The Manufacturing Sector: Adapting to Structural Change[1]

Introduction

During the past two decades the manufacturing sector in Australia has undergone considerable structural change. As in other advanced countries, manufacturing activity has declined as a share of the total economy. At the same time, there has been strong growth in exports by Australian manufacturers and above-average productivity growth as the sector has become more trade-oriented. This article outlines the development of a more trade-oriented manufacturing sector and highlights some of the wider implications of such change.

Relative Performance of the Manufacturing Sector

Output in the economy as a whole has undergone a sustained expansion since the early 1990s. The strength of this growth has, however, varied across industries. In the manufacturing sector, output growth has been somewhat slower than average and hence the share of the economy's output attributable to manufacturing has declined from nearly 20 per cent of total output in the late 1970s, to 13 per cent currently (Table 1). Over the same period, the recorded level of employment in manufacturing has fallen.

Table 1: Indicators of Manufacturing Activity

	1978	1984	1990	1993	1996	2000
Employment[(a)]						
Level ('000s)	1 278.1	1 196.5	1 235.1	1 130.7	1 171.8	1 141.1
Share of total	21.2	18.4	15.7	14.7	14.1	12.6
Output						
Level[(b)]	51 080	54 680	64 195	63 569	68 646	75 943
Share of total[(c)]	18.6	16.9	15.4	14.6	13.9	13.0

(a) Manufacturing employment has been recoded before 2000 as per ABS Catalogue No 6203.0, November 1999.
(b) Chain volume value added.
(c) Share of total economy chain volume value added at basic prices.

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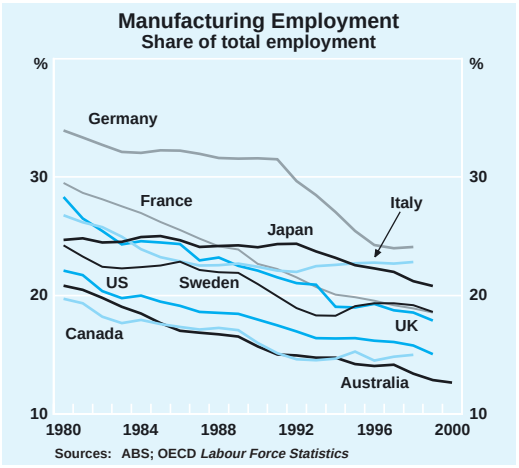
Consequently, while the manufacturing sector remains the second largest employer, and the largest employer of full-time workers, manufacturing jobs account for a much smaller share of total employment than they did a decade ago (Table 1).[2] To some extent, these apparent trends may be overstated as a result of the growth in out-sourcing. The increased contracting out of various services is likely to have meant that some jobs previously in the manufacturing sector have been shifted into the services sector. Nonetheless, there seems little doubt that the manufacturing sector has fallen as a share of the national economy.

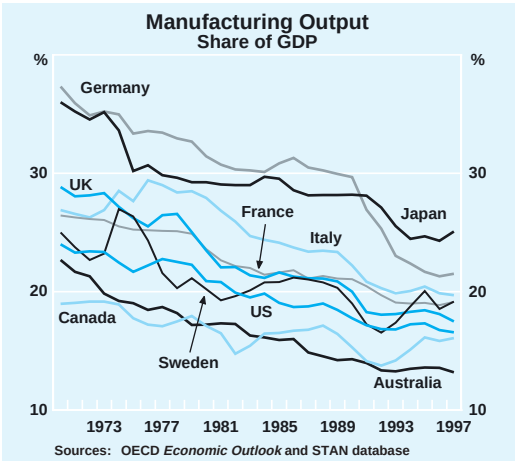
A reduction in the relative size of the manufacturing sector can be expected in an advanced economy as service industries grow and account for a larger share of output. While the manufacturing sector in Australia is smaller than in most industrialised countries, its share of output has declined at about the same pace (Graph 1). Similarly, its employment share, while falling more sharply than that in output, has fallen in line with the experience of other industrialised countries (Graph 2). Reflecting these developments, there has been a tendency for increased productivity in manufacturing across most industrialised countries in the past decade. In Australia, the trend rate of growth in manufacturing output per hour worked compares favourably with that achieved for the non-farm sectors of the economy over the current expansion (Graph 3).

