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Building a picture of New Zealand manufacturing

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NON-TECHNICAL SUMMARY

Manufacturing makes up a substantial share of New Zealand's total economic activity, but that share has been falling for several decades. Something similar has happened in a range of advanced countries. However, manufacturing activity fell particularly sharply in the 2008/09 recession, and there has been only a modest recovery since then. In this note, we look at what has gone on, drawing on the wide range of data available on manufacturing activity in New Zealand.

The New Zealand manufacturing sector is quite diverse. The largest single component of the sector involves the processing of New Zealand's primary production (meat and dairy). A significant part of the sector manufactures for export: the single biggest export market is Australia. But 60 percent of all the output of the manufacturing sector is sold domestically, much of it supplying the domestic construction sector.

Exports of (non-primary) manufactured goods have held up relatively well in the last few years. This should not be too surprising. Economic activity in Australia has remained quite robust, and although the exchange rates of both countries have risen strongly, New Zealand's exchange rate against the Australian dollar has been relatively low.

By contrast, domestic production and sales have been weak. Analysis presented in this note, drawing on Statistics New Zealand's data on the inputs used in each sector of the economy, suggests that the very weak domestic construction sector over the last few years can explain much of the overall weakness in manufacturing activity. Something similar has been seen in other countries where construction sector activity has remained weak in the years since the recession.

1. INTRODUCTION

Manufacturing is a large and diverse part of the New Zealand economy. As in many countries, the share of manufacturing in the economy has been shrinking for decades, but activity has been particularly weak since the 2008/09 recession. This paper tries to explain the recent weakness, exploring the influence of the exchange rate, demand from overseas purchasers, and demand from domestic purchasers.

The next section summarises the data sources used in this paper. Section 3 outlines the composition of the manufacturing industry, and section 4 describes recent developments in the industry. Section 5 characterises the industry's structure and demand conditions. Section 6 discusses the experience of the industry during and after the 2008-09 recession, and section 7 concludes.

2. SOURCES OF INFORMATION ABOUT MANUFACTURING

A variety of Statistics New Zealand data on the manufacturing sector can be used to get a picture of the key economic concepts. These include:

- Value added in production
  The System of National Accounts (SNA) measures quarterly gross domestic product (GDP) as the sum of the value added by every industry in that quarter. At industry level, value added in production is the difference between an industry's outputs and intermediate inputs – sales less purchases – with corrections for inventory changes and indirect taxation. This paper sometimes refers to value added in manufacturing as "SNA manufacturing".

- Output
  The actual output of an industry, measured in nominal terms, is used in Input-Output (IO) tables. This output measure is typically larger than value added in production, as it is not adjusted for the value of the intermediate inputs used in production. IO tables characterise the interdependencies between industries in the economy, providing a very detailed picture of the inputs to and uses of each industry's production. Statistics New Zealand recently released an IO table for the year ended March 2007.

- Sales, purchases, and stocks
  The Economic Survey of Manufacturing (ESM), a comprehensive quarterly survey of manufacturers operating in New Zealand, provides the source data for SNA manufacturing. The ESM measures total sales (operating income), purchases (operating expenditure), labour costs, and inventory levels.

- Exports and imports
  This paper uses overseas merchandise trade (MT) data on exports and imports classified by level of processing (LOP).[1]

  MT data measure the value of all goods crossing New Zealand's borders. The LOP classification is ideally suited to analysis of manufactured trade. Exports and imports are placed in one of the following five categories: primary (unprocessed); primary (processed); manufactured (simply transformed); manufactured (elaborately transformed); miscellaneous, unclassified, and confidential. The specific definition of manufactured trade used in this paper is detailed in the appendix.

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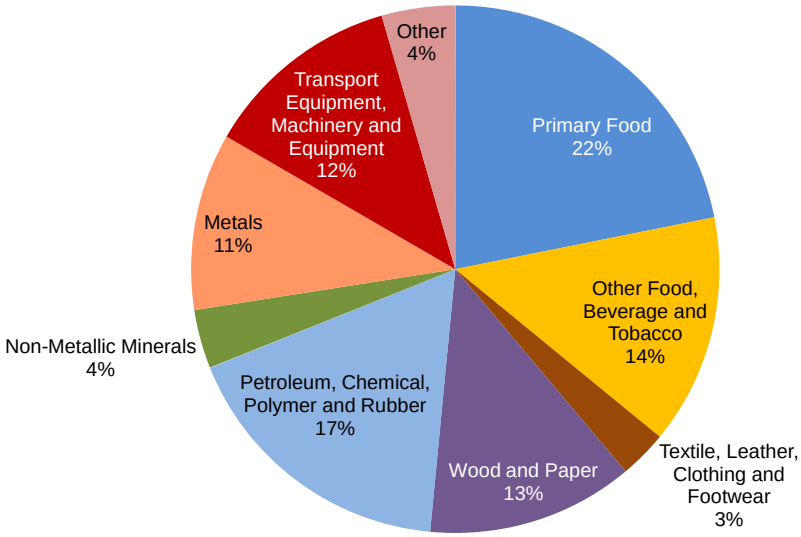
[1] The author is grateful to staff in Statistics New Zealand's Overseas Trade section for providing, on request, a detailed LOP dataset and a country classification.

3. WHAT DOES NEW ZEALAND MANUFACTURE?

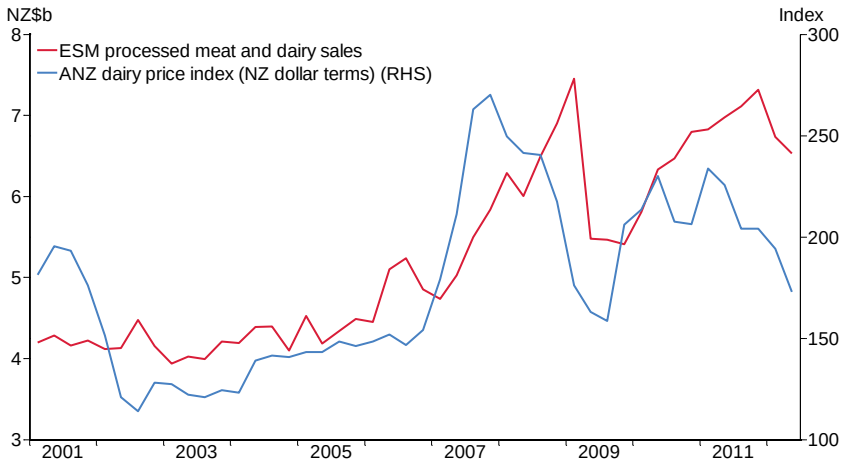
Manufacturing in New Zealand is measured in nine sub-industries (figure 1).

