The Productivity Performance of Australian Manufacturing SMEs

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Abstract

In an open economy like Australia, SMEs ability to export has become very crucial for their long-term survival and growth. This depends on SMEs capacity to remain internationally competitive. Productivity growth is the key which will enable SMEs to deliver products at lower costs. The results indicate that there are large differences in productivity between SMEs and large enterprises but there also exist significant differences in productivity levels across industries in the manufacturing sector. However productivity increased at a faster rate for SMEs than that for large enterprises in the period from 1994-95 to 1999-2000. Despite the faster growth rate achieved by SMEs in productivity, in most of the industries average productivity still remains much lower than that for large enterprises. At the aggregate manufacturing sector level, average productivity stands at half of that achieved by large enterprises. In this context, government policy initiatives need to be directed towards addressing the issues relating to market and institutional rigidities.

Introduction

Manufacturing sector in Australia has undergone significant changes since the mid 1980s as a result of substantial tariff reductions and quantitative restrictions on imports. During this period, Australia has moved from one of the most protected economy to one of the least protected economy among OECD countries. In international trade, the effects of increased trade and competition on productivity have been widely speculated (Bartelsman and Doms, 2000). Technological advances in communication and transport systems have greatly facilitated both information gathering and processing and transportation of goods around the world. At the same time multilateral trade liberalisation under the auspices of the WTO have further removed barriers to trade. This has created a very competitive environment globally for all firms both small and large and this is particularly true of countries with relatively small domestic markets. Tybout (2000) suggests that foreign competition drives inefficient domestic producers to exploit scale economies, eliminate waste, adopt best practice technologies or shut down. In an open small economy like Australia, SMEs ability to export has now become very crucial for their long-term survival and growth. Many recent studies have indicated that manufacturing SMEs consider the lack of price competitiveness as a major contributing factor to their inability to export (see Feaver et al (1999) and BIE (1990)). Caves and Barton (1990) found that economic performance of small firms is lower than that of large firms in terms of productivity and efficiency.

The goal of industry policy in Australia is to achieve a more efficient and more internationally competitive manufacturing sector. The major key to achieve international competitiveness and a durable industrial success is productivity growth. Higher productivity will decrease unit cost and improve profitability. Although productivity gains are almost automatically connected with price competitiveness as a result of lower production costs, they simultaneously reflect and permit greater efficiency (OECD,1993). Productivity growth not only improves international competitiveness of industry but also can contribute to industry growth. Relative levels of productivity estimates are used for examining international competitiveness (see Jorgeson & Kuroda, 1995). Productivity estimates can be also used to make inter-firm or inter-industry comparisons to examine their performance.

Australia's overall manufacturing productivity performance was below that of a group of OECD countries examined for the period between 1973 and 1993 (see Clark et al , 1996). Caves (1984) found that a small domestic market and lack of scale economies are important factors in explaining the lower on average level of productivity in the manufacturing sector in Australia.

There is evidence to suggest that there has been a productivity surge in Australia since the early 1990s (see Parham, 2002). The objective of this paper is, therefore, to study the productivity performance of manufacturing SMEs between 1994-95 and 1999-2000. The paper, however, does not explain the productivity performance. That is, it does not analyse the factors that have contributed to productivity changes. SMEs in this paper are defined as businesses that employ less than 100 people.

Manufacturing in the Australian Economy

The manufacturing share of GDP in Australia like other industrialized countries has been on the decline over the last three decades and it stood at 11.6 percent in 2000-2001 and employed 13 percent of total employed labour force. This relative decline in manufacturing share of total output and employment has occurred despite significant increases in manufacturing output during this period. Between 1975 and 1995, labour productivity within Australian manufacturing sector increased by almost 60 percent, with a trend annual increase of 2.3 percent a year (Clark et al, 1996). The much faster growth rate in the services sector has contributed to this relative decline of the manufacturing sector. Total manufacturing employment declined by 4.8 percentage while its GDP share declined by 1 percentage point between 1994-95 and 1999-2000. Some of the decline in the share of manufacturing observed for Australia (and other industrialized countries) is likely to be overstated due to the increasing specialization of economic activity (Clark et al, 1996)

Australian manufacturing is clearly dominated by the processing of agricultural and mineral products. More than half (50.5%) of the total output of the manufacturing sector, on the basis of value added, originated from the three resource processing industries; Food, beverage and tobacco, Metal products and Petroleum, coal, chemical and associated products in 1999-2000. This represents 1.8 percentage points rise in their share of total manufacturing output between 1994-95 and 1999-2000. The first two industries have also dominated the performance of manufactured exports over the last decade and a half reflecting Australia's strong comparative advantage in those two industries.