Technological advance has been a pervasive force for change in the manufacturing sector and, indeed, all industries. However, an important additional force for change in manufacturing has been its increase in exposure to international competition.

Graph 2



Graph 1



Graph 3

2. With the rapid growth in jobs in property and business services, the manufacturing industry's ranking as the second largest employer is likely to be challenged in the near future.

A useful summary indicator of the manufacturing sector's exposure to international competition is the level of tariff protection. As shown in Table 2, the simple average of the general tariff rate for goods in the manufacturing sector is currently at low levels relative to those that prevailed several decades ago, although it exceeds that of the unsheltered agricultural and mining sectors. While most popular discussion is of nominal tariff rates, assistance from nominal tariffs on outputs may be reduced if local producers are subject to tariffs, or other restrictions, on imported *inputs* to production. Consequently, a more useful measure of protection is the 'effective rate of assistance'.[3] As shown in Graph 4, for the manufacturing sector as a whole, the effective rate of assistance has fallen continuously and sharply since the mid 1980s.

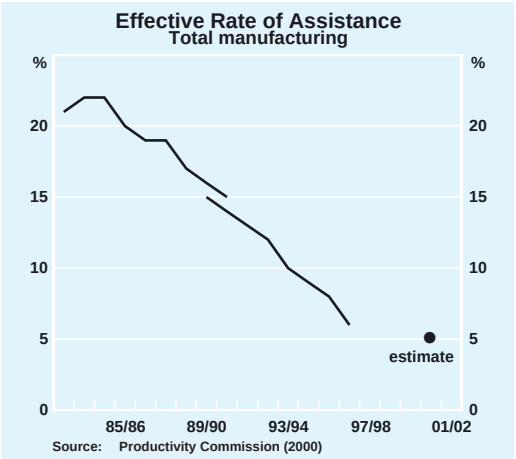
Table 2: Simple Average General Tariff Rate for Goods in Selected ANZSIC Industries, 1 January 2000
(per cent)

Manufacturing	
Food, beverages and tobacco	1.6
Wood and paper product	3.3
Printing, publishing and recorded media	2.1
Petroleum, coal, chemical and associated product	1.8
Non-metallic mineral product	2.9
Basic metal product	2.9
Fabricated metal product	3.8
Other vehicles	2.1
Other machinery and equipment	2.3
Other manufacturing	3.1
Other and unspecified	1.3
Agriculture	**0.3**
Mining	**0.5**

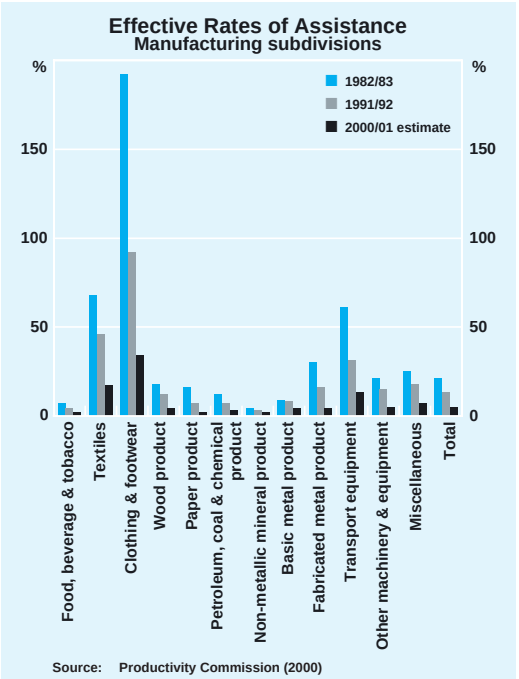
Source: Productivity Commission (2000)

For individual industries, the *levels* of assistance differ considerably, but all have experienced significant reductions in assistance (Graph 5).

Graph 4



Graph 5



3. To be more precise, it is the net effect of assistance on inputs and outputs expressed as a proportion of the unassisted value added of an industry. See Productivity Commission (2000).