Figure 1: SNA manufacturing sub-industries (real shares, year to June 2012)[2]



The largest component is primary food manufacturing, which involves the processing of dairy and meat products. This sub-industry is likely to be influenced by factors affecting primary production, such as weather. In recent years, the value of processed food sales has also been affected by swings in world food commodity prices (figure 2). Consequently, the primary food component is sometimes excluded from the analysis in this paper in order to abstract from the nominal effects of commodity price changes, as well as from the effects of climate on agriculture-related manufacturing.

Figure 2: Primary food manufacturing sales and prices (nominal, seasonally adjusted)



Source: Statistics New Zealand, ANZ National Bank Ltd.

[2] The "other" category includes printing, furniture, and some elaborately transformed products, such as medical devices.

4. THE MANUFACTURING INDUSTRY TODAY

In the June quarter 2012, the manufacturing industry made up 13.6 percent of New Zealand's real GDP. This share has been trending down for decades (figure 3), as it has in many (although by no means all) advanced economies (figure 4). The declining relative size of the manufacturing sector (in countries with weak exchange rates as well as in countries with strong exchange rates) reflects a general shift in many advanced economies towards a greater emphasis on the production and consumption of services.

Figure 3: Real share of manufacturing in GDP (seasonally adjusted)

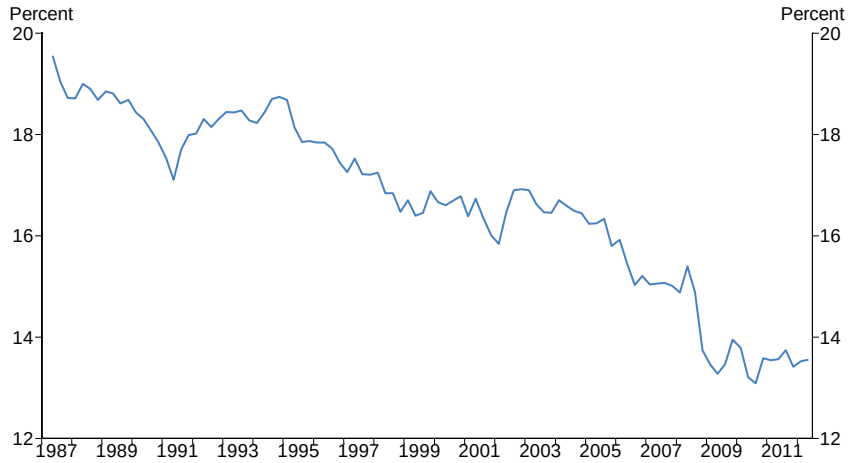
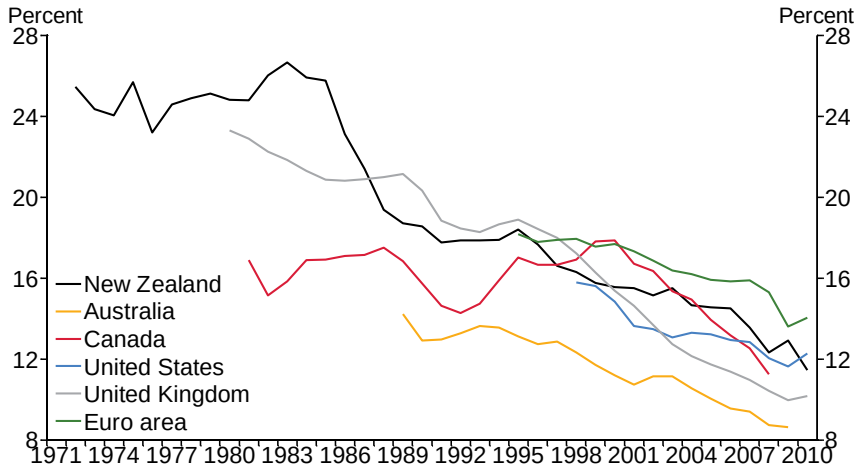


Figure 4: Nominal shares of manufacturing in GDP, selected economies (annual)



Source: Statistics New Zealand, OECD (http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1#, retrieved 13 November 2012).

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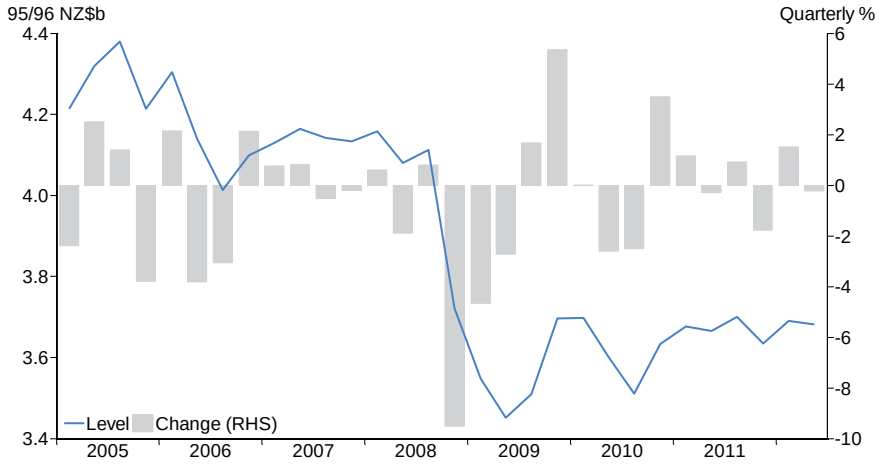
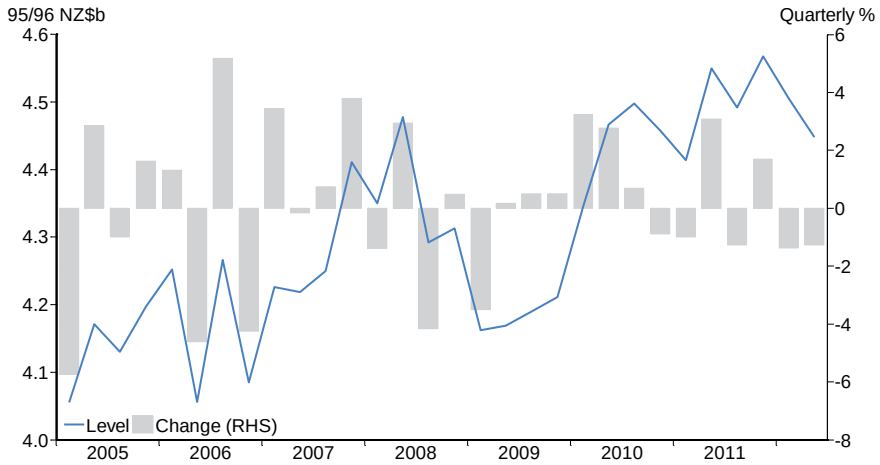
Figure 5: Real quarterly manufacturing value added (excluding meat and dairy processing, seasonally adjusted)



