

The relationship between the Australian manufacturing and construction sectors

Executive summary:

- Manufacturing is a significant supplier of intermediate goods to the domestic construction sector. Manufacturing industries that are significant suppliers of intermediate inputs to the construction sector are other non-metallic mineral products; fabricated metal products except machinery and equipment; wood and products of wood and cork; basic metals and; machinery and equipment.
- The engineering construction and non-dwelling construction industries rely to a greater degree on inputs from the non-metallic mineral products and fabricated metals products industries. In contrast, the dwelling construction industry is relatively more reliant on plaster and concrete product manufacturing, ceramic product manufacturing and sawmills (wood) product manufacturing.
- For most of the last decade there has been a consistent positive trend between the outputs of the two sectors. However, the period immediately preceding and post the global financial crisis has seen a divergence in performance of the two sectors.
- The period mid 2006 to mid 2008 was characterised by concurrent growth in manufacturing activity and in all three broad sectors of the construction sector.
- Mid 2008 to third quarter 2009 saw the onset of the global financial crisis and dwelling and non-dwelling construction activity bore the brunt of the weakening in domestic demand and tighter credit conditions. Corresponding with these trends, manufacturing activity weakened through this period both through direct demand effects and a tightening of credit conditions.
- Manufacturing growth improved through the final quarter of 2009 through to the third quarter of 2010. This corresponded with rising investment in dwelling construction consistent with a lift in approvals in 2009 on the back of grant schemes to first home owners. The rate of contraction in non-dwelling construction also decelerated over this period in line with the increase in public building works stemming from the Federal Government's Education stimulus program. While this stimulus package did benefit some manufacturers that supply to construction, the manufacturing sector was still having difficulty in terms of credit availability and this acted as a constraint on growth.
- The benign overall growth in manufacturing activity from the December quarter 2010 has coincided with renewed weakness in dwelling investment and a contracting non-dwelling sector. This reflects a range of factors including the dampening demand impact of higher interest rates, stretched affordability, a diminishing level of Government backed projects and subdued private investment in hotels, retail premises and other commercial construction projects.

- Nevertheless, construction gross valued added has risen since mid 2010, supported largely by strengthening engineering construction which has coincided with the re-instatement of capital investment expenditure in the mining and oil & gas processing sectors.
- This dichotomy of rising construction valued added and benign overall growth in manufacturing activity in this period is likely to reflect the disproportionate adverse impact of the appreciating exchange rate on trade exposed industries within the manufacturing sector compared to the construction sector which is subject to less trade exposure.

Introduction

This Note examines the interdependence between the Australian manufacturing and construction sectors, and the extent to which this relationship has changed in the period immediately preceding, during, and following the global financial crisis (GFC).

Section 2 examines the supply chain linkages (input-output) between the two sectors and between the industries within each sector. It shows that manufacturing industries are highly dependent on the construction sector for intermediate input sales. The degree of dependence varies across manufacturing industries and the interdependence with different parts of the construction sector is not uniform.

Section 3 analyses the behaviour and interrelationship over time – specifically examining trends over the last decade. It shows that there has been a high degree of interdependence between activity in the two sectors over the last decade but with a divergence in recent years whereby construction has recovered from the impact of the GFC and manufacturing sector activity continues to be anaemic. Reasons for this divergence in performance are canvassed.

Section 4 canvasses reasons for this divergence and delves into the recent relationship between the two sectors – specifically looking at pre-GFC and post-GFC cycles. It identifies four distinct periods when the relationship between the two sectors differed: mid 2006 to mid 2008; mid 2008 to third quarter 2009; fourth quarter 2009 to third quarter 2010; and fourth quarter 2010 to mid 2011.