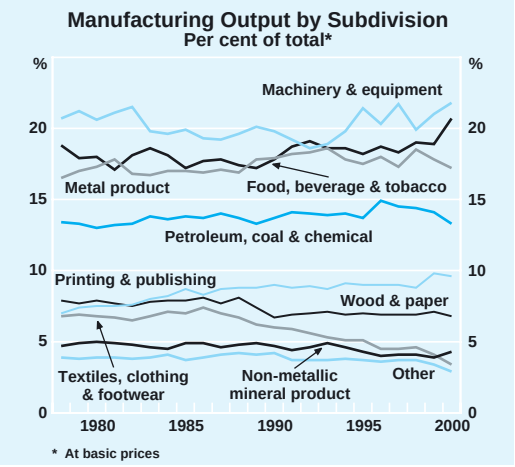
Trends Within the Sector

Output and employment

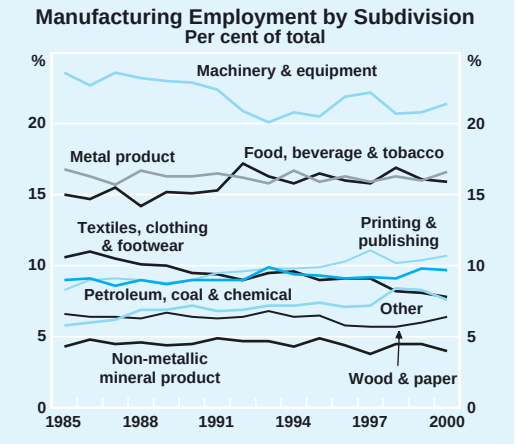
A widely held expectation has been that a more open economy will generate a relative increase in the production of 'new' elaborately transformed goods, and a decline in production of traditional manufactures. This is because an advanced economy has a relative abundance of skilled labour that is used intensively in the production of elaborately transformed goods, and so has a comparative advantage in their production.[4] However, we find that the share of manufacturing output attributable to each industry has in most cases remained fairly stable, even over two decades (Graph 6). The only obvious exception has been the decline in the share of output from the most protected industry – textiles, clothing and footwear – which has been offset by small increases in the share of output from a range of other industries.

A similar picture is evident with respect to employment, where each industry's share of manufacturing sector employment has also remained quite stable over the period for which industry-level employment data are available (Graph 7). (While Graph 7 presents shares of total employment, very similar results are obtained for full-time employment and for total hours worked in each industry.) In other words, the absolute reduction in manufacturing sector employment over the current cycle, and the attendant rise in sectoral productivity, has not been driven by job losses concentrated in a few industries. Reductions in employment have tended to be more broadly based, with the exception of the once highly protected textiles, clothing and footwear industry, where the proportionate decline in jobs (as opposed to absolute job losses) has been more pronounced than in other manufacturing industries.

