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Promotion of Innovation and Job Growth in Small and Medium Sized Enterprises in
Australia: Evidence and Policy Issues

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Abstract:

Small and medium sized enterprises (SMEs) play a substantial role in Australian growth and job creation. We discuss approaches to understanding the drivers of innovation and then review evidence on the determinants of innovation by Australian SMEs. We also examine the role of these firms in job creation. Against this evidence and the conceptual underpinnings, we then discuss some issues that arise with the government's current innovation agenda.

Keywords: Australia; Research and development; SMEs; innovation; innovation policy

1. Introduction

In the National Innovation and Science Agenda (2015) (NISA), major new steps are proposed in government support for innovation, including investing in education, science and research, and infrastructure, enhancing incentives to business investment, and removing regulatory obstacles to innovative activities in Australia. The NISA recognises innovation as the key driver in advancing growth and competitiveness in modern developed economies. Fostering innovation creates jobs, new firms, products and industries, and expands the market beyond the domestic boundary.

Innovation has long been considered as the key factor for the survival, growth and development of small and medium-sized enterprises (SMEs) as noted by Acs and Audretsch (1990) and others.¹ A greater innovation capacity counterbalances SME vulnerability due to small size and young age in a knowledge-based globalised business environment (Hoffman et al., 1998). Also, the capacity of SMEs to develop new products and to innovate “are in the very core of value creation” (Hurmelinna-Laukkanen et al., 2008).

Bhattacharya and Bloch (2004) and Rogers (2004) examine determinants of innovation for small to medium sized Australian firms using data from the Business Longitudinal Survey (BLS) conducted by the Australian Bureau of Statistics (ABS) from mid-1990s.² Both studies show that firm size, research and development expenditures (R&D), and engagement in international trade enhance innovations for at least some groups for SMEs.³ Rogers also finds a positive effect of networking, a result that is confirmed by Gronum, Verreyne and Kastle (2012) using the Business Longitudinal Database from the ABS for the late 2000s. Gronum,

¹ Rosenbusch et al. (2011) has a comprehensive review of research on innovative activities for SMEs covering different aspects.

² Following the definition from the ABS, we consider small businesses with less than 20 employees for non-manufacturing, and in manufacturing as those employing less than 100. Medium sized businesses are larger than small business and have up to 200 employees. There are other definitions based on revenue, loan and legal structure (RBA, 2012, graph 1, p. 2).

³ Bhattacharya (2014) also shows that firm age plays a key role in the growth processes of SMEs.

Verreyne and Kastle also confirm the positive impact of firm size on innovation performance.

Innovation in SMEs is of particular interest because of the key role SMEs are playing in creating employment in the modern economy. This is particularly the case with newly created firms, almost all of which start small. In Australia, 1.4 million new jobs have been created by firms aged less than three years old between 2006 and 2011. Employment in mature businesses, in contrast, fell 400,000 within this period.

Our main objective in this article is to review evidence on the drivers of innovation and job growth in Australian SMEs. However, in Section 2, we first discuss the conceptual framework for the economic analysis of innovation and the implications for designing public policy. Section 3 contains a discussion of mostly Australian evidence on the determinants of innovation for SMEs, while Section 4 reviews data on the role of SMEs in job creation in Australia. In Section 5, we discuss some of the barriers to innovation and entrepreneurship in SMEs in Australia. Section 6 concludes by reviewing policy proposals in the NISA in light of the analysis and evidence presented in the earlier sections.

2. What drives innovation in SMEs?

Economic analysis of innovation encounters a basic difficulty identified by the “prophet of innovation”, Joseph Schumpeter, long ago. In his seminal contribution to innovation-driven growth theory, *The Theory of Economic Development* (Schumpeter, 1934), Schumpeter notes a distinction between entrepreneurship and management.⁴ As he explains in Schumpeter (1947), successful entrepreneurship involves a creative response in the sense of doing something outside the range of existing practice, whereas good management involves an

⁴ *The Theory of Economic Development* is the English translation of the second edition of Schumpeter’s German book, *Theorie der wirtschaftlichen Entwicklung*, first published in 1911.

adaptive response of calculating the best outcome given good information on likely effects of possible actions.

