1 Enhancing Australia's productivity growth

Productivity growth is important to Australia because, through income growth, it contributes to our community wellbeing. While capital accumulation and increasing labour force participation also increase per capita income growth, productivity growth is the only way of growing the economy without necessarily requiring additional physical inputs.

In this context, what can we learn from the recent slowdown in Australian productivity growth from its 1990s peaks? Have the reform impacts that enhanced earlier productivity growth run their course? Are there lessons for policy that could boost future productivity growth?

A little over half of the decline in productivity growth below long-term average rates this decade has arisen from developments in agriculture and mining — notably drought and the export boom. There are good reasons for expecting productivity growth in these sectors to improve, but sustained aggregate productivity growth recovery will not be automatic, and attaining above-average growth will require improved performance in several key areas.

Innovation and diffusion of new and better production methods, and the introduction of new goods and services, are the core drivers of productivity growth — getting more, and more highly valued, outputs from any level of inputs.

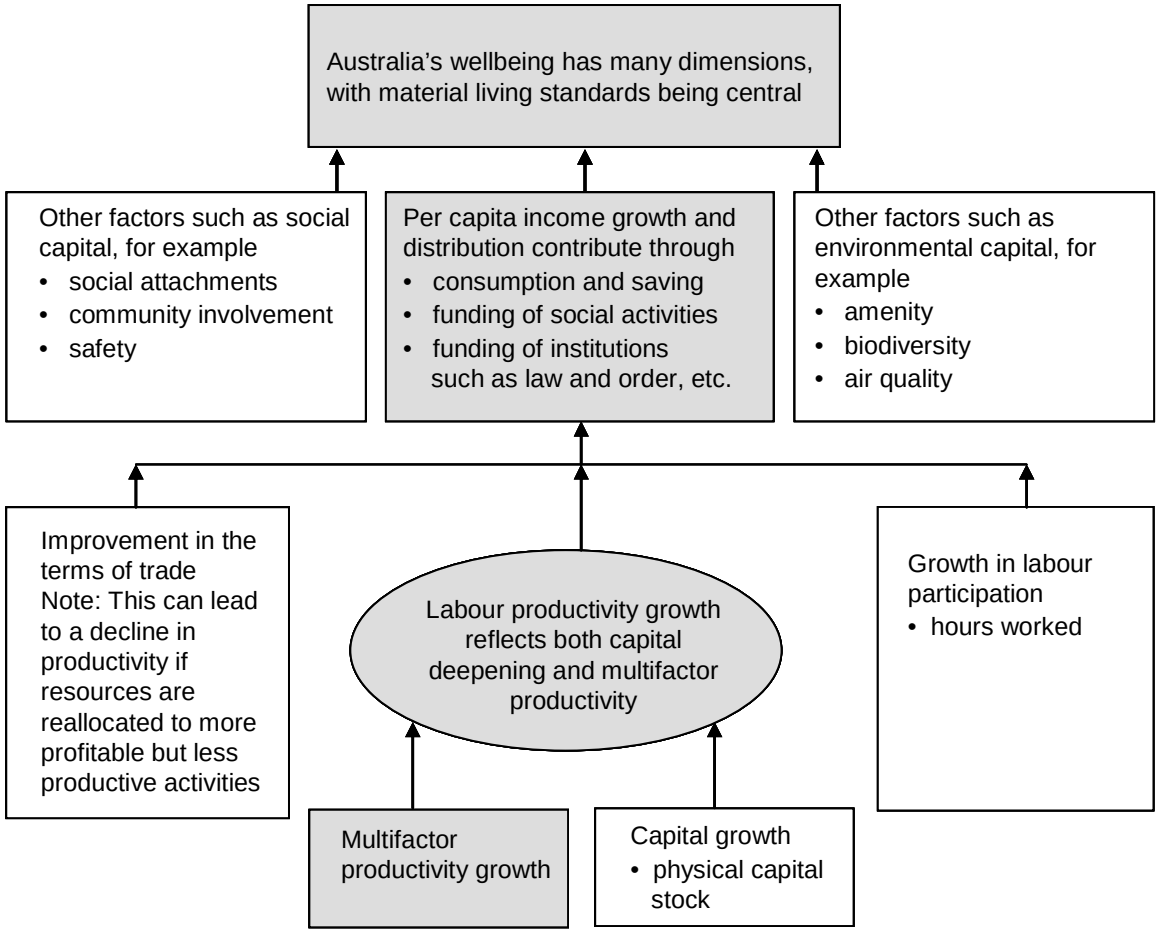
International evidence suggests that it is market competition, rather than government assistance, that is the main driver of innovation and its diffusion throughout the economy. But innovation and productivity growth also depend on having flexible regulatory settings, capable people and efficient infrastructure, for each of which government plays an important role. Further reforms in these areas could yield significant benefits.

Why is productivity growth important?

The ultimate objective of all public policy is to improve the wellbeing of the community. The concept of wellbeing has numerous dimensions, both material and non-material. However, income growth and its distribution are central to the ability

of families to provide for current and future consumption, and for government to fund social services and support creative endeavours. Income growth also creates improved opportunities for employment, with associated benefits in improved social outcomes. These interdependencies are sketched in figure 1.1

Figure 1.1 **How productivity growth contributes to wellbeing**



Productivity underpins per capita income

Productivity growth contributes to growth in per capita income as it increases the outputs of goods and services produced per unit of physical input. Box 1.1 explains the different measures of productivity. The most commonly used is labour productivity, but a better indicator of economic efficiency and effectiveness is multifactor productivity (MFP). This measures the growth in output above that explained by growth in measured capital and labour inputs. (Unless otherwise specified, productivity references in this chapter are to multifactor productivity.)

Box 1.1 **Measuring productivity trends**

There are two commonly used measures of productivity: labour productivity, which is the volume of output per hour worked; and MFP, which is the volume of output from a bundle of both labour and capital inputs.

MFP provides the better indicator of the overall improvement in an economy's efficiency, as it measures the growth in economic output above that directly attributable to growth in measured capital and labour inputs. As such, it captures the influence of improvements in production-related factors such as skills, technology, and management practices that are not incorporated in official capital and labour measures.