Graph 6



Graph 7

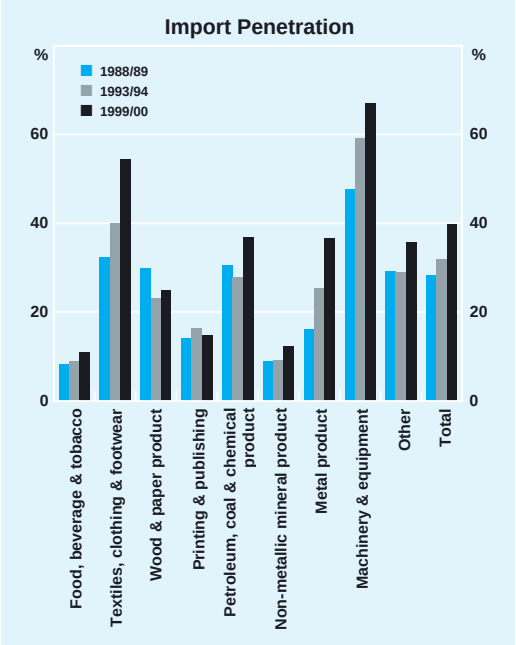


Trade exposure

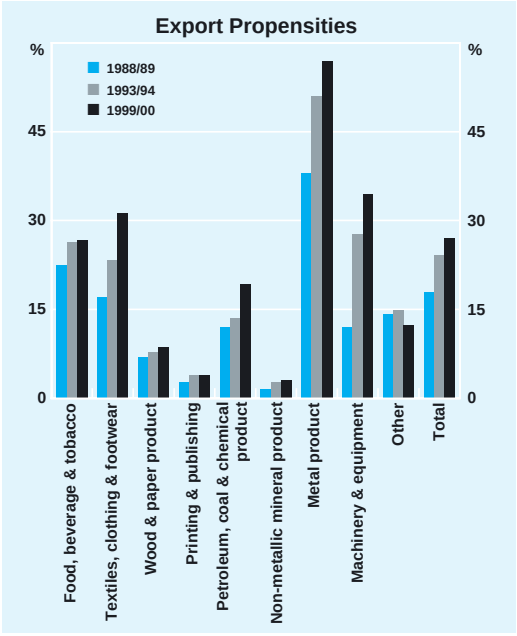
The relative stability of output and employment shares has occurred despite substantial differences in the extent of import competition that has ensued from reductions in industry protection. Graph 8 highlights the increases in import penetration of domestic sales for each of the manufacturing industries. There are various ways of measuring the extent of import penetration, but for the purposes of this article it is defined simply as the share of imports in total sales to the

4. This is the conventional Heckscher-Ohlin theory of international trade.

Graph 8



Graph 9



domestic market.[5] Industries with traditionally high exposure to import competition – textiles, clothing and footwear, and machinery and equipment – have experienced further sharp rises in import penetration, particularly since the mid 1990s. Most other industries have also experienced some increase in import penetration from the rates of the late 1980s; the largest proportionate increase in import penetration has been in the metal products industry. In contrast, food, beverage and tobacco, non-metallic minerals and printing industries remain subject to a much smaller degree of direct import competition.

However, along with these trends in import penetration, there have been significant increases in the export orientation of manufacturing industries, as summarised in Graph 9. Export orientation is defined here as the share of total sales earned from exports.[6] In fact, industries that have been subject to the greatest increase in import penetration have also displayed the largest increases in export orientation. Particularly striking is the rise in export orientation of the textiles, clothing and footwear industry, metal products and machinery and equipment.

In an open economy, when trade barriers are reduced, we expect a simultaneous increase in the propensity to both import and export. The principal argument is that tariffs on imported inputs to production are a 'tax' on exports and their removal will encourage exports as well as greater import penetration, but the strength of the rise in export orientation of the Australian manufacturing sector implies a more fundamental change in the focus of manufacturing firms. These issues were raised in the Reserve Bank's November 1992 *Bulletin*. The McKinsey & Co (1993) report identified cultural reasons for this change that stem from the dismantling of protection. Others have identified an important role for the large exchange rate depreciation of the mid 1980s which appeared to help potential exporters overcome the sunk

5. As employed in the Productivity Commission information paper by Clark, Geer and Underhill (1996).
6. As in Clark *et al* (1996).

costs of entering a foreign market. Also important are the positive externalities that result from Australian exporters becoming established and 'paving the way' for other entrants by reducing information costs and gaining acceptance of Australian brands.[7] Consequently, export of manufactures is no longer a disposal of excess supply. Instead, there has been an increase in the propensity to export. In fact, for many manufacturers exporting is now a core activity.

The increasing export focus

The recent Business Longitudinal Survey conducted by the ABS, which surveyed firms between 1994/95 and 1997/98, provides information on the importance of export markets for Australian firms. According to the survey, around 13 per cent of manufacturing businesses, and more than half of large manufacturing business, exported during this period.[8] Of those manufacturers that exported, nearly 22 per cent were irregular exporters (that is, they exported in at least one year but not each year of the survey). However, nearly 66 per cent were regular exporters and 13 per cent were 'born global' (that is, they exported in their first year of operation).

