COMMENTS ON THE PRODUCTIVITY COMMISSION'S *DRAFT RESEARCH REPORT ON PUBLIC SUPPORT FOR SCIENCE AND INNOVATION*

Overview

The Australian Business Foundation appreciates the opportunity to comment on the Productivity Commission's *Draft Research Report on Public Support for Science and Innovation.*

The Foundation welcomes the bulk of the findings as a rigorous, thoughtful analysis that is slow to adopt conventional wisdom or to be swayed by fads in the innovation debate. In particular, the Commission presents a suitably broad concept of innovation: 'deliberative processes by firms, governments and others that add value to the economy or society by generating or recognising potentially beneficial knowledge and using such knowledge to improve products, services, processes or organisational forms' (*Draft Report,* p. 1.7).

Further, the Productivity Commission acknowledges that innovative activities form part of a national system, and that understanding this is vital to effective policymaking. The *Draft Report* defines the key features of national innovation systems as follows:

- all elements are interconnected;
- dynamics are non-linear and complex;
- non-market institutions are equally important as market ones;
- much relevant knowledge is tacit and therefore embodied in agents;
- the ability to identify and solve problems is essential;
- customers are determining agents;
- gaps or missing linkages in the system are deleterious; and
- all government policies and services more or less affect innovation policy (*Draft Report,* p. 1.17f).

The Australian Business Foundation, however, notes that despite presenting a broad concept of innovation, the Productivity Commission's *Draft Report* restricts its deeper analysis to only one innovative activity, namely research and development (R&D).

The justification for this seems to be based on:

- equating public support for innovation as overwhelmingly public expenditure on R&D; and
- the availability of R&D data and its amenability to quantitative economic analysis.

In the Foundation's view, this cautious and unambitious assessment sacrifices policy relevance for analytic precision. It also is more reflective of past practice and existing expenditure patterns, rather than of the broad concept of innovation initially presented. The *Draft Report* passes up the opportunity of identifying policy settings and mechanisms that would foster a national innovation system that is more responsive to the challenges of competing in a modern, globalised, knowledge-based economy.

Non-R&D forms of innovation

Having shown the social benefits of public support for R&D, the Productivity Commission should reassess the extent and benefit of public support (not necessarily additional spending) for *non-R&D* forms of innovation.

While the *Draft Report* acknowledges experts' concerns with the shortcomings of Australian managers, the lack of serial entrepreneurs in Australia and the defensive innovation behaviour of resident firms, it rules out any significant role for government in promoting a more innovative culture in Australian businesses (*Draft Report,* p. 6.19ff).

In contrast, the Australian Business Foundation believes that there is a strong case for public policy in facilitating the diffusion and absorption of new business knowledge (technological or otherwise), as this is equally important – if not more so – than its creation. The significance of non-R&D forms of innovation has been shown in previous Foundation studies of Australian industry by Professor Keith Smith[1] and the ASX,[2] as well as by an authoritative analysis of US aggregate productivity conducted by McKinsey and supervised by Professor Robert Solow and others.[3]

In particular, to the three elements of *Backing Australia's Ability* (commercialisation, generating ideas and developing skills) should be added a fourth programme fostering customer-driven innovation at the business enterprise level. This should aim at:

- reducing the transaction costs of enterprises acquiring and using knowledge from external sources (including initiatives that foster reciprocal knowledge flows and collaborative working relationships

between enterprises, and between enterprises and other key economic actors, including researchers and transnational enterprises); and

- assisting enterprises to appropriate value from their innovative activities (e.g., assistance with managing risk and uncertainty, discovery of opportunities, market access, implementation of business and management systems, staff training, etc.).

Uncertainty versus risk

In discussing barriers to financing innovation, the *Draft Report* distinguishes between uncertainty and risk, observing that 'the absence of knowledge even about how [sic] the underlying probability distribution of project returns means that socially worthwhile projects will be left unfinanced' (*Draft Report,* p. 3.24). This insight informs the Productivity Commission's qualified acceptance of the idea that governments should help small and start-up companies gain access to finance for innovation (*Draft Report,* p. 3.1).

The Australian Business Foundation encourages the Productivity Commission to consider further the impediments imposed on firms by conditions of uncertainty (where some unknowns will always remain unknowable), rather than focusing on conditions of risk (where all unknowns can reasonably be estimated).[4] While estimating the costs of financing an innovative project might be a matter of risk analysis, best conducted by private investors or financial institutions, conjectures about the benefits of many innovative activities (such as intra-firm collaboration) are unlikely to attract finance or indeed motivate managers. The government therefore has a legitimate and important role in helping private businesses bear the cost of uncertainty of innovation.