Over the period 1994-95 to 1999-2000, industry value added increased by 11 percent. Eight industry subdivisions recorded increases and while the others recorded a decrease. The largest percentage increase was achieved by Food, beverage and tobacco manufacturing (15.1%) while Textile, clothing, footwear and leather manufacturing recoded the highest decline (8.1%) (see ABS, 2001).

Manufacturing was ranked last in terms of annualised growth rates over the last 10 years increasing by 1.8 percent compared to Communication services achieving 9.7 percent, the highest, during the same period (ABS, 2001).

Exports as a percentage of the total sales and transfer out of goods produced stood at 17.5 percent in 1999-2000. This represents an increase of 3.5 percentage points relative to 1994-95 (ABS, 2001). The structural shift in the economy has been causing changes to the composition exports over the last two decades. Export of manufactures increased quite substantially during this period. The share of manufactured products to total merchandise exports increased from 25 per cent in 1991-92 to 29 percent in 2001-2002 (DFAT, 2002).

SMEs accounted for 97.2 percent of management units, 43.4 percent of employment and 34 percent of value added in the manufacturing sector in 1999-200. Between 1994-95 and 1999-2000, SMEs increased their share of management units, employment and value added over this period. Given such an

increasing preeminence of SMEs in the sector, their ability to grow over time is very crucial for the sector and also for the economy.

The Concepts and Measurement of Productivity

It is important to provide a precise definition of the concept of productivity (see Diewert, 1992). Productivity is a measure of the rate at which inputs are transformed into output. Productivity therefore provides the technical relationships that exist between inputs and outputs. It is a measure of technical efficiency not economic efficiency.

The level of productivity within a firm or an industry depends on labour, capital and the state of technology. Productivity growth over time will reflect the growth in these factors over time. The most common measure of productivity usually used is labour productivity or output per person employed or per hour worked. Conceptually hours worked is better measure because this takes into account both changes in persons employed and overtime worked, standard weekly hours, leave taken and the proportion of part-time workers. However hours worked can be difficult to measure and are different from paid-for hours. Workers are often paid for standard weekly hours without being fully utilized (see Ball and St Cyr, 1966). In recent times there are ample evidence to suggest that working overtime without being paid for is quite wide-spread in Australia. (see Wooden, 2001). In either case hours worked will not reflect the actual hours worked.

Labour productivity performance is indeed influenced by other factors such as capital equipment, new technology, improved management skills etc. Changing patterns of factor use and changes in the quality of the workforce also influence labour productivity. Both of these changes could have significant effects on output. However to estimate multifactor productivity (MFP) is beset with computational difficulties arising from conceptual as well as practical problems. Some of these problems are relating to data needed and adjustments required. When productivity is defined as output per unit of two or more factor inputs the measurement problems multiply as a number of measurement and definitional issues need to be considered (Barrell et al, 2000).

Labour productivity is easy to understand and easy to estimate. Productivity is also an indicator of technical efficiency because it shows the relationship between outputs and labour inputs given the technology within the firm or the industry. Labour productivity is influenced by changing pattern of factor use. Labour productivity is generally analysed in the context of multifactor productivity. Therefore labour productivity can be regarded as a measure of overall productivity performance. In this way also any limitations relating to the measurement of productivity can be easily identified and understood. Furthermore Changes in output per employed person can be seen as the outcome of production, employment and capital investment decisions. As such the measure provides one means of summarizing the outcome of a range of different decisions (Gretton and Fisher, 1997).

Productivity is measured in terms of output. Output is most commonly measured in terms of value but in some cases physical units are also used. Production in terms of value can be measured ether as the real value of turnover or the real value added. However turnover does not provide a precise measure of productivity as it incorporates a fair amount of double counting due to value added by bought in inputs.