Interest normally focuses on the percentage rate of productivity *growth* over time, though *levels* of labour productivity (measured in dollars of output per hour) can also be compared across industries and across countries

Measuring labour and capital quality changes is difficult

Labour and capital qualities are hard to measure. For example, rising educational qualifications tend to improve the productivity of labour, especially when education improves technical or problem-solving skills, or improves understanding and dialogue in the workplace. Technological change means that the characteristics of capital inputs, of the production process, and of outputs of goods and services are constantly changing, and these quality improvements can also be difficult to measure.

Productivity growth is only measured well for the market sector

While estimates of output and hours worked are published for the whole economy, productivity is only well-measured in the part the ABS calls the 'market sector'. In these market-sector industries, prices are indicators of quality that can be used to compare the value of new goods and services to that of the old versions they replace.

In the one-third of the economy outside of this market sector — industries such as health, education, government administration and property and business services — it is more difficult to separate price changes from changes in the quality and quantity of services. Official estimates of output growth in these industries are based on either the volume of inputs into production or relatively simple indicators of the volume of output. For example, current estimates of output growth in education reflect changes in the number of students. These measures reflect changes in the composition of services offered (primary, secondary and tertiary education) but not improvements in quality that may result, for example, from using new technologies to teach more effectively or by employing more effective teachers.

Productivity growth trends can only be observed over reasonably long time periods

Even in the market sector, it is difficult to infer trend rates of growth from short-term productivity movements. Productivity estimates move around a lot from year to year because of: real shocks to parts of the economy; errors in measurement of either inputs or outputs; and the cyclical pattern that results because employment growth tends to lag output growth. This means that average productivity growth over a number of years provides a better gauge of the trend pace of productivity improvement.

Figure 1.2 shows the contribution to the average income growth of Australians over the past four decades, from changes in labour utilisation, the terms of trade, and labour productivity. Labour productivity growth, which reflects both MFP growth *and* the increase over time in the amount of capital per hour worked, has been the main source of income growth in every decade. Changes in the terms of trade — the prices of Australian exports relative to imports — have had a small effect over longer periods with the exception of the most recent decade where sustained high commodity prices have made a large contribution to income growth. Increases in labour utilisation have made generally small and positive contributions to output growth over the past four decades.

Figure 1.2 **Contribution to income growth — the importance of productivity**

Contributions to annual average growth in real gross domestic income per capita, percentage points per year

Data source: Commission calculations based on ABS, *(Australian System of National Accounts, 2006-07)*.

Why the emphasis on productivity growth for the future?

Future income growth provides the means for dealing with emerging demographic and environmental challenges, reducing the need to forgo consumption or living standards (box 1.2). Fortuitous terms of trade improvements aside, productivity growth is the only way of growing aggregate income without the necessity for additional physical inputs, relying instead on the application of knowledge embodied in capital, labour and new technologies. Although the accumulation and application of knowledge still require investment, the constraints are less than those imposed by demographics and the forgone consumption required for capital investment, and the rewards potentially greater.

Improvements in the terms of trade have played a major role in raising incomes in Australia in the past few years. Rapid economic development in China and India has pushed up prices for Australia's resource-based exports, while simultaneously reducing world prices for our manufactured imports. These externally-driven price changes have increased the volume of goods and services that can be purchased with Australian income and, while some of that income accrues to foreign shareholders of Australian companies, most has remained in Australia. While the terms of trade depends on global forces, it seems unlikely that further terms of trade improvements will continue to yield such strong income growth in the future.

Similarly, increases in labour force participation have made a contribution to income growth over the last eight years as labour markets became more flexible, and incentives for participation improved (PC 2007b). While this trend is expected to continue for a few more years, without major shifts in pension and superannuation policies, population ageing will reduce labour force participation significantly (PC 2007b, 2005b).

Capital and other types of investment are affected by lifecycle considerations resulting from the ageing population, which has an impact on aggregate savings rates. While Australia has an open capital market, domestic savings remain an important source of capital for investment. And the national capacity to borrow also depends on the prospects for future income growth. Higher productivity growth may assist in attracting foreign investment, which in turn contributes to income growth.

Box 1.2 **Productivity growth provides higher incomes to meet some key challenges**

Recent Commission work has highlighted that stronger productivity growth would reduce or negate the adverse impact on living standards of three looming long-term challenges: population ageing; sustainable water use; and climate change.

An ageing population tends to lower labour utilisation and raises the expenditure on aged care and public pensions, as an increasing share of the population retires from the workforce. The *Intergenerational Report* (The Treasury 2007) estimated that real GDP per person increased by 130 per cent over the 40 years to 2006-07. Given the same rate of productivity growth, slower growth in employment over the next 40 years is likely to see GDP per person increase by only 90 per cent over the 40 years to 2046-47. Policies to improve participation are important, but can make up only a fraction of this gap. There are natural limits from work-leisure choices on the extent to which increasing labour utilisation can add to wellbeing. The Commission estimated that health promotion and disease prevention, education and training and improvement of work incentives may lead to a 6 per cent increase in labour force participation over the next quarter century (PC 2007b).

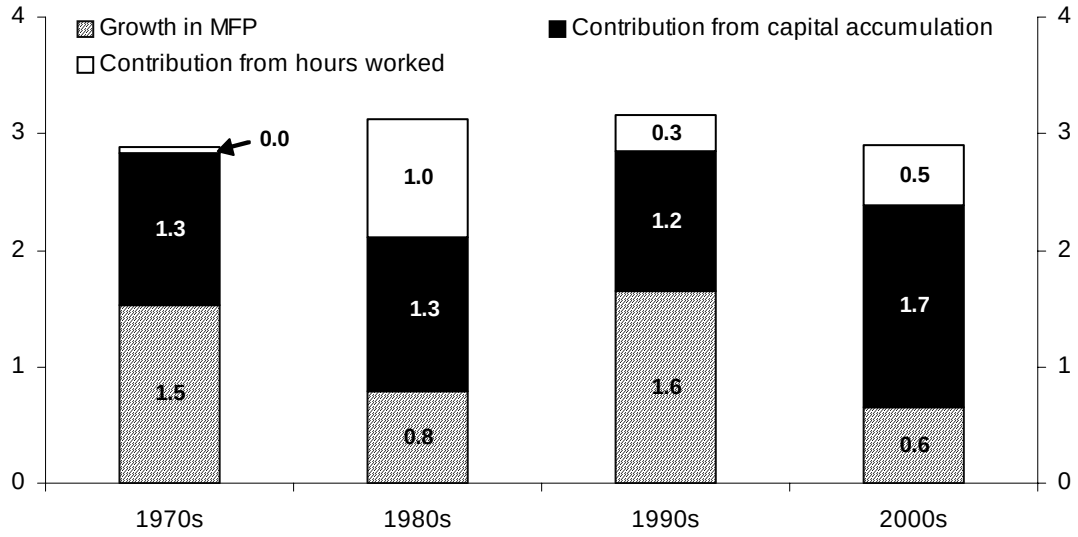
A second challenge is addressing overallocation of water in some river systems and adapting water policies to the severity of the drought and the risks of a hotter climate. Water shortages and restrictions have raised questions about the sustainability of existing irrigation arrangements as well as urban water supplies. The requisite mixture of pricing changes and investments will be easier to bear with productivity growth (PC 2006c, 2008c).