When economists study the effect of incentives on behaviour, the analysis assumes that the individual or firm responds adaptively in terms of Schumpeter's classification of behaviour. Optimal responses of decision makers to a change in circumstances are determined and then used to analyse the implications for market behaviour. Thus, an increase in wage elicits increased labour supply from an individual responding adaptively, provided the substitution effect exceeds the income effect and institutional arrangements allow incremental changes in effort. Schumpeter suggests that a different framework is required in analysing entrepreneurial activity, in particular more is involved than the prospect of profits.

Since Schumpeter's day, economics has made substantial progress in the theory of decision making involving risk and strategic interaction as they affect innovation behaviour, which is ably demonstrated by Baumol (2002) in his analysis of the determinants of innovation in modern oligopoly corporations. However, Baumol's analysis largely deals with the systemised innovation behaviour of established firms who are leaders in their respective industries. His treatment of entrepreneurship is mainly in a chapter in which he discusses the broader issues how the culture of capitalism and the rule of law have stimulated entrepreneurship in modern capitalist economies compared to alternative economic systems.

Schumpeter emphasises that innovation involves overcoming of resistance to change and that this requires uncommon, but not rare, talents, especially leadership. Contrary to the standard assumption in economic theory, not all profitable ideas are quickly turned into innovations. This leaves standard economics without a framework for analysing the take up of ideas into innovation. For example, economic theory has not much to say about why there

is a low rate of collaboration on innovation between Australian businesses and universities both absolutely and in comparison to other countries.⁵

The gap between ideas and innovations and the lack of a proper theory of creative responses (entrepreneurial activity) remain impediments to developing a comprehensive theory of the determinants of innovation and a proper framework for designing innovation policy. Another fundamental problem, which applies particularly to SMEs, is the distributed nature of knowledge. SMEs each draw directly on the specialised knowledge of a small number of individuals. This implies that the knowledge within each SME is necessarily limited in scope and generally distinct from that in other SMEs.

Specialisation has been recognised as essential to the achievement of high productivity at least since the famous description of the division of labour in a pin factory by Adam Smith in the *Wealth of Nations*. In the pin factory, management organises the distribution of specialised knowledge to achieve an effective (productive) division of labour. In the case of SMEs, the organisation of their specialised knowledge within the economy depends upon external mechanisms.

One external mechanism that has received much attention in the SME innovation literature is networking. The scope of the specialised knowledge from within an SME can be expanded if it is linked with the knowledge of others through a network. Yet, identifying useful linkages is costly, at least in terms of time, and the search limited by the restricted knowledge set of each firm, which constrains their ability to absorb external knowledge.

An aspect of networks that impacts of the role an SME plays in the economy is its connection to sources of finance. Schumpeter (1934) stresses the role that banks play in determining whether potential entrepreneurs succeed in bringing their innovations to fruition.

⁵ The recent *Report of the Review of Research Policy and Funding Arrangements* (Watt, 2015) starts its Executive Summary by noting that Australia ranks last out of 26 OECD countries in the proportion of businesses collaborating with universities or public research institutions on innovation.

Banks screen proposals from entrepreneurs in their network to determine which ideas are worth funding. Those that are funded are able to secure means of production for implementation of their innovation. In the modern environment the sources of potential finance include banks, venture capital funds, private investors, occasionally governments (especially in terms of seed funding programs) and, even, crowd funding.

In the absence of a solid theoretical framework for studying entrepreneurship, economic studies of innovation in small and medium enterprises have focussed on empirical relationships between innovation activity and firm or industry characteristics. These relationships are only loosely related to theory. For example, industry concentration is included with an expected positive coefficient based on Schumpeter's (1950) discussion of the role of large industrial research laboratories and imperfect competition is fostering innovation in the modern economy.⁶ Firm size is also expected to have a positive influence. Furthermore, following a production-function approach, innovations are treated as outputs of the firm that are positively related to its R&D expenditures as inputs. Finally, the extent of networking is expected to positively impact on innovation.