Therefore production is measured as the real value added by the industry. Value added is defined as sales less the cost of raw materials, services and components to produce them. Data on value added is deflated by an index of domestic transaction prices to obtain the real value added. When output is defined as value added, the factor inputs are labour and capital (see Muellbauer, 1991)

The estimation of labour or multifactor productivity is usually analysed using the neoclassical production function, often a Cobb Douglas production function for empirical implementation (see Greenhalgh and Gregory, 2000). Production function modeling is an important tool in analyzing returns to scale, technical change and productivity growth. Therefore a basic functional form can be formulated through the use of a Cobb-Douglas production function with constant returns to scale to estimate labour productivity.

$$Q=AK^{\alpha} L^{\beta} \qquad (1)$$

Where Q is output measured in terms of value added, K is capital, L is labour employed and A is technology and $\alpha + \beta = 1$, α and β being the elasticities of output with respect capital and labour. The functional form specified above assumes constant elasticity of substitution between capital and labour. By rearranging equation (1), labour productivity can be specified as:

$$Q/L=A^{\alpha}K^{\beta-1} =A(K/L)^{\alpha} \quad \text{since } \alpha + \beta =1 \qquad (2)$$

Equation (2) now clearly suggests that labour productivity is dependent on the capital to labour ratio given the level of technology. Any changes in output, hence, will result from changes in this ratio. However as α is expected to be positive, higher values of the capital to labour ratio will generate higher values of output per employee. Since the parameters are not estimated in the model, the appropriate deflator must be used to estimate productivity.

Data and Industry Classification

The empirical analysis in this paper is based on published data from the Australian Bureau of Statistics (ABS). Data has been collected from various issues of *Small Business in Australia (Cat. No. 1321.0) and Australian System of National Accounts (Cat. No. 5204.0*). Data in the first named publication has been obtained from a number of different sources. But much of the data presented in the publication has been obtained from sample surveys therefore are subject to both sampling and non-sampling errors. ABS data exclude non-employing businesses.

All monetary values have been deflated using the GNE deflator for the purposes of comparison. The data available on labour inputs is based on employment numbers; therefore they remain the main measure of labour inputs to estimate labour productivity.

The manufacturing sector is highly diverse involving very low levels of processing (simply transformed manufactures (STMs)) such as the production of some agricultural and mineral products at the one

spectrum to the application of highly sophisticated and complex production process (elaborately transformed manufactures (ETMs)) on the other spectrum. Given the diversity of the sector and greatly varying types of activities within the sector, in this study the manufacturing sector is divided into nine industries at the two-digit Australia New Zealand Standard Industry Classification (ANZSIC) level.

Results

Table 1 presents estimates of comparative labour productivity levels for small and medium enterprises (SMEs) and large enterprises (LEs) for the period between 1994-95 and 1999-2000 at the two digit ANZSIC disaggregated levels. Comparisons of productivity at a disaggregated level provide a much clearer picture of productivity performance. Productivity estimates are bases on labour productivity. Measures of labour productivity can be used as indicators of productivity performance (IC, 1997). The principal criterion used to examine the productivity performance of SMEs is to compare with large enterprises. The estimation procedure is as outlined in equation 2.

The results indicate that levels of productivity vary substantially between industries both for SMEs and LEs within the manufacturing sector. There is also significant variation within an industry between SMEs and LEs. SMEs recorded the highest productivity levels in the other manufacturing industry which includes prefabricated metal building- sheds, furniture- beds, chairs, desks, jewellery, coins, gem cutting, toys and sporting goods and musical instruments. Some of the output of this industry are high value added goods such as furniture, jewellery, and musical instruments. This industry is dominated by SMEs both in terms of management units and employment compared to all other industries in the manufacturing sector. In this industry, SMEs accounted for 99.3 percent of management units and 86 per cent of employment in 1999-2000. They achieved the lowest levels of productivity in the food, beverage and tobacco industry. This industry has always been dominated by large including large multinational firms. Large enterprises recorded the highest productivity levels in the non-metallic industry while their poorest performance was in the textile, clothing, footwear and leather industry.

SMEs exhibited much larger variability in their productivity levels than large enterprises across the industries. This variability for both SMEs and LEs increased between 1994-95 and 1999-2000 but significantly more so for SMEs than LEs. SMEs in only two industries out of the nine industries recorded above average productivity levels while LEs achieved above average productivity levels in four industries during the period under study.