A third challenge comes from climate change. The cost of efforts to mitigate climate change through reducing the carbon intensity of GDP could reach at least 1.4 per cent of GNP in 2020 and continue to increase beyond that (Garnaut 2008). Additional costs of adaptation and compliance are likely. Our capacity to bear such costs without detracting from per capita income levels depends on achieving higher productivity growth.

What has happened to Australia's productivity growth and why?

Following a surge in productivity over the 1990s, Australia's productivity growth has slowed this decade to below the long-term average rate. Figure 1.4 shows the contributions to growth in the market sector output over the last four decades from growth in hours worked, capital accumulation and growth in productivity. While output growth has varied only slightly over the period — between an annual average rate of 2.9 and 3.2 per cent per year — MFP has varied considerably, with a substantial decline in productivity growth from 1.6 per cent over the 1990s to 0.6 per cent over the seven years of the current decade for which data are available.

Figure 1.3 **Annual average change, percentage points**



Data source: ABS *(Australian System of National Accounts, 2006-07)*.

What lies behind the slump in productivity growth?

Other OECD economies have also suffered slowdowns

The productivity level potentially achievable by Australia depends in part on the technological frontiers established in other leading economies.[1] Australia has roughly kept pace with productivity growth in the European Union over the last decade, but fallen behind that of the United States.

Over long periods of time, Australia might reasonably expect at least to keep up with movements in the frontier, and ideally narrow the gap. The rapid growth in the 1990s saw such a catch-up, with Australian labour productivity rising from around 80 per cent of the US level in 1990 to 88 per cent in 1999. But by 2007, Australia had fallen back to only 83 per cent of the US level of output per hour worked, although Australia's productivity had held steady relative to the European Union over the same period (see box 1.3).

[1] Australia is unlikely to match the frontier level of productivity because our ability to benefit from scale, specialisation and trade is limited by the relatively small scale of domestic markets, the remoteness of Australian regional markets from each other and from the centres of world production (Battersby 2006; Boulhol and de Serres 2008).

Box 1.3 **International comparisons of productivity and income growth**

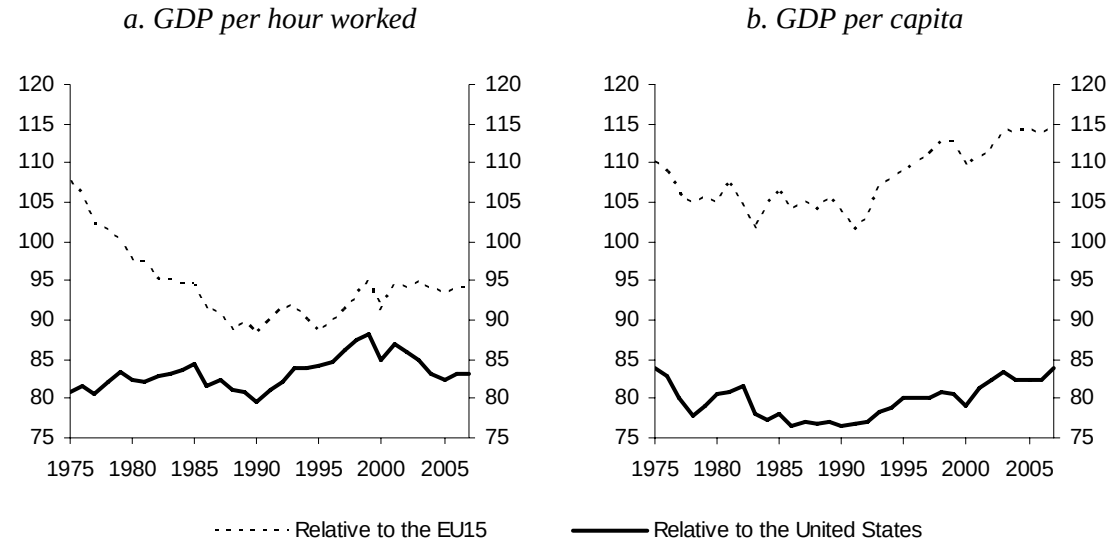
International comparisons of productivity levels need to be approached with caution. Most comparisons are based on labour productivity rather than the more complex measures of multifactor productivity. Observed differences may therefore reflect different rates of capital accumulation and employment rates, rather than productivity differences (Dolman, Parham and Zheng 2007).

Part of the decline in Australian labour productivity relative to the United States reflects US conditions. The 2001 recession in the United States was mild in terms of its effect on output, but one of the most severe since the 1930s depression in terms of its effect on employment (Kennedy and Harris 2004). This has been reflected in unusually rapid growth in labour productivity in the United States this decade, yet output growth has been lacklustre.

Elsewhere in the OECD labour productivity growth has slowed. Measured relative to the average across the European Union, for example, Australia has held on to its labour productivity gains through the 1990s — rising from 88 per cent in 1990, to 95 per cent in 1999 and was 94 per cent of the EU average in 2007 (panel a).

Importantly, in terms of GDP per capita, which also takes into account employment growth, Australia has continued to make up ground compared to both the US and the EU (panel b).

Australian GDP per hour worked and GDP per capita relative to international benchmarks[a]



a US or EU15 = 100.

Data source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, February 2008.