Manufacturing activity fell sharply during the 2008-09 recession (figure 5). After reaching a trough in the June quarter 2009, total manufacturing activity subsequently grew only quite slowly. By contrast, real manufactured exports grew fairly quickly (figure 6). These two series are not directly comparable – figure 5 shows value added (i.e. net of intermediate consumption), while figure 6 simply shows the gross volume of exports, which can be larger in magnitude. (In the year ended March 2007, only around 30 percent of nominal manufacturing output was value added, with the rest being intermediate inputs.)

Even allowing for the different statistical bases, it appears that the weakness in manufacturing has been most severe not among exporters but among firms selling to the domestic market.

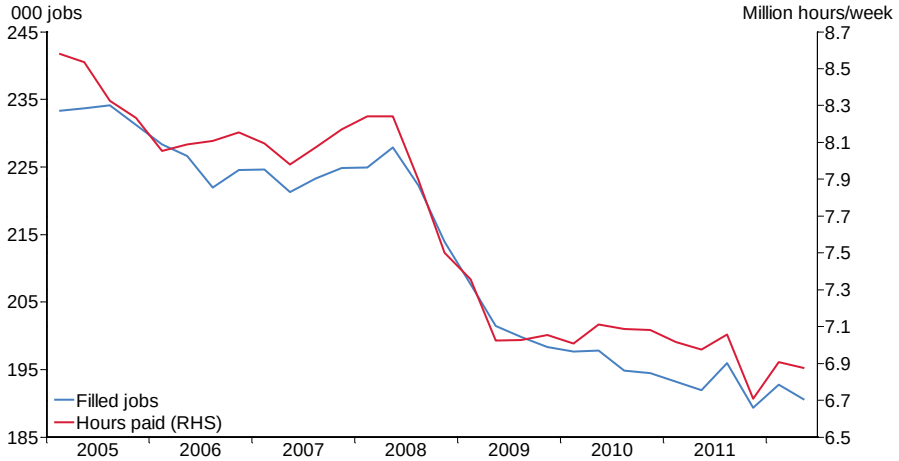
Figure 6: Real quarterly gross manufactured exports (excluding meat and dairy processing, seasonally adjusted)[3]



[3] This series is the sum of exports of metals, machinery and equipment, chemicals, plastics, rubber, petroleum, textiles and clothing, wood and paper products, and food, beverage and tobacco (excluding processed meat and dairy products).

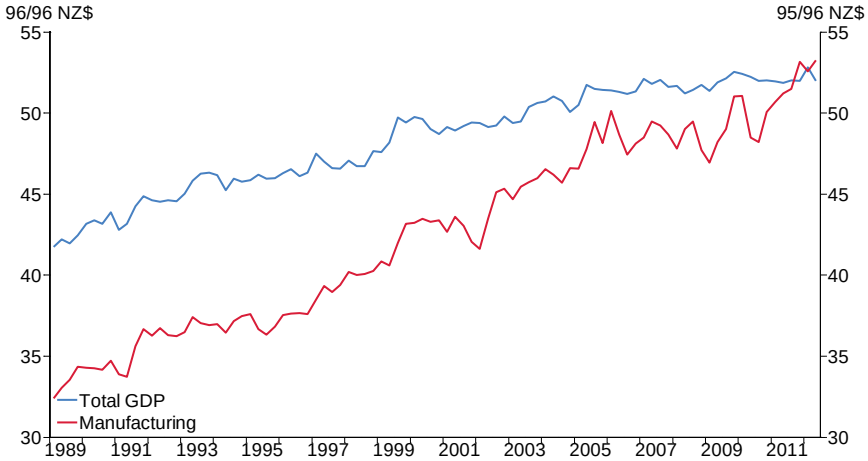
Lower overall activity meant that manufacturers had less need for labour during and after the recession. The fall in activity coincided with a fall in employment, with both jobs and hours declining sharply (figure 7). While activity growth recovered only slowly in the following years, employment has not recovered.

Figure 7: Manufacturing industry jobs and hours (Quarterly Employment Survey, seasonally adjusted)



In combination, flat or falling employment and modestly rising output imply that labour productivity has been increasing in the years following the recession. This increase is a continuation of the upward trend in manufacturing labour productivity that has persisted for several decades. Labour productivity has been increasing somewhat faster in manufacturing than in the whole economy, including over the last few years (figure 8).

Figure 8: Labour productivity (real value added per hour, seasonally adjusted)

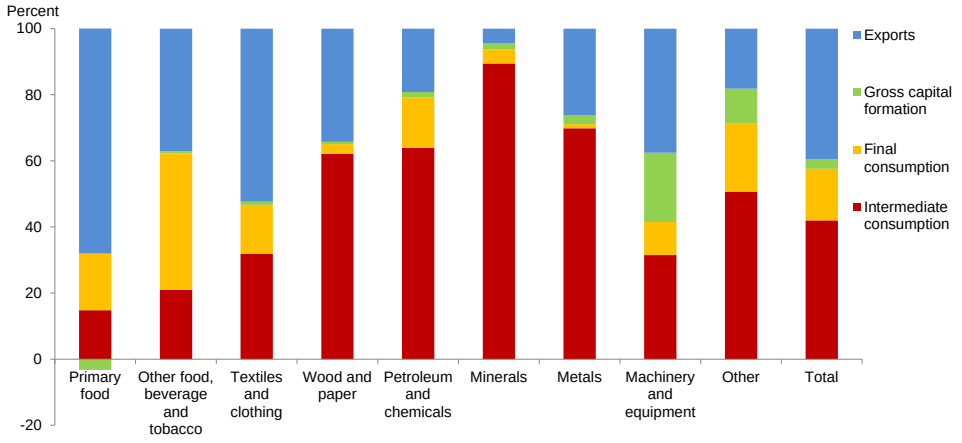


In order to understand these developments in manufacturing, we now examine the structure of the industry's inputs and demand.