3. Determinants of Innovation in SMEs

In their seminal study of innovation performance of US manufacturing industries, Acs and Audretsch (1988) examine the proposition that the drivers of innovation differ between large and small firms.⁷ They find evidence to support this proposition. One particularly interesting finding is that small firms account for a higher number of innovations in industries that are more heavily dominated by large firms. This is consistent with Baumol's (2002, p.57) view

⁶ Schumpeter's (1950) emphasis on the role of large oligopolies in innovation is often contrasted with his earlier, Schumpeter (1934), emphasis on the individual entrepreneur and new firm. However, Baumol (2002) points to the different, and generally complementary, roles of innovations from small firms versus large firms.

⁷ The cut-off size for small firms in Acs and Audretsch (1988) is 500 employees, which is larger than the 200 employee cut-off for SMEs in the Australian data.

of the complementarity between the innovation activities of large and small firms, with small firms (Baumol's independent entrepreneur), 'providing many if not most of the more revolutionary and heterodox contributions, while the routine innovation activities of the oligopoly corporations take those contributions and improve and extend them'.

Industry-level data are used in the Acs and Audretsch (1988) study, so the focus is on industry structural variables as determinants of innovation. Subsequent development of firm-level databases has allowed researchers to extend the range of possible determinants to firm-specific characteristics. In Australia, the ABS has provided firm-level data from the Business Longitudinal Survey (BLS) covering data for the mid-1990s and data from various sources in the Business Longitudinal Database (BLD) for the 2006-7 to 2010-11. This database has been extended and combined with still other sources of data for individual firms in the Expanded Analytical Business Longitudinal Database (EABLD), which covers annual data from 2000-1 to 2012-13 and is ongoing.

Bloch and Bhattacharya (2004) and Rogers (2004) both use the BLS data to conduct regression analysis of the determinants of innovation. Bloch and Bhattacharya use only manufacturing firms, while Rogers also has a regression for non-manufacturing firms. Bloch and Bhattacharya provide results for sub-samples divided into high-tech and low-tech, while Rogers subdivides the sample by employee size categories. The studies also use different model specifications. Rogers uses 16 independent variables in a linear relationship (with the firm size variable measured in logarithms), while Bhattacharya and Bloch use half that number of variables and have a quadratic relationship between employment and the dependent variable. The dependent variable in both studies is dichotomous, namely whether or not the firm had introduced an innovation in products (including services for the non-manufacturing firms) or processes.

Both studies find positive and statistically significant impacts of firm size, R&D intensity and export activity on the innovation variable, in the full sample of manufacturing firms and at least some sub-samples. Of the other variables in common across their specifications, Bloch and Bhattacharya find a positive and statistically significant impact of the four-firm concentration ratio as a measure of market power, especially in high-tech industries, but Rogers finds insignificant coefficients. Both studies also include a measure of firm profitability and find a weakly significant positive coefficient only in a single sub-sample (low-tech firms in Bloch and Bhattacharya and firms with greater than 100 employees in Rogers).

Gronum, Verreyne and Kastle (2012) use the BLD data to examine the relationship between networks and innovation and their joint impact on performance in Australian SMEs. They find that a variable measuring the extent and depth of network connections has a positive and statistically significant impact on innovation breadth, which seems to dominate in explaining the positive relationship between the network variables and a range of measures of firm performance. The positive impact of networks on innovation confirms a finding from the Rogers (2004) study, where there are positive and statistically significant coefficients of the network variable for the full sample of both manufacturing and non-manufacturing firms, with a particularly strong impact for small manufacturing firms.

Overall, the firm-level evidence from Australia suggests innovations from SMEs are enhanced by the firm's size, R&D intensity and involvement in exporting, as well as by the extent of the firm's networking. Further, innovations are positively linked to firm performance. This is particularly important given the central role that SME job creation has taken in sustaining employment growth in the Australian economy in recent years.

4. SMEs in Job Growth and the Role of Innovation in Australia

SMEs are Australia's backbone in creating new businesses and employment.⁸ In an extensive analysis with EABLD, Hendrickson et al. (2015) provide details of age, structure and employment growth for Australian SMEs. They show Australian employment growth is led by a high proportion of small firms, commonly referred to as "gazelles". Also, compared to the major OECD countries, Australia is particularly rich with micro and small firms (less than 50 employees), who comprise around 98 per cent of all Australian firms and account for 41 per cent of total employment over 2001–2011. Over the period of 2006–2011, 96.8 per cent of most micro-start-ups (new firms with 0–9 employees) either exit or continue with very little growth.⁹ Only 3.2 per cent of these micro-start-ups, the gazelles, grow significantly over five years post-entry and create 77 per cent of total job creation within their cohort.