Slower productivity growth is the flip side of rising terms of trade and greater utilisation of labour and capital

Historically, periods of lower productivity growth have coincided with higher growth in labour and capital inputs, leaving income growth relatively stable (figure 1.4). The current decade has seen a return to such input-driven growth in output. Strong growth in employment and investment, together with the rise in Australia's terms of trade, have generated significantly greater prosperity in recent years, despite the relatively weak productivity performance. Enterprises appear to have found more room to increase prices amid buoyant domestic demand for their products. Unit labour costs have been falling through the current decade and the income share of profits has risen rapidly. Compared with the 1990s, more effort seems to have gone into expanding production through investment and new hiring, rather than cost cutting.

For example, measured banking sector productivity growth was facilitated through the 1990s by the closure of nearly 2000 bank branches. But amid improving profitability and rapidly growing demand for financial services — tied to increases in household and business credit — banks more recently have been looking for new ways to serve customers and increase market share: the current decade has seen more than 260 additional branches open and measured productivity in the industry slow. This may also reflect a measurement problem as the quality of the services may well have increased, but this is not captured in the output measure.

In addition, adding new capacity may cause lower short-term productivity growth during the construction and training phases, with productivity rising with duration of the operational phase. The mining industry provides a clear example where rising output prices have encouraged organisations to add large amounts of additional labour and undertake new investment in an effort to try to extract more output, as discussed below.

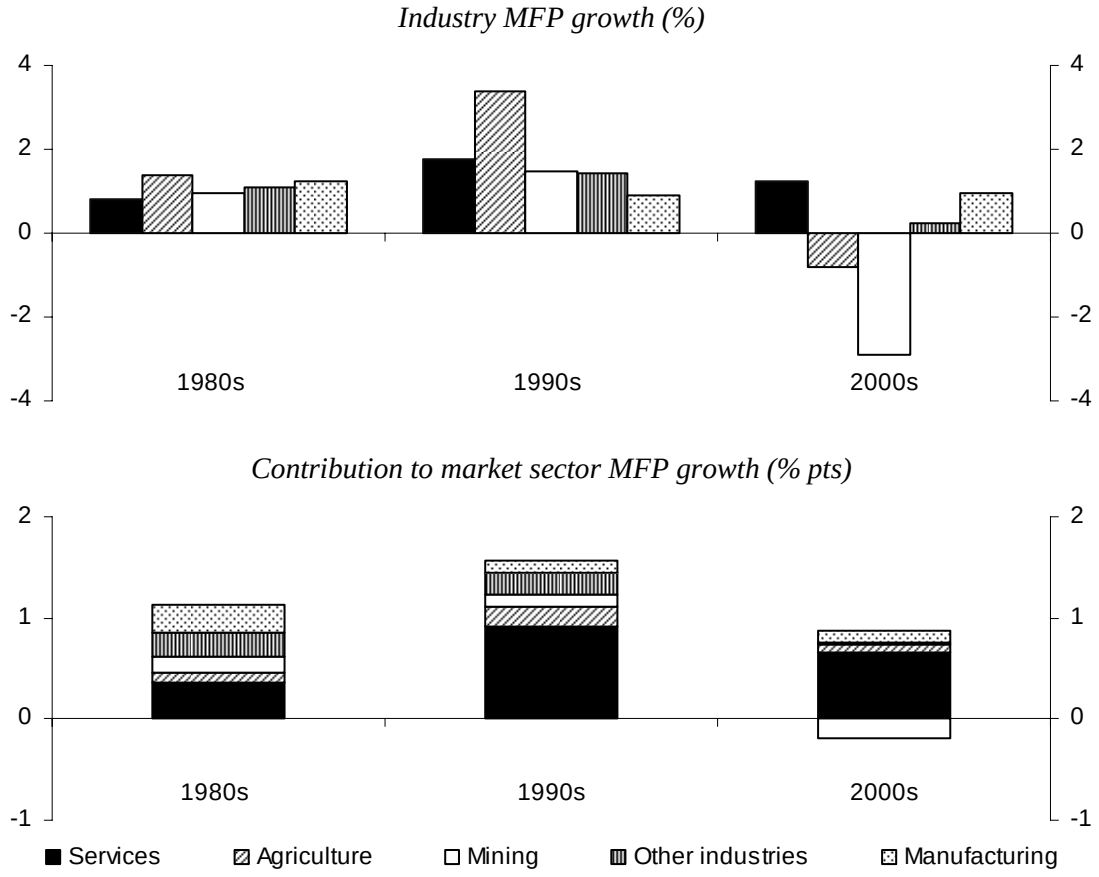
Agriculture and mining experienced the greatest productivity slow downs

The productivity surge of the 1990s was broadly based. This was unusual as service industries became the main sources of productivity growth for the first time. Because their labour-intensive nature makes it more difficult to apply cost-saving technological innovations, it had been thought that productivity growth was more difficult to achieve in service industries (Baumol 1967).

Figure 1.4 shows the contribution of different sectors of the economy to market sector productivity growth in the last three decades. In the 1980s, service industries explained only one-third of market sector productivity growth — this rose to almost two-thirds in the 1990s. So far this decade almost all of the growth in market sector

productivity has occurred within services. The distributive trade services (wholesale, retail and transport and storage) contributed to the 1990's surge, as did the then recently deregulated and rapidly expanding industries of finance and insurance and communications. Some of the traditional 'engines of growth', such as manufacturing, did not.

Figure 1.4 **Multifactor productivity in broad industry groups**
Annual average change



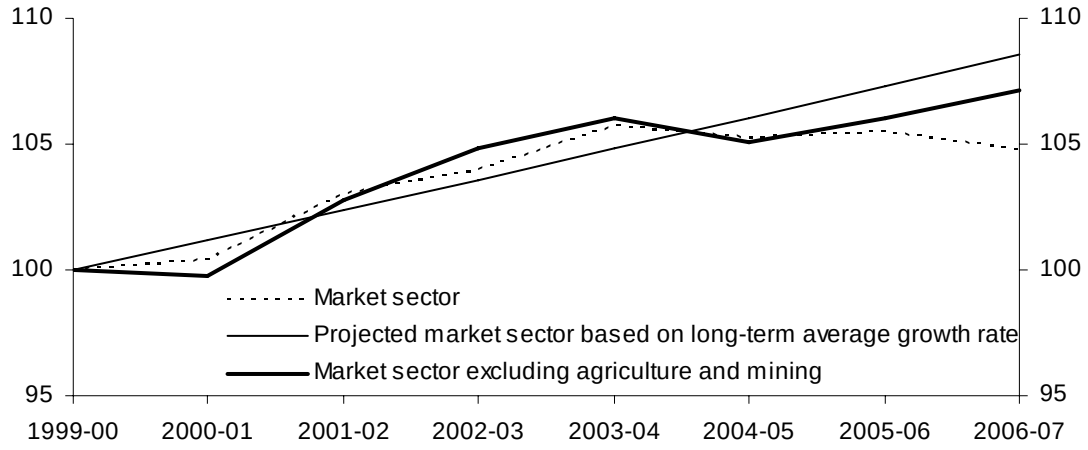
a Services are wholesale and retail trade, transport and storage, finance and insurance, communications, cultural and recreational services and accommodation, cafes and restaurants. Other industries are construction and electricity, gas and water supply.