5. WHO USES NEW ZEALAND'S MANUFACTURED GOODS?

The output of the manufacturing sector is used by both domestic and overseas purchasers. The March 2007 input-output (IO) table shows that around 40 percent of the output of the manufacturing industry is supplied to other industries in the economy in the form of intermediate consumption, and around 40 percent is exported (figure 9). However, the composition of demand is quite different for different sub-industries. Food, beverage and tobacco manufacturers, for example, supply a relatively large proportion of their output directly to domestic consumers, meaning that changes in consumption conditions (such as consumers' incomes) might be expected to affect these manufacturers more quickly than those with less direct exposure to domestic consumption.

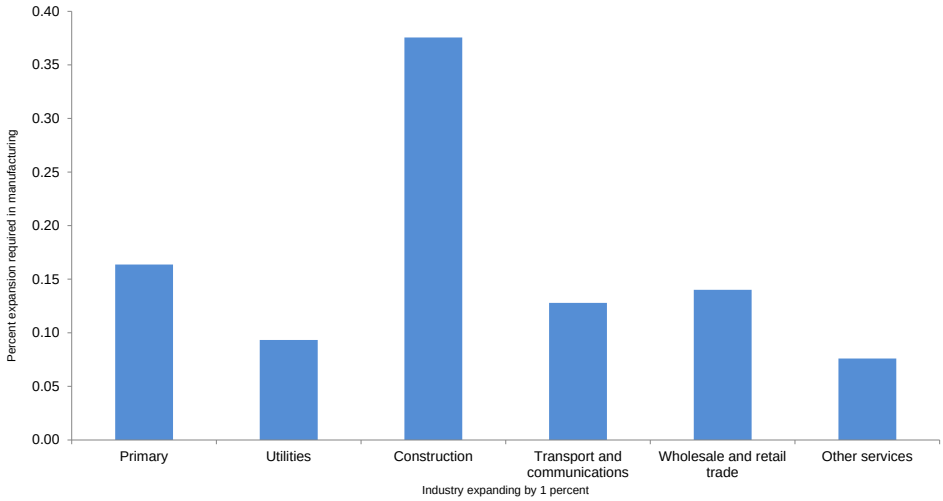
Figure 9: Uses of manufacturing industry output (nominal, year ended March 2007)



Because many other industries use manufactured goods in their own production, there is considerable interdependence between manufacturing and the other industries of the economy. The IO table characterises industry interdependence by measuring the proportional expansion required in every industry in order to achieve an expansion of given size in a single industry. By this measure, every industry in New Zealand requires at least a 0.1 percent increase in domestic manufacturing output (as well as expansions in other industries) in order to expand its own output by 1 percent (figure 10).

Construction is the industry most heavily dependent upon manufactured inputs. A 1 percent expansion in construction activity requires a 0.38 percent expansion in manufacturing activity, comprising changes of roughly 0.1 percent in each of four sub-industries: wood and paper, petroleum and chemicals, minerals, and metals. Consequently, it would be expected that changes in construction activity would be associated with large proportional changes in manufacturing activity, and particularly in these four sub-industries.

Figure 10: Percent expansion required in manufacturing sub-industries to provide a 1 percent expansion in other industries[4] (nominal, year ended March 2007)



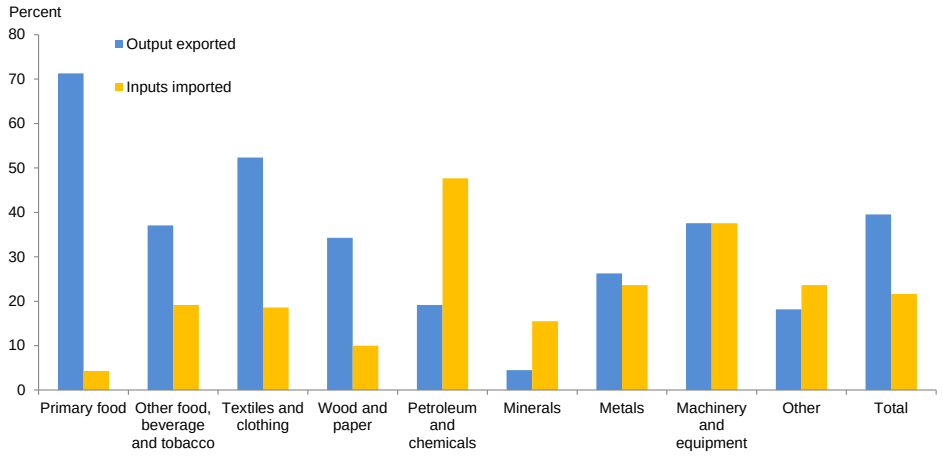
The manufacturing industry is also quite exposed to international factors such as world demand and the exchange rate. The degree of exposure may be measured in a range of ways. Relevant measures include the proportion of output or sales that are exported; the proportion of inputs that are imported; and the degree of import competition, measured by the proportion of domestically sold goods that are imported.

Manufacturing sector output may be either directly exported or supplied to domestic customers, and inputs may be either directly imported or sourced from domestic suppliers. In the year ended March 2007, according to the IO table, the manufacturing industry directly exported 40 percent of its output, while sourcing 22 percent of its inputs directly from overseas. These ratios underestimate actual trade exposure, as they do not account for less direct exposures. Such exposures might include inputs imported for intermediate use by another industry before supply to the manufacturing industry, or manufactured goods supplied to another industry as intermediate inputs for export goods.