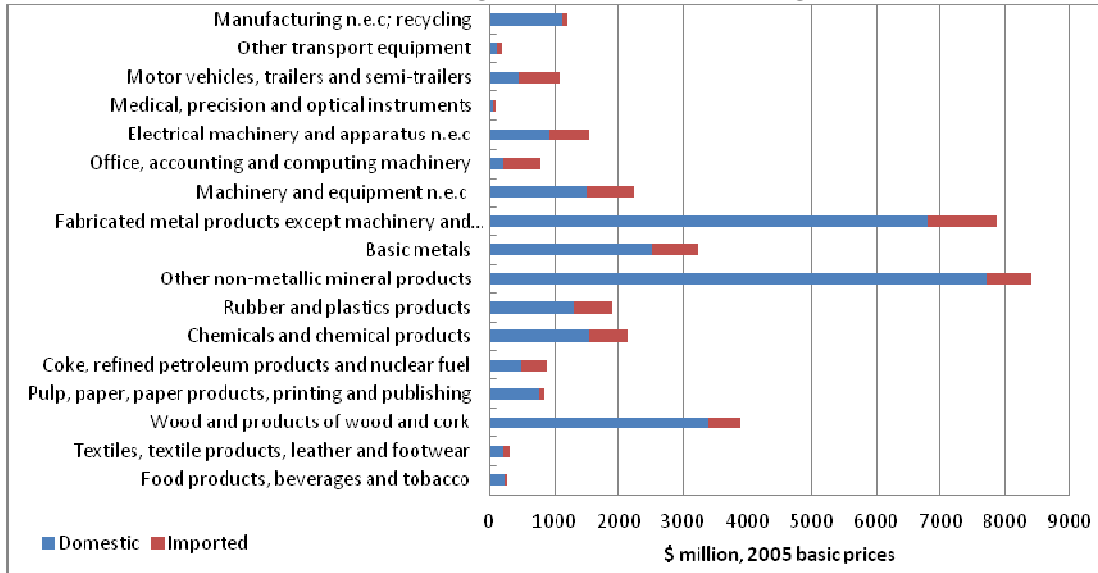
Section 5 provides concluding comments.

Nature of linkages between the two sectors

Manufacturing is a significant supplier of intermediate goods to the domestic construction sector. Approximately 30 per cent of all intermediate inputs demanded by the domestic construction sector are sourced from the manufacturing sector, including 24 per cent from the domestic manufacturing sector (the remaining 6 per cent is imported from overseas manufacturers). Of the 30 per cent sourced from the manufacturing sector, the demand from each manufacturing industry supplying to

the construction sector (including the split between domestic and imported intermediate input demand) is shown in Chart 1.¹

Chart 1: Domestic demand linkages between manufacturing and construction



Source: OECD input-output tables, 2004-05, basic prices, ISIC 3 digit industry classifications.

All manufacturing industries supply intermediate inputs to the domestic construction sector. Manufacturing industries that are significant suppliers of intermediate inputs to the construction sector:

- Other non-metallic mineral products.
- Fabricated metal products except machinery and equipment.
- Wood and products of wood and cork.
- Basic metals.
- Machinery and equipment.

The various manufacturing industries in Australia are highly dependent on the domestic construction sector. The degree of this dependence is evident in Table 1 which shows the percentage of each manufacturing industry's output that is used by the construction sector (as an intermediate input) when taking into account all uses of that industry's output (for example, the output of a manufacturing industry may be used as an intermediate input or may be consumed by households or government or be exported).

Table 1 shows that, consistent with Chart 1 which shows other non-metallic products is a key supplier of intermediate inputs to construction, approximately 60 per cent of the total output of the non-metallic products industry is to construction. Similarly 38 per cent of the output of the wood and products of wood manufacturing industry is demanded by the domestic construction sector while for

¹ The industry classification presented in this section is based on the International Standard Industrial Classification (version 3) used by the OECD rather than the ANZSIC codes used by the ABS.

fabricated metal products this figure is 32 per cent and for rubber and plastics products manufacturing it is around 13 per cent.

Table 1: Relative dependence of manufacturing industries on construction

Manufacturing industry:	Per cent of output used by construction sector
Other non-metallic mineral products	59.3
Wood and products of wood and cork	38.1
Fabricated metal products except machinery and equipment	32.1
Rubber and plastics products	13.4
Electrical machinery and apparatus n.e.c	11.1
Machinery and equipment n.e.c	10.0
Manufacturing n.e.c; recycling	9.6
Chemicals and chemical products	6.1
Basic metals	6.0
Coke, refined petroleum products and nuclear fuel	2.7
Pulp, paper, paper products, printing and publishing	2.6
Textiles, textile products, leather and footwear	2.2
Motor vehicles, trailers and semi-trailers	1.9
Medical, precision and optical instruments	1.6
Other transport equipment	1.3
Food products, beverages and tobacco	0.3

Source: OECD input-output tables, 2004-05, basic prices, ISIC 3 digit industry classifications.