Among the key features that stand out for age-size classifications in Australia compared to SMEs in other OECD countries are:¹⁰

- Total employment and job creation are higher for young firms but lower for mature firms.
- Both entry and exit rates are high for young Australian SMEs
- Australian SMEs play a large role in overall job creation

Other important features when considering the role of start-up SMEs in Australia are:

- SMEs are profitable and grow quickly in early years, but profits and growth decline with age
- Innovation is high for young SMEs, but doesn't persist

A picture emerges from the data of a dynamic start-up sector in the Australian economy, which provides a disproportionate share of job creation in the overall economy. Innovative

⁸ We consider here job growth as an indicator of economic and social inclusion instead of overall growth of the SMEs

⁹ Start-up firms are within 0–2 years of operation

¹⁰ For the purposes of OECD comparisons headcount measures are used. Size classes are small to medium (1–249 employees) and large (250+ employees); while two age groups are young (1–5 years old) and mature (6+ years old).

activity is also disproportionately high among the group. For example, in 2012-13, 24.1 per cent of Australian SMEs less than one year old invested in new products, while for mature SMEs (+10 years) the figure was 19 per cent. However, survival rates are low and it is only a small minority of the start-ups that are responsible for the overall dynamic of the group. All the characteristics of innovation and creative destruction are operating strongly, at least compared to other OECD countries.

5. Barriers to Innovation and Success for SMEs in Australia

Among the general impediments to innovation for SMEs mentioned in Section 2 are resistance to change, weak networks, lack of access to finance and the need for leadership. Additional impediments that apply specifically in the Australian context have been identified in a series of studies.¹¹ These impediments include relatively high labour and capital cost, energy prices, lack of workers with particular skills and a rigid regulatory environment. Further indication of the difficulties faced by young SMEs is the observation that competitive trading conditions, along with poor access for working capital, have resulted in increasing rate of insolvency particularly after the global financial crisis period (CPA Australia, 2012).

Many entrepreneurial enterprises are stillborn and those that manage to reach the start-up stage face low survival rates as the data cited above suggest. Yet, the data also show a high rate of start-up activity in Australia. Specialised knowledge within a start-up enterprise provides a focus for novel approaches to products, processes and distribution. However, the limited scope of the knowledge means there are bound to be gaps in the firm's understanding of the broader economic context in which it is operating. Add to this the ever-changing nature

¹¹ Detail discussions on various barriers and regulatory restrictions can be found in Lattimore et al. (1998), Department of Industry, Innovation and Science (2015) and OECD (2010).

of that context and the difficulty faced by entrepreneurs in forming start-ups and then surviving the test of the market is easy to appreciate.

Reducing the extent of failed innovations would be a clear benefit to the entrepreneurs involved and also potential aid society in reducing part of the cost to achieving the gains from those innovations that succeed. However, attempts to pick winners have had limited success in both the public and private spheres. The essential difficulty is the distributed nature of knowledge. Even experts or groups of experts have limits to the scope of their knowledge and no one knows what will happen in the future. Further, as representatives of established knowledge, such experts might be particularly weak in judging revolutionary change. Still, there seems to be consensus that mentoring, incubators and access to business planning advice is beneficial to start-up survival.

Even where an innovation is successful, there is no guarantee that the process is beneficial to the well-being of society at large. In addition to the possibility of fraud or externalities, there is the cost in terms of obsolescence to consider. In many cases, other young and small firms are major casualties. While it is common to treat sunk costs as irrelevant in economics, they are very much relevant in considering the net benefits of a process that regularly generates such costs.

Take a simple example. Suppose that there is new capital equipment available that is cheaper and more productive than the previous vintage. From the perspective of a start-up enterprise, there are profits to be had from the innovation of setting up production with the new equipment and undercutting the costs (and prices) of established producers. Of course, if next year the process is repeated, the first start-up might find itself in difficulty and unable to recover the full cost of its investment in the capital equipment. If the established producer that loses out is overseas, we have enhanced international competitiveness, but if they are local, the domestic wealth takes a hit.