The Productivity Commission itself acknowledges the stimulus to innovative collaboration provided by *CRC Programs*; and in fact, proceeds to recommend improvements in *CRC Programs* to extend the access and range of collaborative endeavours supported by them (*Draft Report,* pp. 9.1, 9.5). Analogous programs are required to promote non-R&D forms of innovation, which are much more applicable to Australia's industrial structure and to the competitive positioning of resident firms.

The commercialisation dilemma

The Foundation concurs with the Productivity Commission that innovation policy consists of much more than promoting the commercialisation of scientific inventions, and that the social value of basic research and traditional university functions must be recognised and preserved (*Draft Findings 4.1* and *6.1*).

Nonetheless, there is a blind spot in the Productivity Commission's analysis of late commercialisation programs like *Commercial Ready.* This oversight stems from the Commission focusing its analytic lens almost exclusively on R&D. The *Draft Report* argues that there are three negative aspects of late commercialisation programs:

- the crowding out of socially valuable research;
- fewer 'spillovers' (i.e., social returns to innovation above private gain) and hence less rationale for public support; and
- the public subsidisation of activities that private agents would have pursued anyway (*Draft Report,* p. 9.27ff).

The alternative view, which the Australian Business Foundation espouses, is that *Commercial Ready* is one of the very few initiatives of the Federal Government which seeks to increase the capacity of Australian-based firms to absorb knowledge (in this case, knowledge acquired in collaboration with universities and publicly funded research agencies).

Assessing the Australian innovation system as a whole

The Productivity Commission accepts that there are strong rationales for public support for science and innovation (*Draft Finding 3.1*). The rationales endorsed by the Commission are:

- the existence of spillovers;
- intangible factors such as national identity and prestige;
- the asymmetric tax treatment of highly risky real investments;
- problems in financial markets that obstruct the financing of risky or uncertain real investments in small enterprises and start-ups;
- problems in the provision of information by public-sector agencies (*Draft Report,* p. 3.1).

The Commission correctly notes that 'in practice, the information requirements to determine the *optimum* scale and mix of public funding are too demanding' and adds that these are 'matters of political judgment, informed by the available evidence' (*Draft Report,* p. 8.1, emphasis in original). Nevertheless, the inappropriateness of searching for an optimal innovation policy does not preclude the possibility and desirability of setting aggregate benchmarks. The Finnish Government, for example, endeavours to calculate the effect of its various policies and programmes on domestic employment, company turnover and exports.[5] That is to say, in Finland there are definite, observable criteria by which to assess the prevailing political judgment on total innovation-related spending.

Conversely, it is not entirely clear how the Productivity Commission reaches the conclusion (in *Draft Finding 8.1*) that the current level and mix of Australia's funding

for science and innovation ($6 billion per annum, heavily weighted to R&D) is appropriate. Granted, the Commission does make a strong case for the existence of spillovers and the necessity of national preparedness for health and environmental crises (*Draft Report,* Chapter 4). It also sets forth detailed criteria by which to evaluate particular government programmes (*Draft Report,* Chapters 7 and 9). But having demonstrated the social utility of public support for science and innovation, the *Draft Report* contains no compelling arguments against boosting the amount of public support or shifting away from a programme emphasis on R&D and technological innovation. Rather, the Productivity Commission contents itself with the observation that Australia's overall level of support is average by international standards, and that incremental changes to the current mix of programmes are preferable (*Draft Report,* pp. 8.5, 8.14, 8.23f).

Conversely, research conducted for the Australian Business Foundation highlights the significance of public support for all knowledge-intensive activities, not merely R&D. Professor Keith Smith cites ABS-DITR data showing that in 2002-03, two-thirds of innovation expenditure in Australia was devoted to inputs other than direct research and development. These other inputs included:

- market research;
- training and skill development;
- design;
- the application of new capital goods;
- engineering development; and
- knowledge drawn from patents and licenses.[6]

Professor Smith also points out that in Australia, as in most advanced economies, high technology or science-based industries and the technologies underlying them are very important, but they are also very small. He notes that high technology industries account for only around 3% of Gross National Product (GNP) in most OECD economies.[7]

In short, the Productivity Commission's case for the present success of public support for science and innovation is unfalsifiable. Therefore, the Commission needs to consider which indices can best measure the degree of success (or failure) of the nation's prevailing innovation policy.