The construction sector also has a comparatively low share of inputs sourced from overseas. This again reflects its close links with the domestic manufacturing industries related to building materials manufacturers as well as the relatively high rates of natural protection which are afforded to those building materials that are bulky or have a low price/high weight ratio.

Linkages between industries within each sector

Engineering construction

The engineering construction sector is primarily involved in the construction of major infrastructure, mining and heavy industrial resource based projects. Engineering construction is highly capital intensive and its supply network comprises a wide range of suppliers of manufactured materials such as tools components and machinery and equipment. Due to its high capital intensity the engineering construction sector makes greater use of large-scale machinery and plant than other building and construction sectors. By value, construction related to mining and the processing of oil, gas and other minerals account for the largest part of total private sector expenditure (42.9 per cent) followed by infrastructure (39.8 per cent) and utilities (16 per cent), including electricity, generation and supply projects and water supply projects.

Of all manufacturing industries, non-metallic mineral products provide the highest share of its intermediate outputs to engineering construction as inputs. For example, the cement, lime and ready-mixed concrete manufacturing provide 12 per cent of its intermediate outputs to engineering construction.

Fabricated metal products manufacturing is another source of inputs from the manufacturing sector. For example, the structural metal product manufacturing industry supplies around 10 per cent of its intermediate outputs to engineering construction.

Non-dwelling construction

Critical to construction activity in Australia is non-residential building (commercial construction). Both private sector operators and governments are active in non-residential building as initiators of projects but also as builders and constructors, although conditions in the industry are typically dominated by the private sector. The non-dwelling construction sector is more labour intensive than other building and construction sectors, although on some large-scale projects capital equipment requirements (e.g. cranes, hydraulic pumps) result in higher capital intensity. The main materials supplied by manufacturing industries include aluminium fittings, electrical and air conditioning components, elevators and materials handling systems and steel fabricated products.

As expected, the key manufacturing industry intermediate suppliers for engineering construction are also the key suppliers to non-dwelling construction.

Dwelling construction

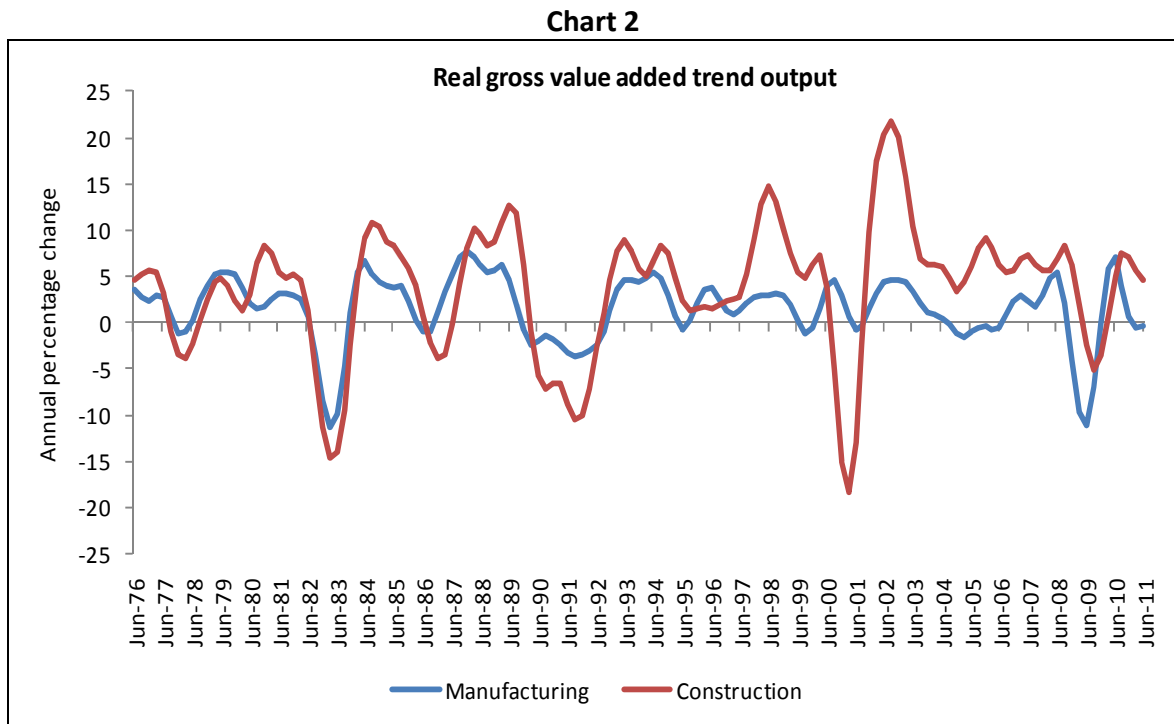
The dwelling construction segment of the construction sector is involved in the construction, repair and renovation of houses and multi-unit residential dwellings. The majority of industry turnover (75 per cent) is derived from new home construction with the manufacturers playing a key role in the supply metal products (pipes, steel, sheet metal); machinery and equipment (hand tools, cranes and earthmovers) and wood and wood products (wooden structural fittings, wooden framed doors, wooden trusses or wall frames).