While this survey does not cover a long enough period to illustrate trends in export orientation, the increased export focus can be seen at an industry level. Using input-output tables, we classify industries as export oriented if at least 10 per cent of their gross production is exported, and import competing if at least 10 per cent of gross production is substitutable with imports.[9] It is then possible to identify industries whose category has changed through time. Of the 56 industries that comprise the manufacturing sector, 11 have changed category over the past decade. Most of these have switched from being import competing to also having a significant export orientation. These industries account for around 20 per cent of both the value added in manufacturing and the value of manufactured exports, representing a substantial re-allocation of resources.

However, while we observe an increasing focus on exporting as a core activity, manufactured goods require not only raw materials for production, but other manufactured inputs. This is especially so for elaborately transformed manufactures (ETMs). Consequently, the coincident rise in the propensity for manufacturing industries to both import and export is indicative of a rise in intra-industry trade.

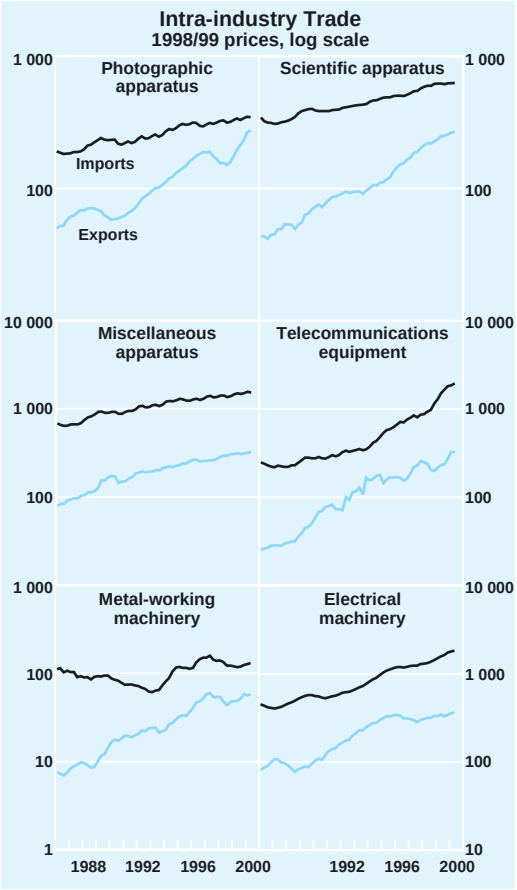
Intra-industry trade

Intra-industry trade occurs when a good is imported as an input to production and then transformed in some way before being exported. As international goods markets become more liberalised, intra-industry trade tends to expand. This is because in the absence of trade barriers, international differences in resource endowments and technology can make it feasible for parts of the production process to take place in different countries.

In order to assess the extent to which intra-industry trade has occurred, we identify goods at a fine level of aggregation and then observe whether they are *both* imported and exported. Graph 10 shows some examples of this, by comparing import and export volumes for some selected elaborately transformed manufactures. Not only does there appear to be significant intra-industry trade, it is clear that while exports from each category have grown rapidly, so too have imports (usually at a slightly slower pace). To the extent that these imports are being transformed in production and then exported, the growth in value added (and thereby employment) from

7. Menzies and Heenan (1993) provide a detailed discussion of factors influencing on the decision to enter an export market and attempts to estimate their relative importance.
8. ABS Catalogue No 8154.0, *A Portrait of Australian Exporters, A Report Based on the Business Longitudinal Survey*.
9. This follows Dwyer (1992) and Knight and Johnson (1997). Since trade data are not available in value-added terms, it is necessary to express exports (imports) as a share of gross production.

Graph 10



ETMs will be lower than that for exports. Estimates of value added generated by these ETMs confirm that this is the case.[10]

Implications

The extent of growth in intra-industry trade would appear to be important in explaining why, despite the impressive export performance of Australian manufactures, there has not been more conspicuous growth in output and employment of 'new' elaborately transformed manufacturing relative to more traditional forms of manufacturing. It does not preclude, however, other important benefits to the sector or to the wider economy.

Table 3 shows that within the manufacturing sector, the wages of those employed by exporters are, on average, higher than those employed by non-exporters; this is also true regardless of firm size.[11] The result is indicative of returns to skill in a sector that is increasingly geared towards the export of manufactures that are skill-intensive in production (and in which an advanced economy like Australia has a comparative advantage).