International exposure ratios are very different in different sub-industries (figure 11). Primary food manufacturers export the highest proportion of their output; milk powder makes up the majority of exports from this sub-industry. Petroleum and chemical manufacturers import the highest proportion of their inputs. A significant proportion of this sub-industry is engaged in refining imported crude oil. Mineral manufacturers neither import nor export very much; their main outputs are construction materials – glass, plaster, cement, concrete and stone – that are mostly derived from domestic quarrying, and supplied to the domestic construction sector.

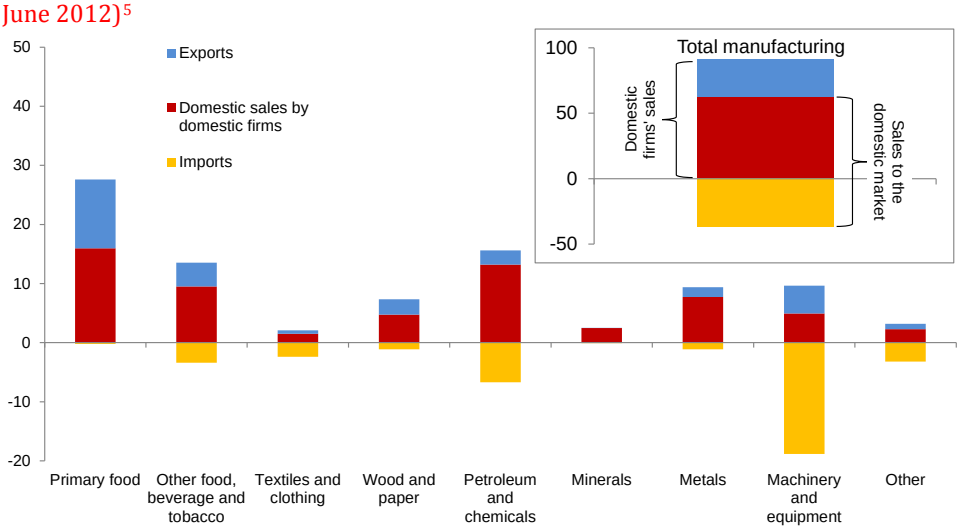
[4] To achieve a 1 percent expansion, each industry requires expansions in other industries as well as the expansion in manufacturing that is shown here.

Figure 11: Manufacturing industry trade in inputs and outputs (nominal, year ended March 2007)



A more timely, but less reliable, approximation of international exposure is obtained by combining ESM sales with MT data. These data are collected from different sources and for different purposes, so they are not directly comparable; inferences drawn by comparing them may be imprecise. Nonetheless, MT exports of manufactured goods accounted for 31 percent of total ESM sales in the year ended June 2012. Adjusting ESM sales for net exports provides an estimate of total sales to the domestic market, including imports. Imports of manufactured goods accounted for 37 percent of this total in the same year. Again, these exposure ratios are quite different in the various sub-industries (figure 12).

Figure 12: Composition of MT and ESM nominal manufactured sales (NZ$b, year ended June 2012)[5]



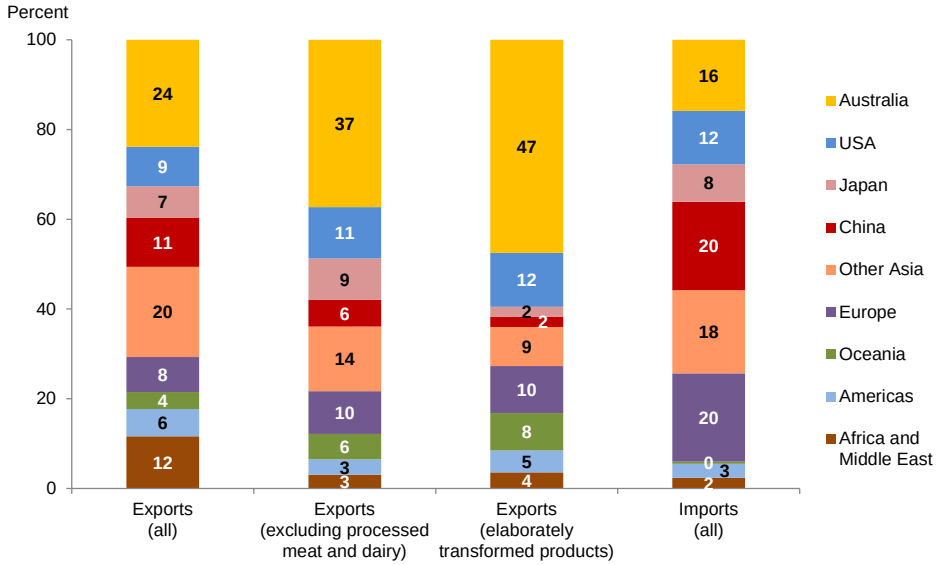
As well as the degree of international sensitivity, manufacturers' sales are influenced by the composition of their trade with other countries – the destinations of their exports, as well as the sources of competing imports. Both imports and exports of manufactured goods are dominated by trade with Australia and Asia (figure 13).

[5] The series "domestic sales by domestic firms" is the residual obtained by subtracting merchandise trade net exports from ESM sales.

Exports to Asia are largely processed primary food products, such as milk powder; Australia is a more important trading partner for manufactured exports other than primary food. In the even narrower class of elaborately transformed products, Australia accounts for nearly half of all exports, while only 13 percent go to Asian countries.

About half of all imported manufactured products originate from Asia. Many of these will compete directly with domestically produced goods. The import composition shown in figure 13 is very similar for the various classifications of manufactured goods.