Data source: Commission calculations based on ABS *(Australian System of National Accounts, 2006-07)*; own estimates (http://www.pc.gov.au/research/productivity/estimates-trends). Hours worked data differ from those used in figure 1.3 prior to 1985-86.

While productivity growth in all sectors has slowed so far this decade, the agricultural and mining sectors stand out, recording negative productivity growth over the period since 2000. These developments in agriculture and mining explain more than half of the fall in Australia's productivity growth below the long-term average growth rate (figure 1.5). In 2006-07 alone, drought subtracted 1.3 percentage points from market sector MFP. The combined effects of the commodity price boom and depletion of oil and gas reserves on mining productivity

have subtracted 1.7 percentage points from market sector MFP over the past five years.

Figure 1.5 **Multifactor productivity**
1999-2000 = 100



Source: Commission calculations based on ABS *(Australian System of National Accounts, 2006-07)*; own estimates (http://www.pc.gov.au/research/productivity/estimates-trends).

The utilities sector's performance has also dropped

Electricity, gas and water supply is a third sector that has detracted heavily from measured productivity growth this decade, though the reasons are less easily identifiable. Reforms from the mid-1980s saw improvement in work practices in government enterprises, brought pricing more closely into line with costs, increased competition, raised incentives to improve productivity through privatisation and reform of organisational structures, and reduced the extent of excess capacity. Productivity grew rapidly, but official estimates show that it peaked in the late 1990s and has fallen by 20 per cent in the current decade (subtracting around 0.7 percentage points from market sector MFP growth this decade). As the benefits of earlier reforms are reflected in higher underlying productivity *levels*, productivity *growth* could be expected to slow, but the reason for the significant decline is unclear. While drought conditions have lowered the output of the water supply industry, this can account for only a small part of it. Moreover, the official estimates are not easily reconciled with those from alternative studies of electricity and gas suppliers (Lawrence 2007).

The outlook for productivity growth

Will the lagging sectors recover?

Agricultural productivity grew strongly over most of the current decade, despite drought conditions in much of the country. This is partly because farmers have adjusted by disengaging workers. But the poor season in 2006-07 meant lower productivity in that year as output contracted faster than employment. The current drought, in conjunction with over-allocation of water in the Murray-Darling system, has substantially reduced water available for irrigation, which may have longer-term effects for that sector. While some recovery is to be expected as drought conditions ease, the necessity of water policy changes and the potential consequences of climate change, will likely force a period of adjustment that may slow the recovery in agricultural productivity growth.

The pronounced decline in mining productivity during the past three years stems partly from the high prices which have driven the export boom. Higher prices make it economic to mine resources with lower mineral yields. High prices have also stimulated investment in existing and greenfield sites. As these investments come on stream, productivity growth should recover somewhat, although the extent will depend on price and hence the extraction rates of minerals that are more difficult and costly to produce. This response to relative prices is an example of the short-term tensions that can arise between income growth and productivity. Longer-term, resource depletion has also contributed to lower productivity. For example, oil and gas reserves in Bass Strait and the Bonaparte Gulf have been depleted this decade.

As noted above, the decline in measured productivity growth in utilities is puzzling. It could reflect difficulties in measuring productivity in a sector that has undergone significant changes in structure over the last two decades. Productivity in utilities and other essential infrastructure makes an important contribution to overall productivity, as these services provide support platforms for private sector production and distribution and public sector service delivery. The Commission review of National Competition Policy (NCP) estimated that productivity and price changes in the 1990s increased GDP by 2.5 per cent, or $20 billion (PC 2005a), so recovery of productivity in this sector, if it has indeed fallen, is important for long-term overall productivity growth.

A further question is whether investment in new infrastructure, which might initially create some surplus capacity, has contributed to lowering measured productivity in the short run. The scale of this effect is likely to be small — non-dwelling investment in utilities, communication and transport is less than one-fifth of total market sector investment. Nevertheless, the adequacy of the current levels of infrastructure is important and has become the focus of current policy attention.

There will be enduring benefits from earlier reforms

Reforms in the late 1980s and 1990s brought greater product market competition, labour market flexibility, macroeconomic stability and financial market efficiency. These played important roles in bringing about the reorganisation of production and work practices to enable firms to reduce costs and take advantage of developments in technology, thereby enhancing productivity growth in the 1990s (PC 2005a). Better regulation of infrastructure industries also yielded large cost savings (PC 2005a). But have these benefits now run their course?

Notwithstanding the sectoral setbacks noted above, it is likely that there will be continuing benefits from these earlier reforms. In particular, greater market competition and microeconomic flexibility can be expected to have enhanced permanently the conditions for the search for and diffusion of more productive processes and better products. More proximate drivers of productivity — innovation, education and skills and ICT investment — also appear to have remained broadly supportive of productivity growth.

That said, achieving productivity growth rates above the long-term average is not assured. Further policy reforms are needed if Australia is to continue to improve living standards while meeting the challenges of demographic and environmental change.

What policies will facilitate productivity growth?

Innovation and its diffusion are fundamental

Productivity growth at the economy-wide level comes from innovation by enterprises, diffusion of these improvements to others and the reallocation of resources from less to more productive organisations and industries. For both the public and private sectors, it is at the level of organisations that innovation and diffusion occur. This requires both knowledge accumulation and application. The recent report by the Review of the National Innovation System (Cutler Report) notes that 98 per cent of new technologies are currently sourced from outside Australia (Cutler 2008). Since most knowledge creation occurs outside any individual organisation, innovation requires the ability to locate and make effective use of knowledge (New Zealand Treasury 2008).