Table 3: Wages in Firms that are Exporters and Non-Exporters[(a)]

	Manufacturing		All industries	
Establishment size (persons)	**Exporters** $'000	**Non-exporters** $'000	**Exporters** $'000	**Non-exporters** $'000
1-4	29.1	26.4	33.7	24.3
5-19	34.2	26.6	35.5	24.7
Total small business	*33.6*	26.5	*35.3*	*24.6*
20-199	37.5	32.1	39.9	30.8
200 or more	48.4	41.6	50.9	32.1
Total	**43.9**	**32.2**	**46.0**	**28.6**

(a) Average wages and salaries per employee (full-time equivalent) in 1997/98

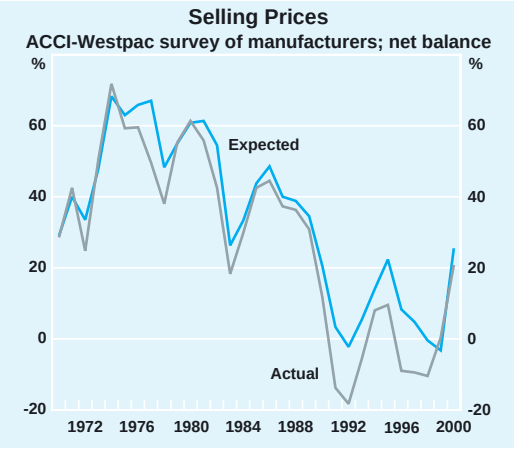
Source: ABS Catalogue No 8154.0

10. As has previously been found for Australian manufacturers by Fahrer and Pease (1994). Estimates of value added were derived from input-output tables.
11. Using data from the Business Longitudinal Survey, Harcourt (2000) has demonstrated that, for the economy as a whole, wages tend to be higher for those employed in exporting firms. We use the same survey, but focus on the industry data.

In addition to realising increased returns to skill, export-oriented manufacturers have been able to reach larger foreign markets and take advantage of economies of scale in production, thereby enhancing the productivity of the sector. To the extent that international business cycles are not perfectly synchronised, access to foreign markets has also given exporters of manufactures the potential to reduce their sensitivity to domestic demand conditions, which have traditionally dominated the fortunes of the sector. To some degree this has been evident in recent surveys of business sentiment where non-exporters have reported more pronounced deterioration in trading conditions than exporters. Furthermore, during the Asian crisis manufacturers showed their ability to partially insulate themselves from demand shocks in selected overseas markets by redirecting some types of exports – particularly metal products – away from the initially troubled Asian economies to other destinations.

Successful adaptation to change has not, however, been confined to those manufacturers adopting an export focus. Those firms that remain engaged in traditional import-competing activities have also made some significant adjustments. In particular, they have had to contend with a considerable discipline on pricing behaviour. This is seen in a loss of 'pricing power', which can be summarised by the setting of final prices at systematically lower levels than initial expectations (Graph 11). This loss of pricing power has probably increased the tendency for cost shocks, particularly those perceived as transitory, to be absorbed in mark-ups. Consequently, it has direct bearing on the short-run dynamics of the inflation process by contributing to greater inertia in the setting of final prices. It would appear to be a factor in the muted response of inflation to disturbances to costs, especially import prices at the docks, over the course of the 1990s. Furthermore, the loss of pricing power has also induced efficiency gains to contain costs of production and, thereby, has contributed to the productivity performance of the sector as a whole.

Graph 11



Conclusion

The relative size of the manufacturing sector is smaller than it was a few decades ago, as has been the experience of most advanced economies. However, in the Australian case, this fall in relative size masks some important changes in the composition of manufacturing activity. In response to its increased exposure to international competition, manufacturing has become considerably more export oriented. Consequently, in addition to the discipline that stems from import competition, there has been a growing tendency to utilise comparative advantage in the production of a range of manufactures, particularly those that are skill-intensive. These changes in manufacturing activity can be expected to contribute to the performance of the sector over the longer run. Furthermore, its demonstrated adaptability to change suggests that, as a whole, it may be better equipped to respond to economic shocks than was the case in previous decades.

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