Key manufacturing industry intermediate suppliers for engineering construction are plaster and concrete product manufacturing (29 per cent of its intermediate output to the dwelling construction industry). Also, ceramic product manufacturing, sawmill product manufacturing and other wood product manufacturing each supply about 25 per cent of their intermediate output to the dwelling construction industry.

This section has highlighted that different industries within manufacturing and construction have different degrees of interdependence, suggesting that a rise or fall on economic activity in one industry within either sector may not necessarily translate into uniform impacts. The next section examines the relationship between the two sectors over time, namely during the last decade while Section 4 examines the period immediately preceding and post the GFC.

Relationship between the two sectors over the last decade

Chart 2 presents the growth in trend real gross value added (GVA) from the Australian manufacturing and construction sectors over the last three decades.

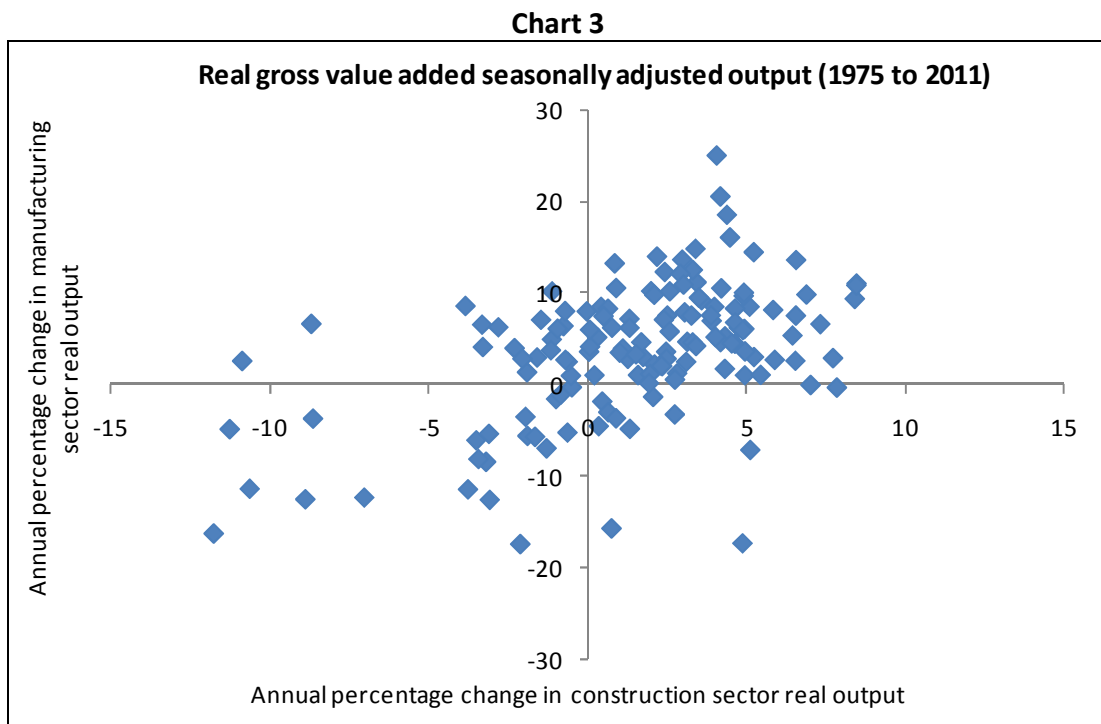


Source: ABS

Chart 2 reveals a few interesting trends:

- Between mid-2001 and prior to the onset of the global financial crisis in 2008, the annual trend growth rate of construction sector GVA has consistently well exceeded that of the manufacturing sector, reflecting the construction boom associated with robust housing market activity as well as the mining boom which has created demand for engineering related construction.
- During the economic downturns prior to the global financial crisis (GFC), such as in the early 1990s, annual trend growth rate of construction sector GVA output declined more than that in the manufacturing sector. However, during the global financial crisis, the reverse occurred.
- Whilst the global financial crisis has dented growth in the manufacturing and construction sectors, the annual trend growth rate of construction sector GVA has recovered to pre-crisis levels but that in the manufacturing sector remains well below pre-crisis levels.

- Up until the early-2010 real trend GVA for the manufacturing and construction sectors has been positively correlated. The positive correlation is also evident in seasonally adjusted real output data. Chart 3 presents a scatter plot of the annual growth of real gross value added (seasonally adjusted) from the manufacturing and construction sectors over the period of 1975 to 2011. It clearly shows that positive (negative) growth in construction sector output is largely associated with positive (negative) growth in manufacturing sector output.



Source: ABS

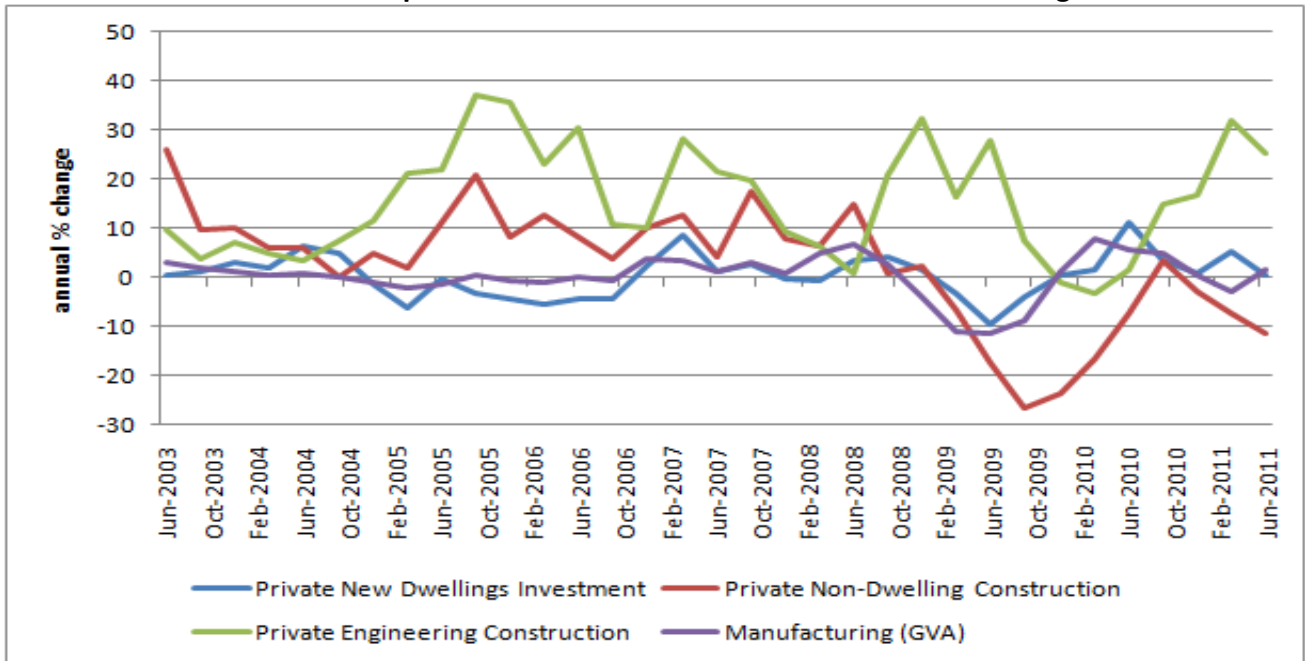
Investment trends by broad construction sector

Expenditure on building and construction activity is defined within the system of National Accounts as investment and is recorded as a component of gross fixed capital expenditure (GFCE). The main components of GFCE are expenditure on dwellings, non-dwelling construction, equipment and real estate transfer expenses (fees incurred by the buyer or seller of real estate). Investment represents economic activity that adds to current or future production and consumption. While investment in dwellings does not strictly contribute to future production, by convention it is classified as investment. This is partly based on that expenditure on dwellings gives rise to an asset with a life expectancy greater than one year.