What usually distinguishes leading organisations is not so much their ability to *create* knowledge, as their ability to absorb and apply it to their own circumstances. Most innovation is incremental — a continuous process of adjustment to reduce production costs, improve quality and respond to changing customer needs. Diffusion occurs as other organisations either copy to catch-up, or else lose market share. Both innovation and diffusion contribute to economy-wide productivity growth, with the process of creative destruction as organisations leave an industry being as important as organisations copying the innovations of others (box 1.5).

Box 1.4 A hypothetical illustration of organisation-level influences on average productivity

The productivity of individual organisations can differ widely — even within the same industry. Productivity differences can reflect, for example, differences in size of organisation (and therefore scale and technology) or innovation strategy, with some organisations prepared to invest heavily to develop and introduce new technological advances while others only introduce changes when technologies are well-developed.

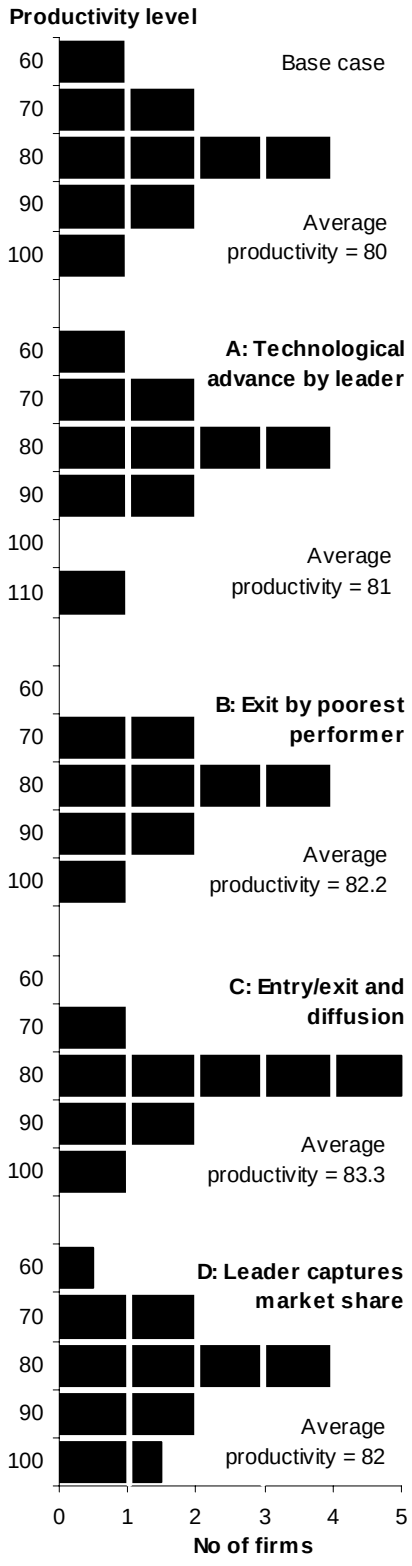
The heterogeneity in organisation-level productivity means that industry productivity is more complex and open to more influences than is often thought.

In this illustrative example, there are 10 organisations in an industry and their productivity levels vary from 60 to 100, as shown in the base case at the top of the adjoining diagram. For ease, the organisations are assumed to be the same size. The initial base case industry average productivity level is 80.

Average productivity can increase through a number of mechanisms:

- a productivity improvement (for example, technological advance) by the leading organisation (case A);
- a productivity improvement (for example, the diffusion of an existing technology) among follower organisations, which enables them to catch up at least partially to the leader (case C);
- the exit of the least-productive organisations (cases B and C);
- the entry of new organisations with above-average productivity levels (case C); and
- leading organisations (more productive) capture market share from less-productive organisations (case D).

Whilst this illustration is stylised and does not purport to indicate the relative importance of the different mechanisms in practice, it does illustrate that organisation-level dynamics can have very important influences on average productivity. Overall productivity improvements can be as much about raising the performance of productivity laggards, or their exit, as it is about developing and implementing 'cutting-edge' technologies.



Incentives, flexibility and capabilities underpin innovation

Policies to influence innovation and its diffusion, can be grouped under three headings :

- *Incentives* — the external pressures and disciplines on organisations to perform well.
- *Flexibility* — the ability to make changes to respond effectively to market pressures.
- *Capabilities* — the human and knowledge capital, as well as infrastructure and institutions, that are needed to make necessary changes.