Table 1

Productivity Levels by Firm Size and Industry

ANZSIC	Industry	SMEs ($m)		LEs ($m)		Productivity Ratios SMEs to LEs	
		1994 - 1995	1999 – 2000	1994 - 1995	1999 - 2000	1994 - 1995	1999 - 2000
21	Food, beverage and tobacco	0.012246	0.014776	0.068979	0.084079	0.177527	0.175737
22	TCF & leather	0.035820	0.049188	0.049518	0.056570	0.723383	0.8695
23	Wood & paper products	0.041215	0.056032	0.093316	0.115818	0.441665	0.483789
24	Printing, publishing & recorded media	0.043194	0.049361	0.091232	0.095107	0.473455	0.519009
25	Petroleum, coal, chemical & associated products	0.025084	0.043125	0.099955	0.111118	0.250955	0.388099
26	Non-metallic mineral products	0.020719	0.042949	0.100954	0.129999	0.205236	0.330377
27	Metal products	0.055767	0.093692	0.076510	0.068345	0.728884	1.370856
28	Machinery and equipment	0.025873	0.033793	0.069404	0.075798	0.372752	0.445124
29	Other manufacturing	0.157687	0.232818	0.052707	0.055714	3.238161	4.1788
21-29	Total Manufacturing	0.031435	0.044448	0.077294	0.086301	0.406696	0.515034

SMEs increased their productivity levels between 1994-95 and 1999-2000 across all the industries in the manufacturing sector,. Large enterprises also achieved productivity gains in all the industries except Metal products where the industry experienced a decline in productivity by 10.67 percent. This is a surprising result given that SMEs recorded a very high level of productivity growth in this industry (see Table 2). The deterioration in the productivity performance in the metal products industry by LEs has implications for manufacturing exports as this is one of the two principal export oriented industries, based on processing mineral resources.

Table 2
Productivity Changes, 1994-95 to 1999-2000

ANZSIC	Industry	% Change in Productivity	
		SMEs	LEs
21	Food, beverage and tobacco	20.66	21.89
22	TCF and leather	37.32	14.24
23	Wood and paper products	35.95	24.11
24	Printing, publishing and recorded media	14.28	4.25
25	Petroleum, coal, chemical and associated products	71.92	11.17
26	Non-metallic mineral products	107.29	28.77
27	Metal products	68.01	-10.67
28	Machinery and equipment	30.40	9.21
29	Other manufacturing	47.65	5.70
21-29	Total manufacturing	41.40	11.65

Table 2 further indicates that productivity increased at a faster rate for SMEs than that for larger enterprises across all the industries except the food, beverage and tobacco industry. In three industries, Non-metallic mineral products; Petroleum, coal, chemical and associated products and Metal products, SMEs achieved very significant productivity gains between 1994-95 and 1999-2000. On the contrary, overall productivity gains recorded by LEs were much lower than those of SMEs. But both SMEs and LEs showed significant variations in their respective productivity gains across the industries. SMEs in three industries achieved above average productivity gains while LEs achieved the same in four industries. The highest and lowest recorded changes in productivity levels for SMEs exhibited a much wider dispersal than those for LEs.

It is estimated that during the period from 1994-95 to 1999-2000, SMEs nearly doubled their productivity gain in Australian manufacturing. Productivity ratios of SMEs to LEs improved for all the industries except for the food beverage and tobacco industry where the ratio had slightly fallen. Despite such a spectacular productivity growth performance achieved by SMEs, in all the industries except Other manufacturing and Metal products, their average productivity is lower than that for large

enterprises (see Table 1). At the aggregate manufacturing sector level, average productivity of SMEs is almost half of that achieved by large enterprises.

Conclusions

This paper focuses on the productivity performance of SMEs in the Manufacturing sector in Australia between 1994-95 and 1999-2000. In an open economy like Australia, manufacturing SMEs ability to export has become very crucial for their long-term survival and growth as most of the products of manufacturing industries are traded on world markets. SMEs ability to compete internationally depends on their capacity to remain competitive. One of the principal methods to achieve international competitiveness is productivity growth which enables industries to supply products at lower costs.

The results indicate that productivity varies substantially between industries both for SMEs and large enterprises within the manufacturing sector. Productivity for SMEs increased at a much faster rate than that for large enterprises during the period under study. Despite the faster growth rate achieved by SMEs in productivity, in most industries average productivity is lower than that for large enterprises except in two industries. At the aggregate manufacturing sector level, average productivity of SMEs is almost half of that achieved by large enterprises.

There are clearly large differences in productivity between SMEs and large enterprises but there also exists significant differences in productivity levels across industries in the manufacturing.

In an open economic environment, improved levels of productivity which in turn mean reductions in unit costs is extremely important for SMEs to achieve international competitiveness. SMEs ability to maintain and improve their international competitiveness through productivity gains will also help to contribute to industry growth. In this context, government policy initiatives need to be directed to address the issues relating to market and/ or institutional rigidities so as to enable SMEs to improve their productivity performance.

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