Sectoral shares in GDP

Source: Statistics NZ: GDP by Industry Group

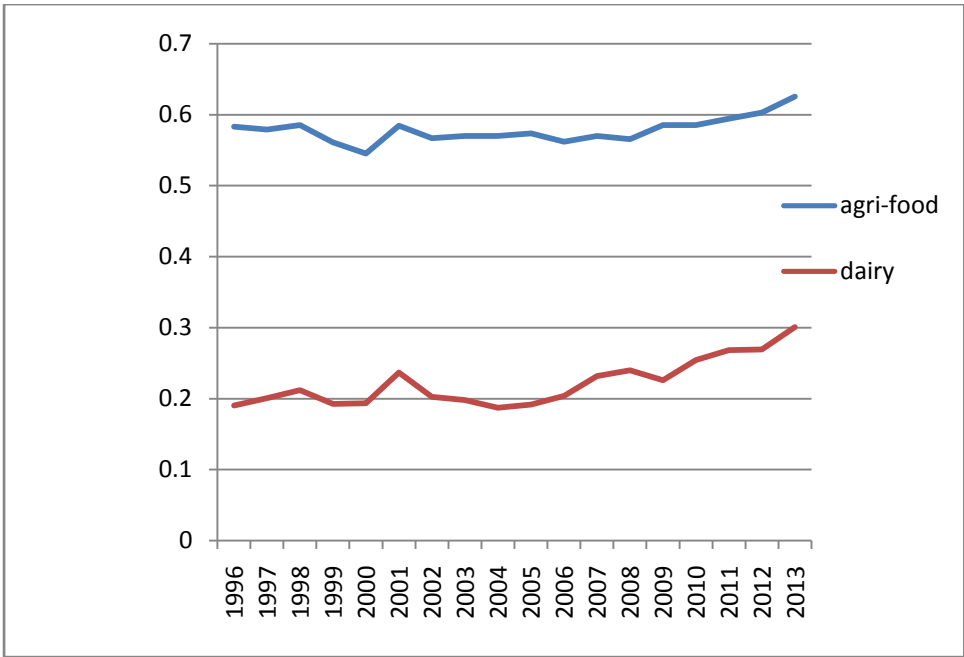


Figure 2. Share of agri-food in total NZ merchandise exports

Source: COMTRADE

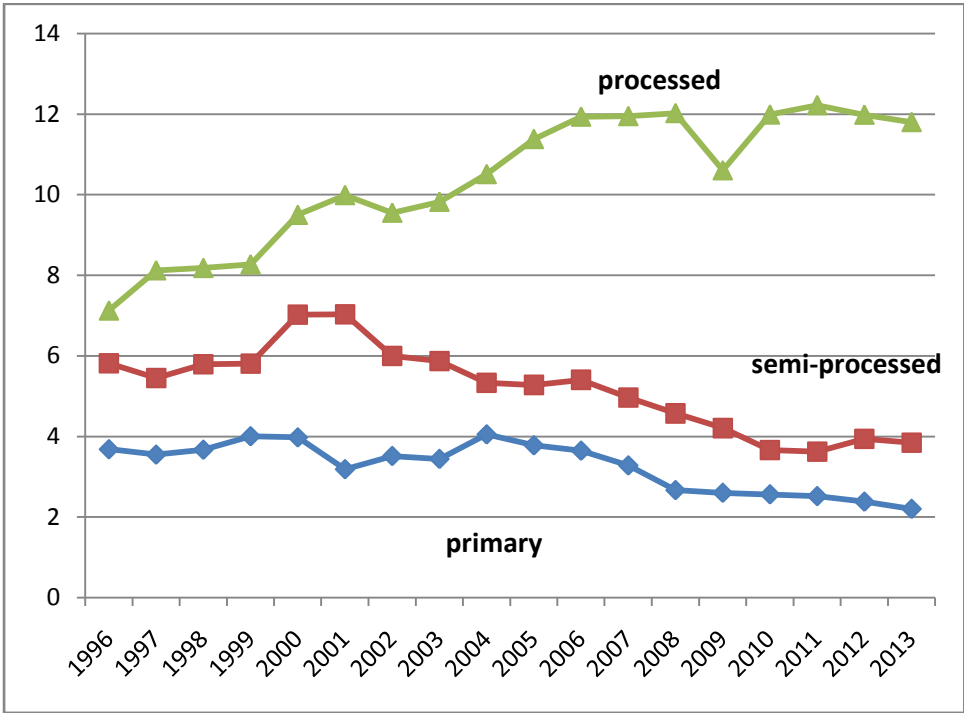


Figure 3. New Zealand’s revealed comparative advantage in agricultural and food products

Source: COMTRADE