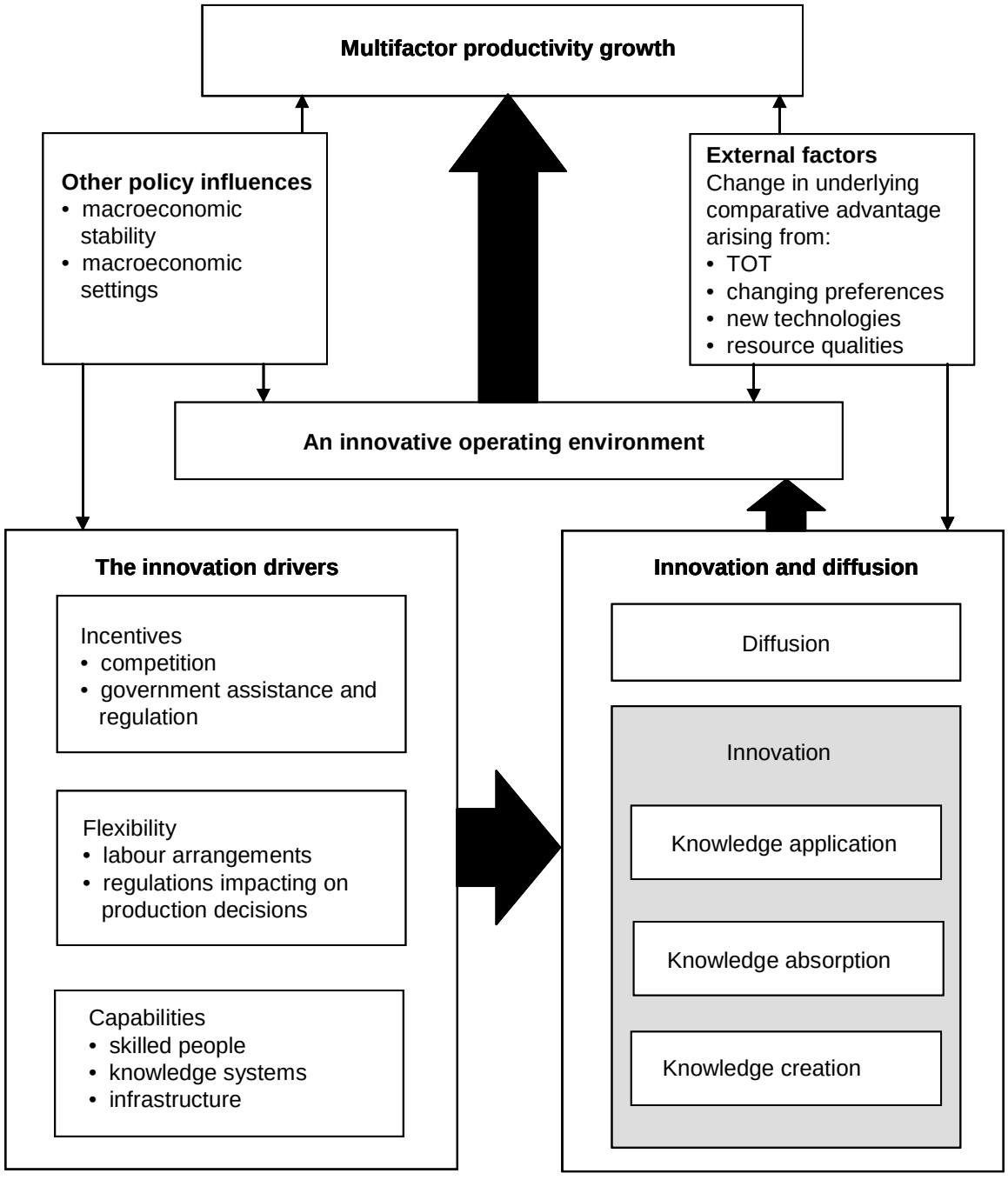
All three policy 'planks' influence the ability of an organisation to innovate or adopt improvements in processes and products. Innovation is not just about the 'eureka' moments from R&D; indeed, it is more about the continual learning and experimenting at the organisation level and responding to client needs. Figure 1.6 summarises these broad influences.

The three determinants of innovation performance — incentives, flexibility and capabilities — are strongly interactive. All three need to be attended to in a policy framework to promote innovation by organisations, and diffusion of best practices among them. The Cutler Report placed particular emphasis on the importance of capabilities, but a successful innovation policy has to place such capabilities in the context of the incentives and flexibility to drive change and apply those capabilities productively. Successful innovation is rarely supply driven — the generation of knowledge and capabilities does not ensure their effective application. It is competition that forces organisations to absorb and apply new knowledge in order to improve their profits and to survive. Australia's own history of decades of relatively weak innovation and productivity growth coinciding with a relatively highly-educated workforce underlies this.

Incentives: competition is the key

There is a substantial body of international evidence demonstrating the crucial role of market competition in encouraging innovation and diffusion (OECD 2007). Competition provides the fundamental incentive for organisations to pursue changes necessary to succeed, through innovation and productivity gains. It also underpins the process of 'creative destruction', with organisations that do not adapt or innovate successfully losing market share to those that do.

Figure 1.6 **Innovation, diffusion and productivity growth**



Falling barriers to international trade and investment in the 1980s exposed Australian firms to intensified competition from the world's best. This forced them to seek new and better production processes, while at the same time providing them with greater access to new ideas and new markets. Restrictions on foreign entry or tariff protection remain significant for the automotive industry and textile, clothing and footwear industries, and implementation of scheduled assistance reductions is expected to deliver further net benefits (PC 2008a,b).

The removal of barriers to international trade exposed many domestic or 'behind the border' impediments to competition that were raising business costs. NCP has been successful in removing or reducing many of these, stimulating, in particular, innovation and productivity improvement in a range of infrastructure services that underpin economic performance (PC 2005a). Nevertheless, there is an unfinished agenda for COAG's National Reform Agenda (NRA) to address. Competitive reforms in areas such as coastal shipping and aviation, as significant transport inputs, offer potential to stimulate innovation and productivity more widely. Improved competition in pervasive small business areas such as pharmacies, taxis and newsagencies would also stimulate innovation in those services, to the benefit of consumers across the country.

Barriers to international trade and domestic contestability are not the only forms of assistance that can dull competitive impulses for innovation. Subsidies to support production or investment can have a similar effect, providing firms with a protective buffer against more competitive rivals. While there can be a case for subsidies where market signals and incentives are inadequate, they need to be well targeted to ensure that the public benefit exceeds the cost, and that public funding does not simply crowd out private sources. Little of the nearly $16 billion of gross annual Commonwealth assistance to industry, as identified in 2006-07, is regularly reviewed to assess whether the community gets value for its money (PC 2008e).

There is a role for various forms of direct assistance to encourage firms to undertake greater R&D. While the Commission has found little evidence to support fears of underinvestment in research with direct commercial applications, there are potential benefits from public support for more basic or strategic research, where the returns can be difficult for an organisation to adequately appropriate. But, again, careful design and evaluation are needed to ensure that support measures actually give rise to additional R&D activity, such that the benefits to society exceed the costs (PC 2007a). This was acknowledged in the Cutler Report, which noted the need for government to be:

> confident, firstly, that there are structural impediments to markets doing this work and, secondly, that government involvement will generate more benefits in addressing these problems than it will generate in collateral costs. (Cutler 2008, p16)

Again, it is important to recognise that much of the innovation on which productivity improvements at the firm and economy-wide levels depend, does not involve technologies developed by innovating organisations. Indeed, according to survey data, only 30 per cent of what the ABS defines as 'major innovating firms' actually perform R&D (PC 2007a). For the bulk of innovation activity, therefore, competition provides sufficient incentive for private enterprises, without the need for taxpayer support.

Flexibility: enabling organisations to be responsive

Innovation often entails changes in the way organisations arrange their production processes. Increasingly, firms tailor products to different customer needs, often providing a joint package of goods and services. They need to be able to react quickly to changes in customer requirements.