The path of future developments in technology and their implications for obsolescence are unknown. This is a problem facing any investment in an evolving economy, but it is most acute for young, small firms who generally have limited a narrow range of specialised knowledge and a narrow market in which they operate. This suggests that the profitability and survival rates of SMEs in Australia would benefit from improving the overall eco-system of the research and development environment by involving stakeholders from business, scientist, engineers, and marketeers and adopting adequate institutional settings.

Regional innovation efforts provide examples of a way forward. Innovative enterprises are generally clustered in metropolitan regions. In many cases, national and state industry programs are beyond the reach for local and regional SMEs. The Regional Australia Institute has developed a 'regional accelerator' program in which a pro-entrepreneurship environment, supportive regulatory framework, collaboration, availability of capital and technical skills are identified as major drivers in promoting SMEs in regional areas. Similar examples of successful start-up incubators or small business mentoring programs can be found in metropolitan Australian and in urban and regional centres overseas.

6. Reflections on public policy

Underlying the present government policy in Australia and in most countries around the globe is the presumption that there is too little innovative activity, especially from SMEs. The virtues of higher productivity, better products and enhanced international competitiveness are clearly appreciated. As suggested in our discussion above, there are also substantial costs to innovation, including the resources used in failed attempts to innovate and the assets, skills and firms that become obsolete after successful innovation.

Australia has a relatively high rate of new firm entry, with Hendrickson, et al. (2015) showing the share of start-ups in the population of business firms is second only to Brazil

amongst OECD countries for which data are available. Yet, government policy continues to encourage more start-ups. The recent NISA proposes a number of measures to further encourage new innovative firms. We discuss some of these against the conceptual framework presented in Section 2 and the practical discussion of barriers in Section 5.

Among the measures proposed in NISA, are two new government funds, the CSIRO Innovation Fund and the Biomedical Translation Fund, to co-invest with the private sector in spin-offs from public-sector research. A clear motivation is to increase the commercialisation of ideas generated by government supported research. Details about the selection process for determining which ventures to back are not yet available, but whatever process is chosen will have to contend with the issues of picking winners that are discussed in the previous section. There is no acknowledgment that most bright ideas don't lead to commercial success.

Another group of measures is designed to address the barriers to finance for new ventures and young firms. These measures are primarily in the form of tax concessions, particularly tax offsets and capital gains exemptions for early stage investors and favourable tax treatment for Early Stage Venture Capital Limited Partnerships. The general thrust is to allow tax benefits to investors even where a young firm is not yet profitable. Considering the high failure rate for start-ups in Australia, it is reasonable to ask whether these measures will exacerbate the problem.

Perhaps more worrying in terms of encouraging failure, there are the provisions in NISA dealing with entrepreneurs whose enterprises have previously failed. These include reducing the default bankruptcy period from three years to one and providing some protection for directors against personal liability for trading while insolvent. The justification given is that there is currently too much emphasis on penalising and stigmatising business failure. One can agree that entrepreneurs may fail several times before they succeed and yet recognise that

there is likely to be serial correlation in an individual entrepreneur's probability of success. Backing winners is more likely to generate more success than is backing losers.

Finally, among measures that are designed to directly support innovation in SMEs, is a measure to support incubators. Not much detail is given and the budgetary allocation is \$2 million a year over the forward estimate, compared to a total Commonwealth support for R&D of about \$10 billion per year. The small scale of the measure probably reflects the fact that state and local governments have been the main providers of incubators and other programs providing practical support to SMEs. Nonetheless, any program that works on increasing the success rate of start-ups or innovative young firms has the potential to help reduce the high failure rates for these enterprises.

There are a raft of other proposed measures in the NISA that deal with training, infrastructure, collaboration between business and universities, and government procurement that have potential impact for SMEs. Some of the training and procurement measures may help with lowering the failure rates for SMEs, but none of them seems specifically designed to this purpose. Overall, there seems to be far too much concentration on increasing the level of activity and far too little attention to ensuring that the activity is successful and yields benefits to society at large.

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