Forming a strategic, national innovation body

The Productivity Commission wisely advocates the need for a better coordination between government programmes (provided that diversity and devolution are not compromised) and better coordination across levels of government (*Draft Report,* p. 8.16ff). However, it rejects proposals for the establishment of a strategic innovation agency or peak body of agencies (like those of Japan, Denmark and Sweden), on the

ground that 'there is no certainty that centralised allocation of funding, or even an increase in high level coordination, would offer a net advantage over current processes' (*Draft Report,* p. 8.16).

Yet, the Australian Business Foundation contends that the formation of a genuine system of innovation depends on the willingness of the national government to coordinate the setting of all policies that affect innovation, to set definite benchmarks and goals for public expenditure, and to connect innovation agents who would otherwise operate independently or collaborate intermittently. That is, judicious and selective government policies, far from distorting price signals and private motivations, are key to a successful national innovation system. (Consult the pertinent comparison by Professor Göran Roos *et al.* of Australia's innovation system with those of Finland and Sweden.[8])

The objective of a specific, national innovation body would be to discern overall innovation priorities and to determine the ongoing balance of innovation expenditure. Far from attempting to 'pick winners', a strategic innovation body would provide a focus for policy initiatives to capitalise on Australia's strengths and opportunities. Since national economies now form part of an open and complex system, the old linear notion of achieving an optimal growth path by manipulating certain variables (like R&D) must give way to developing a framework of mutually consistent policies and actions by both government and industry, which takes account of competing innovation systems abroad.[9]

The Productivity Commission should recall its own initial emphasis on the systemic and complex nature of innovation, particularly the efforts of government worldwide to achieve framework conditions 'closer to world's best practice in business and government services' (*Draft Report,* p. 1.18). With the rapid economic development of China, India and Brazil, and the single-minded policy endeavours of their governments to advance their resident firms' crossborder competitiveness, the Federal Government cannot afford to assume that the present arrangement of formal and informal decision-making mechanisms are sufficient to meet this challenge. Again, a standing innovation body is needed continually to:

- foster ongoing collaboration (not merely the exchange of information) between public and private agents and between businesses; and
- determine the relevant indices by which to measure the effectiveness of the innovation system.

To give a more specific recommendation: for selected strategic industry sectors or value chains (e.g., those that reflect the National Research Priorities) the 'preparedness' of the Australian economy can be enhanced by evolving the Action Agendas program to include provision for the conduct of foresighting exercises. Instead of trying to anticipate the next technological breakthrough or set of industrial

capabilities, a strategic national body should develop policies that encourage resiliency and agility in Australian firms in critical sectors, in the face of unknowable future requirements.

Business Feedback

There are two additional areas of comment that the Australian Business Foundation wishes to bring forward, which derive from feedback of business enterprises to our founder, Australian Business Limited State Chamber. These relate to:

- the 125% base R&D tax concession; and
- shortages of scientists, technologists and engineers.

Base R&D tax concession

Members of ABL State Chamber are concerned about the proposed abolition of the base R&D tax concession (*Draft Finding 9.1*) because it is critical to sustaining the *existing* rate of R&D projects. The Foundation would direct the Productivity Commission to a survey of 116 firms by DITR, which found that:

- financial constraints on R&D are more significant in small companies than in medium and large companies;
- returns on investment in R&D are uncertain, indirect and can involve a long lead time;
- expenditure on R&D is consequently the first cost to be cut during a downturn;
- the costs of applying for the concession mean that companies are not tempted to undertake R&D projects for which there is a poor business case, just to receive a tax benefit; and
- without the tax concession, the projects undertaken by 81 of the 96 companies who claimed the tax concession in 2002-03 would taken longer and exceeded budget.[10]

Skills shortages

Australian businesses consulted by ABL State Chamber are highly sceptical of the Productivity Commission's view that more flexible money wages alone are sufficient to boost the supply of scientists, engineers and technologists (*Draft Report,* p. 5.1). Since there is not a strong private demand in Australia for the professions that underpin natural science (such as mathematics, physics and chemistry), there is a danger that the withholding of public support for these professions will result in a serious depletion of human capital able to identify and solve problems in other spheres. Further, if this stock of tacit knowledge is allowed to be exhausted (as older skilled workers exit the labour force and younger ones emigrate to more

lucrative, more applied fields), then it will be extremely costly and time-consuming to recover.

It is instructive to contrast the traditional prescription of wage flexibility (advocated by the Commission) with the Finnish Government's far-sighted response to a shortage of highly skilled labour in the 1980s. A program of expansion in higher education was promptly initiated, without which perennial labour crises in high-tech industries would be even more acute.[11]

Conclusion

The Australian Business Foundation endorses the Productivity Commission's view that innovation covers an array of knowledge-intensive activities (both high-tech and low) and that these activities take place within a complex and increasingly open national system.