Flexibility to alter work arrangements and workforce requirements, plays an essential role. Reforms since the late 1980s have enabled firms to be far more innovative than was previously apparent. This has been reflected in greater take-up rates of new technologies (Parham et al. 2001). For example, the breakdown in the demarcation of work responsibilities in the wholesale and retail industries with the move from industry to enterprise-based bargaining, enabled adoption of new scanning and database technologies that drove rapid productivity growth from the mid-1980s (Johnston et al. 2000).

While industrial relations regulation has a legitimate concern for workers' basic rights based on community norms, it is important to preserve the ability of organisations to engage effectively with employees to change work arrangements in response to commercial imperatives. Flexibility in employment arrangements can yield significant benefits for employees as well as their employers, as demonstrated by research into the growth in part-time employment for women and older workers since the early 1990s (Abhayaratna et al. 2008).

There is a range of other regulations that can reduce an organisation's adaptability or responsiveness, and burden it with unnecessary costs. Compulsory standards, complex requirements, or marked differences across jurisdictions can all limit, or raise the cost of, organisational changes needed for successful innovation. For example, innovation in occupational health and safety (OH&S) practices based on workers assuming responsibility for risks they are best placed to manage, is prevented by regulation in some jurisdictions. This and another 26 regulatory 'hotspots' have been identified by COAG as needing reform under the NRA (see box 1.5). The Regulation Taskforce estimated that unnecessary compliance costs could amount to some $8 billion nationally (PC 2007b). The costs would be significantly greater if they included the effect that such red tape can have in limiting innovation.

Box 1.5 **Regulatory 'hotspots' identified by COAG**

COAG has identified 27 regulatory areas requiring national reform:

- National harmonisation of occupational health and safety laws is seen as a priority; with commitment to harmonisation reflected in a commitment to develop model legislation by September 2009.
- Early action in 2008 on a further 12 areas, covering environmental assessment and approvals bilaterals, payroll tax administration, trade licences, the Health Workforce Intergovernmental Agreement, national trade measurement, rail safety regulation reform, the consumer policy framework, product safety, trustee companies, mortgage credit and advice, margin lending, and non-deposit taking institutions.
- Significant progress to be made in accelerating the five remaining COAG hotspots — development assistance, building regulation, chemicals and plastics regulatory reform, Australian Business Number and business names registration, and Personal Property Securities reform.
- Nine new areas to be added to COAG's regulation work program, covering standard business reporting, food regulation, a national mine safety framework, electronic conveyancing, upstream petroleum (oil and gas), maritime safety, wine labelling, directors' liabilities, and financial service delivery.

Source: COAG (2008a (Attachment B) and 2008b).

Capabilities: improving the 'support platforms' for innovation

Ultimately, all innovation occurs through people. Organisations need people who can develop new and better ways of doing things, including through adopting and adapting existing knowledge and technologies. Managerial skills are a critical input into innovations in organisational practice, while creative talent enables the development of new products as well as engaging client interest.

COAG's NRA has placed central importance on building Australia's human capital as a key reform stream. The Commission has estimated that improvements in workforce productivity arising from specifically targeted reform areas in health and education could add 3 per cent to annual GDP (PC 2007b). Addressing educational disadvantage is a priority, as is raising productivity in the provision of education services and, above all, improving the quality of teaching at all levels (COAG 2008a,b).

Australia's universities and public research bodies, such as CSIRO, are important in the 'national innovation system' as a store of knowledge, as well as generating new knowledge. Their social value depends on the quality of basic and strategic research that they perform which would not otherwise be done. The Commission's 2007

report on *Public Support for Science and Innovation* found that there was some risk of funding falling short for basic research and a related concern that university research was seeking to be too commercial. The Cutler Report draws similar conclusions and contains recommendations for additional funding for university and public research and that argued publicly-funded knowledge should be made freely available (Cutler 2008). Cutler sees the development of networks and linkages which facilitate dissemination of research findings for more commercial uses as an objective of "market facing" innovation programs. However, experience has shown that developing effective programs that can yield a net benefit over time to the community is challenging. For example, the Cooperative Research Centres, a major, long-standing policy initiative in this area, appear to have strayed from their original mission (PC 2007a).

The timely provision of efficient economic infrastructure also plays a key role in supporting innovation activity and Australia's productivity performance. Among the range of infrastructure services, transport and communications provide particularly important platforms for innovation. These enable many of the intangible investments such as databases, information systems, organisational capital, and delivery systems, that support an organisation's on-going innovation activity. Currently an important policy decision in this area relates to developing a national broadband network. Australia's experience in telecommunications reform underlines the importance of getting the vertical structure of this industry determined appropriately at the outset, with the goal of enabling effective competitive pressure over time without compromising necessary private investment.

More broadly, good regulation is the key to Australia reaping the potential benefits from private investment in infrastructure. Competition regulation has a key role. Third party access regimes have been modified in recent years to reduce their potentially inhibiting effects on investment, but further legislative amendments are needed following a Federal Court decision in 2007 (PC 2007c). Environmental and social regulation can also affect infrastructure investment and usage. In particular, Australia's actions to reduce greenhouse gas emissions will have significant implications for investments in energy and transport that need to be taken into consideration.

Where public provision of infrastructure is necessary, such as for much of the road network, it is important that projects are subject to far more rigorous cost-benefit assessment than has typically occurred in the past, if investments are to yield the highest payoff to Australia's productivity and living standards (PC 2007d).

Finally, in relation to capabilities, governments provide the regulatory and institutional framework for economic activity and must promote innovation and productivity improvements in their own services. The legal and judicial framework for markets, governance systems for Government Trading Enterprises, and accountability frameworks for the delivery of public services provide important platforms that enable, as well as affect the incentives for, innovation and productivity growth in the public and private sectors.

In sum, the challenges confronting Australia lend urgency to policy efforts to raise national productivity. Innovation is a key to achieving this. There is an important role for government in building human capital and supporting R&D where the knowledge will be made generally available. The Cutler Report's emphasis on sound cost-benefit evaluation of proposed programs to support innovation, and their regular review to ensure programs remain cost effective, is well founded. More fundamentally, sustaining and advancing reforms to enhance market competition and to reduce regulatory constraints on enterprise flexibility remain the keys to stimulating innovation, and must continue to play a central role in an effective innovation policy.