Figure 13: Destinations and sources of manufactured merchandise trade (nominal shares, year ended June 2012)



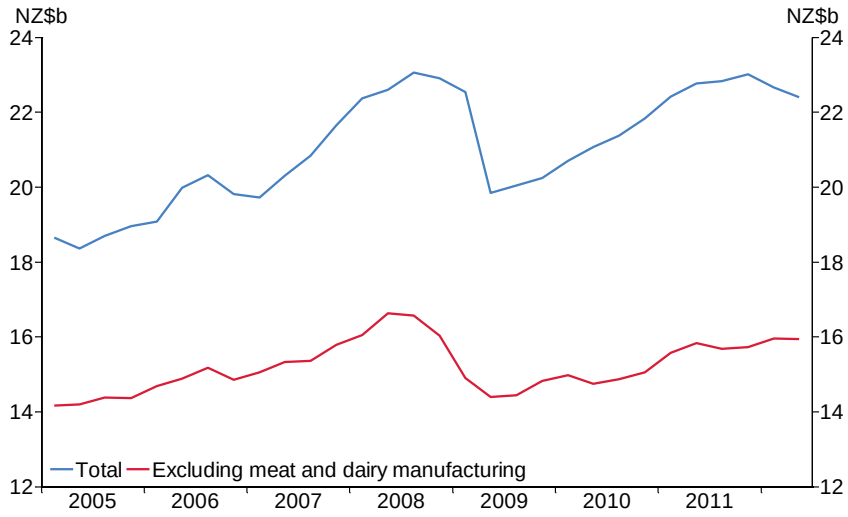
In sum, setting to one side products such as milk powder that are driven by global demand for commodities, the manufacturing industry is especially sensitive to two sets of purchasers: the domestic construction industry, and buyers in Australia. At the same time, manufacturers selling to the domestic market face competition from imports originating in Asia. Exporting manufacturers will also be competing with Asian products in many of their export markets. This market structure was a key determinant of how the industry fared during and after the recession.

6. MANUFACTURING AFTER THE RECESSION

New Zealand, along with many other countries, went into recession in 2008. The recession lasted a year and a half, ending in the June quarter 2009. Value added in the manufacturing industry fell rapidly and substantially during the recession and has remained low since, as was seen in figure 5. In the June quarter 2012 real manufacturing activity remained 9 percent below its pre-recession peak, even though aggregate GDP had recovered to its previous peak in the December quarter 2011.

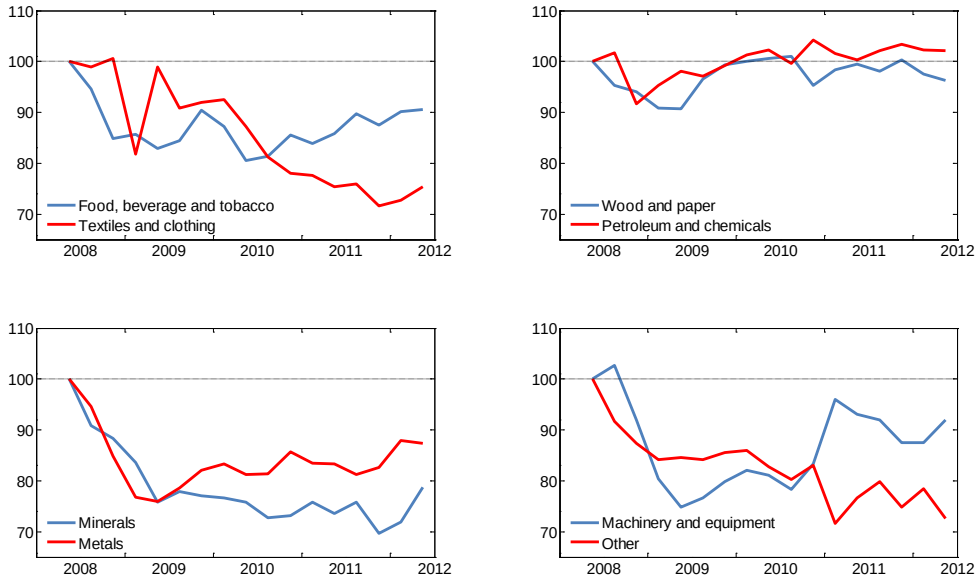
During the recession, the fall in demand both in New Zealand and overseas rapidly affected the manufacturing industry. Sales values fell sharply from the December quarter 2008 to the June quarter 2009 (figure 14). Around half of the fall in nominal sales over this period was due to meat and dairy manufacturing alone, reflecting the fall international food commodity prices (see figure 2).

Figure 14: ESM quarterly sales values (nominal, seasonally adjusted)



The post-recession weakness in manufacturing activity was spread across all sub-industries, indicating that difficult trading conditions existed industry-wide. The initial fall in activity in 2008 was experienced in all sub-industries, and weak growth in subsequent years was also widespread (figure 15). Only two sub-industries had regained their 2008 levels of activity by June 2012, while most other sub-industries grew very little in the years following the trough.

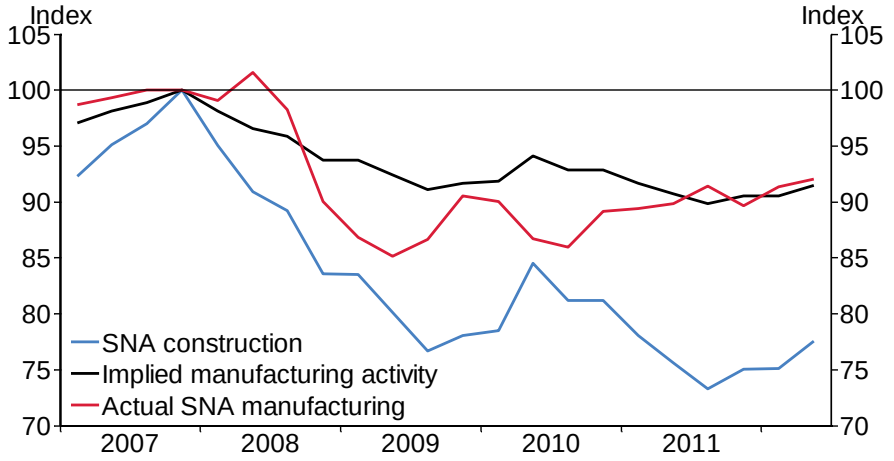
Figure 15: Real quarterly SNA manufacturing by sub-industry (seasonally adjusted, indices, June quarter 2008 = 100 percent)



Although total manufacturing activity has lifted somewhat since the trough of the recession, there is no evidence of any strong or broad-based improvement in conditions during these years. The two partial recoveries in total manufacturing production, beginning in late 2009 and late 2010, were both fairly idiosyncratic. The pickup in late 2009 came mostly from food, beverage and tobacco manufacturing, but this was quickly reversed. The lift in production in late 2010 was solely due to machinery and equipment manufacturing, which subsequently maintained its higher level of production.