This section examines recent growth trends in private investment in three broad sectors of construction (dwellings, non-dwellings and engineering construction) compared to manufacturing GVA growth. These trends, over the period from the June quarter 2003 to June quarter 2011, are presented in Chart 4. The chart demonstrates the close correlation between dwelling investment

and manufacturing GVA growth over this period. This would appear to reflect the close link of dwelling investment and manufacturing to the economic cycle. Both sectors are responsive to short term fluctuations in aggregate demand in the domestic economy, and the influence of such demand factors as growth of real wages, changes in the level of interest rates and investor and consumer sentiment.

Chart 4: Growth in private construction investment and manufacturing GVA



Source: Australian Bureau of Statistics, Australian National Accounts, June quarter 2011

In contrast, engineering and non-dwelling construction are more dependent on longer term rates of growth in demand in the economy which generates demand for infrastructure services such as roads, electricity and water supply. Investment in both sectors is less dependent of domestic interest rates and/or local demand conditions. For instance, resource investments (with their flow-on to engineering construction) are dependent on global commodity demand while changes in industrial structure and in the age structure of the population are important longer term influences in the construction of offices, retail buildings, hospitals and education facilities.

Engineering and non-residential construction can also be more volatile than growth in aggregate domestic activity due to the long lead times between development and construction of many projects such as airports, roads or large resource projects that are capital intensive and undertaken on an irregular basis.

Engineering and non-residential construction expenditure exhibits no consistent cyclical pattern, although the peaks and troughs can be relatively sustained.

Section 4: The recent relationship between the two sectors, pre-GFC and post-GFC cycles

The positive relationship between the manufacturing and construction sectors over the last decade has, however, weakened somewhat over recent years – real trend GVA for manufacturing has declined while that in the construction sector has grown strongly. There are four distinct periods covering the period immediately preceding and following the global financial crisis:

Mid 2006 to mid 2008

This two year period was characterised by growth in manufacturing activity. It was also characterised by general growth in investment expenditure in all three broad sectors of the construction sector, with this injection of investment likely to have provided critical support to manufacturing activity through this period.

Mid 2008 to third quarter 2009

The United States sub-prime crisis which hit markets from late 2007 was increasingly played out through 2008, with weaker consumer and investor sentiment, tight credit markets and heightened risk aversion having significant negative implications for the construction industry. Dwelling and non-dwelling construction activity bore the brunt of the weakening in domestic demand with relatively high interest rates and high development costs discouraging building. Corresponding with these trends, manufacturing activity weakened through this period both through direct demand effects and a tightening of credit conditions.

Fourth quarter 2009 to third quarter 2010

Manufacturing growth improved through the final quarter of 2009 through to the third quarter of 2010. This corresponded with rising investment in dwelling construction consistent with a lift in approvals in 2009 on the back of grant schemes to first home owners (administered by State and Territory Governments), the Federal Government's commitment to the provision of 20,000 new social housing and defence homes, and stronger domestic demand. It also reflected heightened trade-up demand by owner occupiers as a consequence of low interest rates and rises in existing property prices.

The rate of contraction in non-dwelling construction decelerated over this period in line with the increase in public building works stemming from the Federal Government's Education stimulus program. Education building work peaked at approximately \$7.5 billion in the September quarter 2009 with the majority of these approvals attributed to the Building the Education (BER) program. This stimulus funded work, and the on-going roll-out of the program provided critical support to total construction activity and cushioned the overall decline in non-residential building work, particularly from late 2009 to the end of 2010. While this stimulus package did benefit some manufacturers that supply to construction, the manufacturing sector was still having difficulty in terms of credit availability and this acted as a constraint on growth.

This period was also notable for a pick-up in investment growth in engineering construction, consistent with the strength in demand for commodities and increasing shift to project re-starts, particularly in the resources sector.

Fourth quarter 2010 to mid 2011

The benign overall growth in manufacturing activity from the December quarter 2010 has coincided with renewed weakness in dwelling investment and a contracting non-dwelling sector. Under the weight of high interest rates, stretched housing affordability and deepening consumer caution, dwelling investment exhibited weak growth through this period.