Yet, the Foundation regards the scope of the *Draft Report* as being far too focused on R&D, and therefore silent about the real competitive challenge facing firms resident in Australia: namely, increasing their capacity to absorb new business knowledge (whether produced locally or overseas) so they can innovate and grow at a rate comparable to foreign-based firms.

Moreover, the limited scope of the *Draft Report* seems to have directed the Productivity Commission's attention towards current practices and expenditures, at the expense of future opportunities for public support (especially for non-R&D activities) and a more strategic and testable approach to enhancing Australia's international competitiveness.

The Australian Business Foundation therefore recommends that the Productivity Commission's *Final Report* extends its analysis to non-R&D forms of innovation, particularly the fostering of business programs designed to assist Australian enterprises to appropriate value from innovative activities and to acquire and use knowledge productively.

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NOTES

[1] In a report for the Australian Business Foundation, Professor Smith affirms that innovation is pervasive across all Australian industries. Traditional, low-to-medium tech industries (like food processing, metal products, chemicals, transport, mining and hospitality) are no less knowledge-intensive than high-tech ones. Professor Smith drew extensively on data subsequently presented in the 2006 ABS-DITR report: *Patterns of Innovation in Australian Business 2003.* The report notes that 35% of Australian businesses undertook at least one form of product, process or organisational innovation during 2001-03. Additionally, the report highlights that 'innovation is occurring across the economy', with no great variation by industry around the mean. The range varied from 50% of businesses innovating in utilities to 27% of businesses innovating in accommodation, cafes and restaurants (Smith 2004, 9-18; ABS and DITR 2006, 9ff). See also p. 5 above.

[2] Bladier and Ramsay (2005) conclude that the government can contribute very effectively to the sustained success of any particular industry, without spending large amounts of money, diminishing its tax base or providing industry subsidies. Moreover, while the authors advocate R&D jointly funded by industry and government, they emphasise several non-R&D areas in which government intervention may be effective:

- Stimulating industry clustering and growth, through industry associations and the clever allocation of minimal funds.
- Establishing or perpetuating specialist, industry-focused tertiary courses.
- Founding and supporting industry research facilities.
- Levering industry leadership by encouraging an appropriate array of associations within any given industry.
- Supervising self-regulation by professional and financial institutions.

[3] McKinsey Global Institute (2001).

[4] To put it in formal terms: 'uncertainty' means that neither mathematical techniques nor past observation can render future events reliably predictable. This concept is especially relevant to liberal-capitalist economies, in which agents must deal with fixed contractual obligations but unknowable future asset prices. In contrast, 'risk' describes a hypothetical situation in which all future outcomes can be reduced to actuarial certainty by probabilistic statements. Only in this hypothetical world are agents faced with a discreet range of known outcomes, including the likely result of novel combinations of inputs (innovations).

[5] See Roos *et al.* (2005, 21).

[6] Smith (2005, 18; 2004, 9f) and ABS and DITR (2006, 36).

[7] Smith (2004, 6).

[8] Roos *et al.* (2005) give examples of the strategic capacity of the Finnish national innovation system:

- The Science and Technology Policy Council (STPC), chaired by the Prime Minister. STPC coordinates issues of research and development (R&D) between various ministries, provides a platform for policy discussion and defines general guidelines for all public R&D funding. Moreover, Roos *et al.* affirm that STPC's method of triennial strategic planning 'could readily be emulated in Australia'.
- The National Technology Agency of Finland (TEKES), which coordinates and funds technology programs to be implemented in conjunction with firms and research bodies, as well as facilitates international cooperation in research and technology.

Similarly, the Swedish national innovation system is characterised by a comprehensive and long-term approach. Some of its key institutions are:

- The Swedish Business Development Agency (NUTEK), a central economic development authority that finances companies, facilitates regional development and clustering, and provides services for information, advice and networking.
- The Swedish Agency for Innovation Systems (VINNOVA), which funds needs-based R&D.
- The Institute for Growth Studies (ITPS), which collects data on growth policies, analyses economic and technical changes, and evaluates policy decisions.

In contrast, Australia was judged to lack the institutions and public-private alliances that are required for a strategic and coherent approach to innovation-led growth.

[9] See DITR (2006, 49), Livingstone (2006, 1f) and Cutler (2006, 19).

[10] DITR (2005, 5f, 23f).

[11] Roos *et al.* (2005, p. 10).