An important factor behind this broad-based weakness in manufacturing was weakness in the domestic construction sector. Construction activity contracted by 22 percent between the December quarter 2007 and the December quarter 2009, and remained low in the following years. As we saw in figure 10, construction is highly dependent upon manufactured inputs. The fall in construction activity represented a significant decline in demand for the manufacturing industry. The elasticity shown in figure 10 implies that the construction industry contraction that took place between December 2007 and June 2012 is consistent, by itself, with a cumulative 8.5 percent fall in manufacturing activity – quite close to the fall that actually occurred (figure 16). Construction activity has remained very weak following the recession in various other advanced economies, and this weakness is reflected in the manufacturing output of those countries too (the United Kingdom is an example).

Figure 16: Construction and manufacturing real value added (seasonally adjusted, indices, December quarter 2007 = 100 percent)[6]



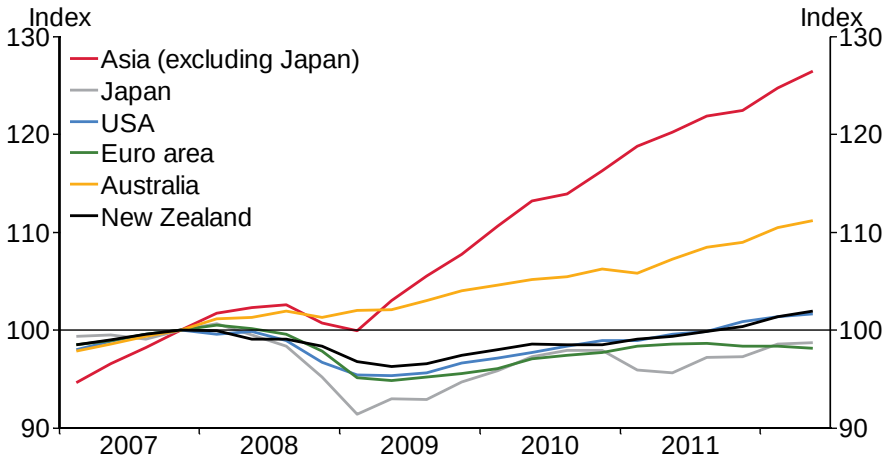
Of course, there were many other factors besides construction activity affecting the industry at the time. The construction-related fall in manufacturing would be expected to be concentrated among manufacturers of wood products, minerals, metals, and petroleum and chemicals (see figure 10). Other sub-industries – and, indeed, these ones – would have been affected by a range of other influences; for example, from

[6] The series "implied manufacturing activity" shows the cumulative change in SNA manufacturing implied by the cumulative change in SNA construction alone, using the elasticity of 0.38 from figure 10.

late 2008 to early 2011, actual manufacturing activity was well below that implied by the fall in construction alone. This additional weakness in manufacturing was most likely due to international factors.

At the same time that construction activity was shrinking, trading partner demand was also weak. Between mid-2008 and early 2009, all of New Zealand's trading partners experienced either constant or contracting GDP (figure 17). The weak activity seen in Australia and Asia would have been particularly significant for manufacturing exporters. From 2009 activity began to recover in both Asia and Australia, providing some lift in demand for manufactured exports.

Figure 17: Real GDP in selected economies (seasonally adjusted, indices, December quarter 2007 = 100 percent)



Source: Haver Analytics, Statistics New Zealand, RBNZ estimates.

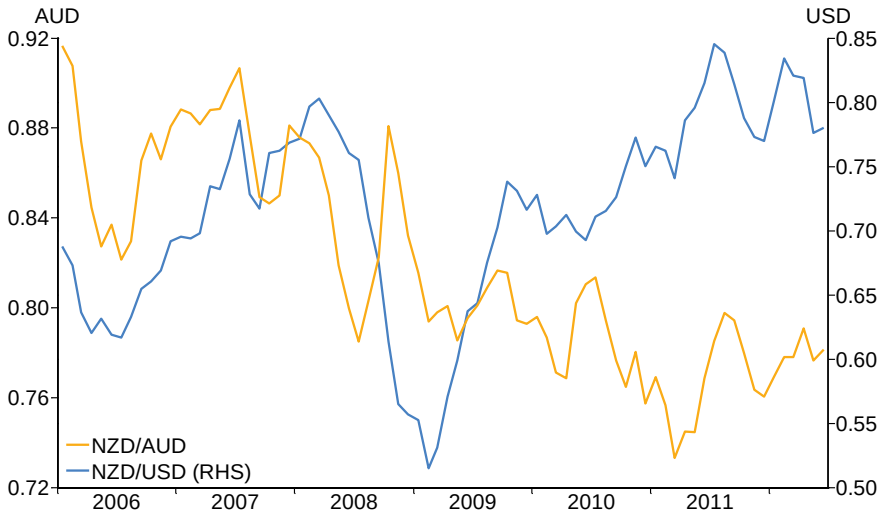
As we saw in figures 5 and 6, manufactured exports outperformed domestic demand in the years following the recession. Weak construction activity meant that domestic demand for manufactured goods was subdued, while relatively robust trading partner demand supported comparatively strong growth in manufactured exports. One other important factor affecting manufacturers is the degree of competition they face from the manufactured goods of other countries – either within New Zealand or in export markets. This competition is very sensitive to exchange rates and their influence upon relative prices.

Australia is the most important market for New Zealand's manufactured exports, while Asia is the biggest source of New Zealand's manufactured imports (see figure 13). The importance of Asian manufactured exports in the world market means that New Zealand's manufactured products will compete with Asian products in every market where they are sold – both domestic and overseas. Many of the currencies of the Asian region are pegged, more or less strongly, to the US dollar, meaning that both domestic and exporting manufacturers effectively face competition in US dollars.

In addition to competing with manufactured goods from Asia, New Zealand exporters compete with manufactured goods produced within their export markets. For most exporting manufacturers, this means competing with Australian manufacturers in Australian dollars.

Since the recession, these two exchange rates have shown very different patterns (figure 18). The New Zealand dollar appreciated against the US dollar between early 2009 and June 2012, increasing the competitiveness of manufactured goods priced in US dollars, and diminishing that of goods priced in New Zealand dollars. At the same time, the New Zealand dollar appreciated significantly against the euro as well. Consequently, both in New Zealand and overseas, demand would have shifted away from New Zealand manufactured goods and towards those from Asia, the US, and Europe.[7] Over the same period the New Zealand dollar was fairly low against the Australian dollar, meaning that the competitiveness of goods exported to Australia did not decline in comparison with Australian products (although it would have declined in comparison with many of the goods imported to Australia from third countries).