A further characteristic of this period was the continuation of the two speed split in the demand for major investment projects in Australia. Non-dwelling construction remained in negative growth territory with private sector investment remaining below levels needed to bridge the gap left by the winding back of fiscal stimulus. However, engineering construction continued to strengthen, underpinned by an increasing shift to project re-starts in the minerals and energy sector as the resources boom mark 2 gathered momentum. Growth in engineering construction work done was particularly solid during the period September quarter 2010 to the March quarter 2011 and provided critical support to overall construction activity.

Nevertheless, the positive demand support to manufacturing flowing from the strong growth in engineering construction was outweighed by the negative trends in both dwelling and non-dwelling construction. As such, this period was characterised by rising construction valued added and benign overall growth in manufacturing activity

Aside from the positive support from engineering construction, other key factors which would appear to have influenced this dichotomy in the performance of the construction industry on aggregate and the manufacturing sector during this period include:

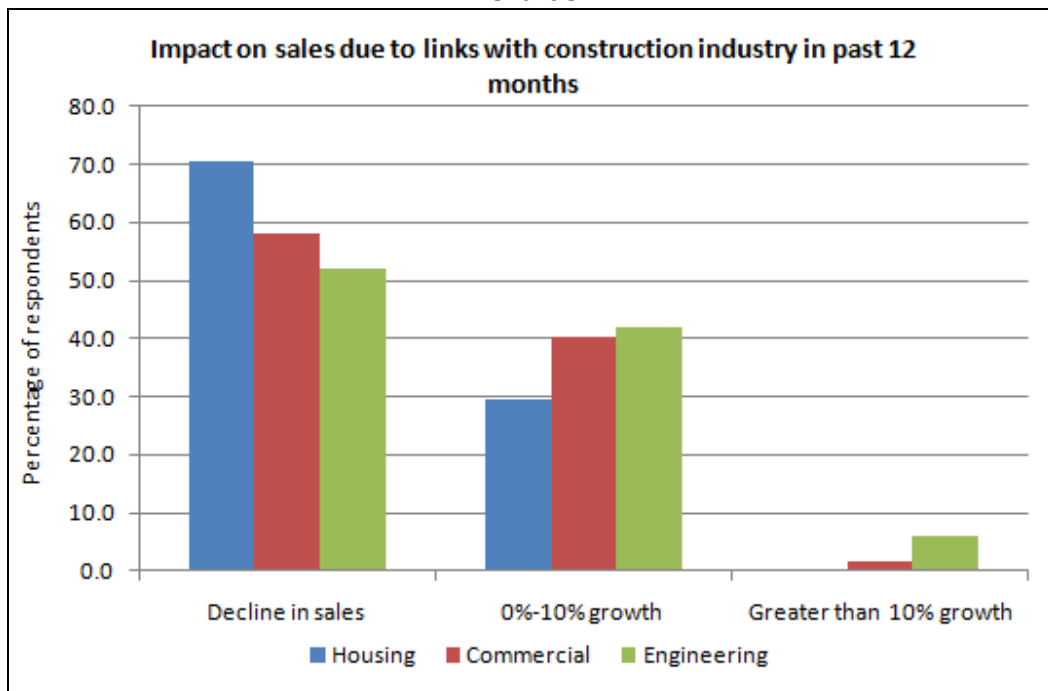
- The strong appreciation of the Australian dollar. This was a dominant factor undermining the competitiveness of trade exposed industries within the manufacturing sector. In contrast, the construction sector, being less trade exposed than the manufacturing sector, would have been less negatively impacted by reduced international competitiveness.
- Lags in the flow of construction work from resource/energy expansions to manufacturing businesses which are primarily engaged in later stage activities such as structural, mechanical and electrical and electronic services as distinct from front end activities such as drilling, earthworks and contract mining.

Recent Australian Industry Group research findings

The relationship between manufacturing and the construction sectors was further explored by the Australian Industry Group in a national survey conducted in September 2011. The survey covered the responses of 214 manufacturers and found that almost one half (47.2 per cent) had sales links to the construction industry. Moreover, with elements of the Australian construction sector continuing to languish, the vast majority of those manufacturers linked to construction reported a decline in their sales over the past year (Chart 5). Declines were reported in sales to all the major industries of the

sector, although the most pronounced declines were for sales to the housing industry (70.4 per cent of respondents). This was followed by commercial construction (58.1 per cent) and engineering construction (52.1 per cent), with declines to the latter sector a likely reflection of lags in the flow of new resources/infrastructure work to respondent businesses.