Figure 18: New Zealand dollar nominal exchange rates to June 2012



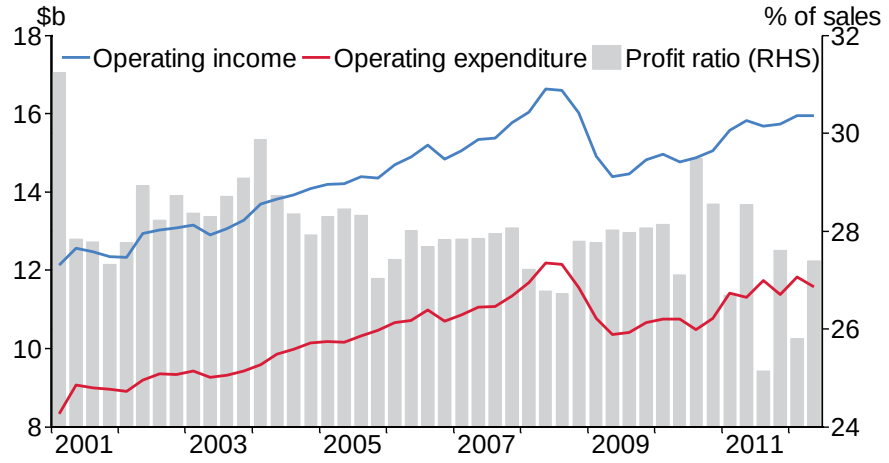
Source: Bloomberg.

These exchange rate patterns help to explain why manufactured exports have outperformed domestic sales since 2009. Exporters have experienced modestly growing demand and a stable exchange rate with a major trading partner, while manufacturers competing with imports have been faced with falling prices on competing goods. At the same time, manufacturers selling to domestic customers – particularly the construction industry – have experienced very weak demand.

[7] The appreciation of the New Zealand dollar against the US dollar and euro would also have reduced the prices of intermediate inputs and capital equipment priced in these currencies, potentially reducing costs for some manufacturers.

Difficult trading conditions for the industry, then, arose from world demand, domestic demand, and the exchange rate. Despite this, manufacturers were able to control their costs as income declined, with the result that the industry-wide nominal profit ratio remained fairly stable during the recession (figure 19). As sales growth remained weak, aggregate profitability appears to have become materially more volatile. The reasons for this volatility are not clear, but may be related to heightened uncertainty about the economic environment.

Figure 19: Manufacturing industry nominal income and expenditure (ESM, seasonally adjusted, excluding meat and dairy manufacturing)



7. CONCLUSION

Manufacturing in New Zealand is a diverse industry. It comprises exporters and import competitors, firms with high and low international exposure, and firms supplying and being supplied by many different industries. What is not often appreciated is how much of the industry supplies the domestic construction sector.

The experience of the manufacturing industry during and after the 2008-09 recession was governed by three main factors: world demand, domestic demand, and the exchange rate. The initial fall in manufacturing production came as demand declined both domestically and abroad. However, demand for manufactured exports – especially in Australia – recovered from 2009, leaving many exporting manufacturers reasonably well-placed. Those exporting to Australia experienced the additional benefit of a relatively low and stable exchange rate, although they will still have faced competition from products originating in other countries and priced in US dollars.

Manufacturers selling to the domestic market faced even more challenging conditions. Domestic demand for manufactured goods remained very weak as the recovery in construction activity was delayed. At the same time, the competitiveness of import-competing manufacturers was being eroded by exchange rate appreciation against the euro and US dollar.

These challenging demand conditions mean that total manufacturing sales and output have recovered only modestly (something seen in various other advanced economies, including some with quite weak exchange rates). Productivity growth has continued unabated, but weak demand following the recession has presented a challenge for maintaining profitability. Looking ahead, most forecasters now expect a considerable increase in construction activity over the next few years, centred on, but not limited to, the post-earthquake repairs and reconstruction of Christchurch.

APPENDIX: MANUFACTURING SUB-INDUSTRY CLASSIFICATIONS

SNA category	ESM category	LOP category	LOP code
Primary food	Meat and dairy products	Meat and meat preparations	1211
		Dairy products – processed	1212
Other food, beverage and tobacco	Seafood processing	Fish, crustaceans, and molluscs, prepared	1213
	Fruit, oil, cereal, and other food	Cereal preparations	1214
		Vegetable and fruit preparations	1215
		Animal and vegetable oils, fats, and waxes	1217
	Beverage and tobacco products	Sugars, confectionery, coffee, cocoa, tea	1216
		Food, beverages, and tobacco n.e.c.	1219
Textile, leather, clothing and footwear	Textile, leather, clothing, and footwear	Manufactures – elaborately transformed – textiles, clothing and footwear	225
Wood and paper	Wood and paper	Wood, simply worked	1292
		Wood pulp	1293
		Wood and cork simply shaped and reconstituted	219115
		Paper and paperboard (simply transformed)	219116
		Paper and paperboard (elaborately transformed)	229113
		Joinery, carpentry and other wood manufactures	229114

MANUFACTURING SUB-INDUSTRY CLASSIFICATIONS (CONTINUED)

SNA category	ESM category	LOP category	LOP code
Petroleum, chemical, polymer and rubber	Petroleum and coal	Primary products – processed – fuels	122
	Chemical, polymer, and rubber	Manufactures – simply transformed – chemical	213
		Manufactures – simply transformed – plastic	214
		Manufactures – elaborately transformed – chemical	222
		Manufactures – elaborately transformed – plastic	223
Non-metallic minerals	Non-metallic mineral products	Manufactures – simply transformed – mineral	211
Metals	Metal products	Manufactures – simply transformed – metal	212
		Manufactures – elaborately transformed – metal	221
Transport equipment, machinery and equipment	Transport equipment, machinery and equipment	Manufactures – elaborately transformed – mechanical and electrical machinery & equipment	224
Total manufacturing	Total manufacturing	Primary products – processed – food	121
		Primary products – processed – fuels	122
		Wood, simply worked	1292
		Wood pulp	1293
		Manufactures	2