Chart 5

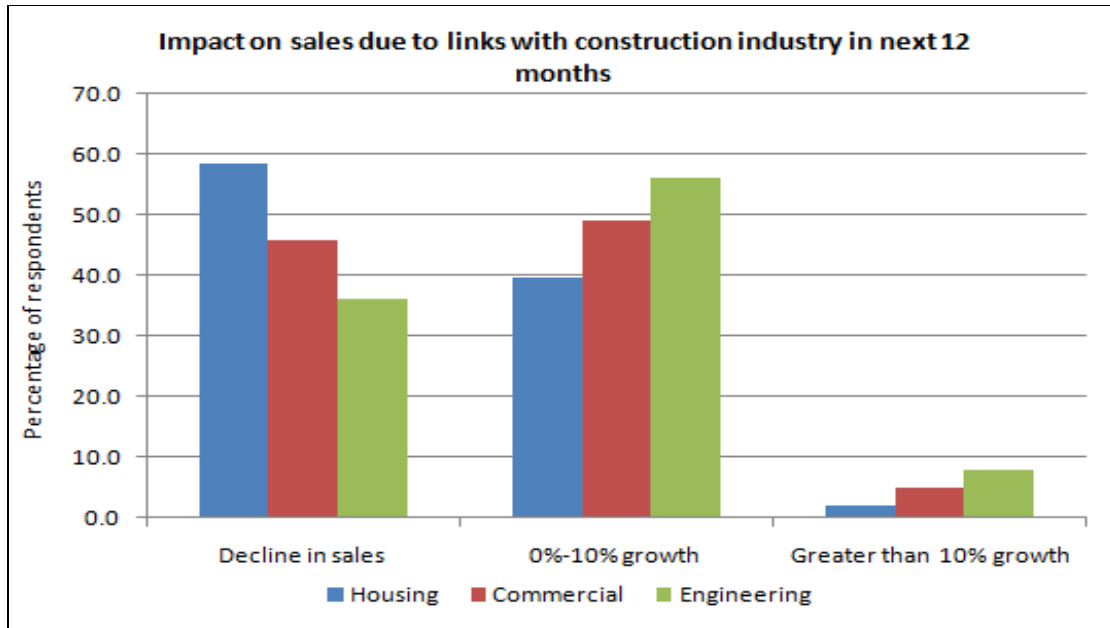


Source: Ai Group Manufacturing Industry Study survey, September 2011

With a range of indicators pointing to persistent weakness in the housing industry over the coming year (including the near 2 ½ year low level in approvals in July 2011), the majority of respondents with linkages to construction (58.5 per cent) expect sales to this sector to decline in the next 12 months (Chart 6).

In contrast, a majority of respondents anticipate growth in sales to the commercial construction industry (54.3 per cent), and more particularly to the engineering construction sector (64.0 per cent). This is consistent with the gradual recovery that is forecast in the private building and property market and the further strengthening in infrastructure and resource based construction over the next 12 months. (Ai Group Construction Outlook Survey, October 2011). Nevertheless, growth is forecast to be mainly in the low to moderate range of 1-10 per cent per annum with 49.2 per cent and 56 per cent of respondents respectively expecting this range of growth in sales to commercial construction and engineering construction.

Chart 6



Source: Ai Group Manufacturing Industry Study survey, September 2011

Conclusion

This Note has examined the relationship between the Australian manufacturing and construction sectors over the last decade and particularly in the period preceding, during and immediately after the global financial crisis. It highlights the interdependence between the sectors as suppliers and demanders of intermediate inputs and analyses how this relationship has changed.

The manufacturing sector continues to be dependent on the activity of the construction sector. However, the recent divergence in the direction of performance between the sectors is suggestive of the role the following factors have particularly played for manufacturing: higher exchange rate on the competitiveness of the trade manufacturing industries, ongoing issues following the GFC related to credit availability and costs and that the pickup in construction is now increasingly linked to the construction and investment phase of resources boom mark 2, the benefits of which have not been as prevalent for manufacturers that are not linked into the mining supply chains.

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