
3 Trends in infrastructure investment

Key points

- Infrastructure investment is not distinguished from gross fixed capital investment in the National Accounts. Two measures that provide some guide to infrastructure investment trends are investment in assets to be used by ‘economic and social infrastructure industries’ and total government spending on investment.
- Investment in economic and social infrastructure as a share of GDP declined steadily in many of the studied countries in the 1980s and 1990s.
 - Levels of investment in economic and social infrastructure as a per cent of GDP vary widely across the studied countries. Australian investment has remained towards the top of the group throughout the period since the 1970s.
- Public investment is undertaken by government (general government) and government owned entities (public corporations). General government spending on investment has declined in all of the studied countries since the 1960s, and particularly sharply in some countries during some periods, but there is not a close relationship with movements in investment in economic and social infrastructure.
 - In Australia, declining public spending on infrastructure investment has been partly offset by an increase in the role of the private sector. This reflects, in part, privatisation of some public corporations that are providers of infrastructure services.
- Differences in infrastructure investment across countries and over time can be attributed to structural changes in each economy and government policy developments.
- Trends in investment alone are an imperfect indicator of infrastructure service adequacy.
 - Judgement is required on a case-by-case basis using rigorous benefit–cost analysis to establish the level of economically warranted investment in infrastructure projects.

Trends in infrastructure investment for the selected countries — Australia, Canada, France, Germany, New Zealand, Sweden, the United Kingdom and the United States — are presented in this chapter. Two different measures of infrastructure investment are considered, with section 3.2 presenting trends in investment within ‘economic and social infrastructure industries’ and section 3.3 presenting trends in general government spending on investment. Factors that could have influenced the

trends and the choice of financing vehicles employed by governments are discussed in section 3.4. Finally, the relationship between the infrastructure investment trends and adequacy of government provision of infrastructure services is briefly discussed in section 3.5.

3.1 Measuring infrastructure investment

Infrastructure can be thought of as the long-lived structural assets that either facilitate the flow of goods, information and factors of production between buyers and sellers (economic infrastructure) or underpin the delivery of essential services such as health and education (social infrastructure). Historically, governments were heavily involved in both economic and social infrastructure investment in most developed countries. This section outlines the different measures of infrastructure that will be the focus of the international comparisons in the following sections. It also shows the changing roles of the different levels of government and the private sector in infrastructure investment in Australia

Trends in infrastructure investment can be tracked from data published in the national accounts. Within the national accounts, investment in tangible, productive assets is measured as ‘gross fixed capital formation’ which is the acquisition less disposal of fixed assets used repeatedly in production for more than one year. This is a gross measure of investment. It measures the acquisition of new assets, but neither repairs and maintenance to existing assets, nor ongoing depreciation, are taken into account. In total, Australia spent around \$261 billion (27 per cent of GDP) on gross fixed capital formation in 2005-06, but this figure includes investment in all sorts of assets across the whole economy and only a small portion of this can be considered infrastructure investment.

In this chapter, two measures of infrastructure investment are used. The first measure is overall investment in assets to be used by ‘economic infrastructure industries’ (electricity, gas and water supply, transport and storage, and communications) or ‘social infrastructure industries’ (health and education), which will be referred to as ‘economic and social infrastructure’. (In the context of this chapter, *total* denotes investment across all industries and *overall* denotes public and private spending.) In Australia, around \$55 billion was invested in economic and social infrastructure in 2005-06 of which \$43 billion was invested in economic infrastructure and \$12 billion in social infrastructure.

The second measure is total government spending on investment. For Australia, investment data are available for the general government and for public corporations, but internationally comparable data are available only for the general

government sector. In Australia, total public sector spending on investment was around \$40 billion in 2005-06 (table 3.1). Of this, around \$23 billion was spent by the general government sector and \$17 billion was spent by public corporations. Public sector spending on investment has been trending lower as a share of GDP over recent decades. The decline has been steeper for public corporations than the general government sector since the mid 1980s, and for the national public sector than the state and local public sectors since the early 1990s (figure 3.1).

Table 3.1 Investment in Australia, 2005-06 (\$ billion)

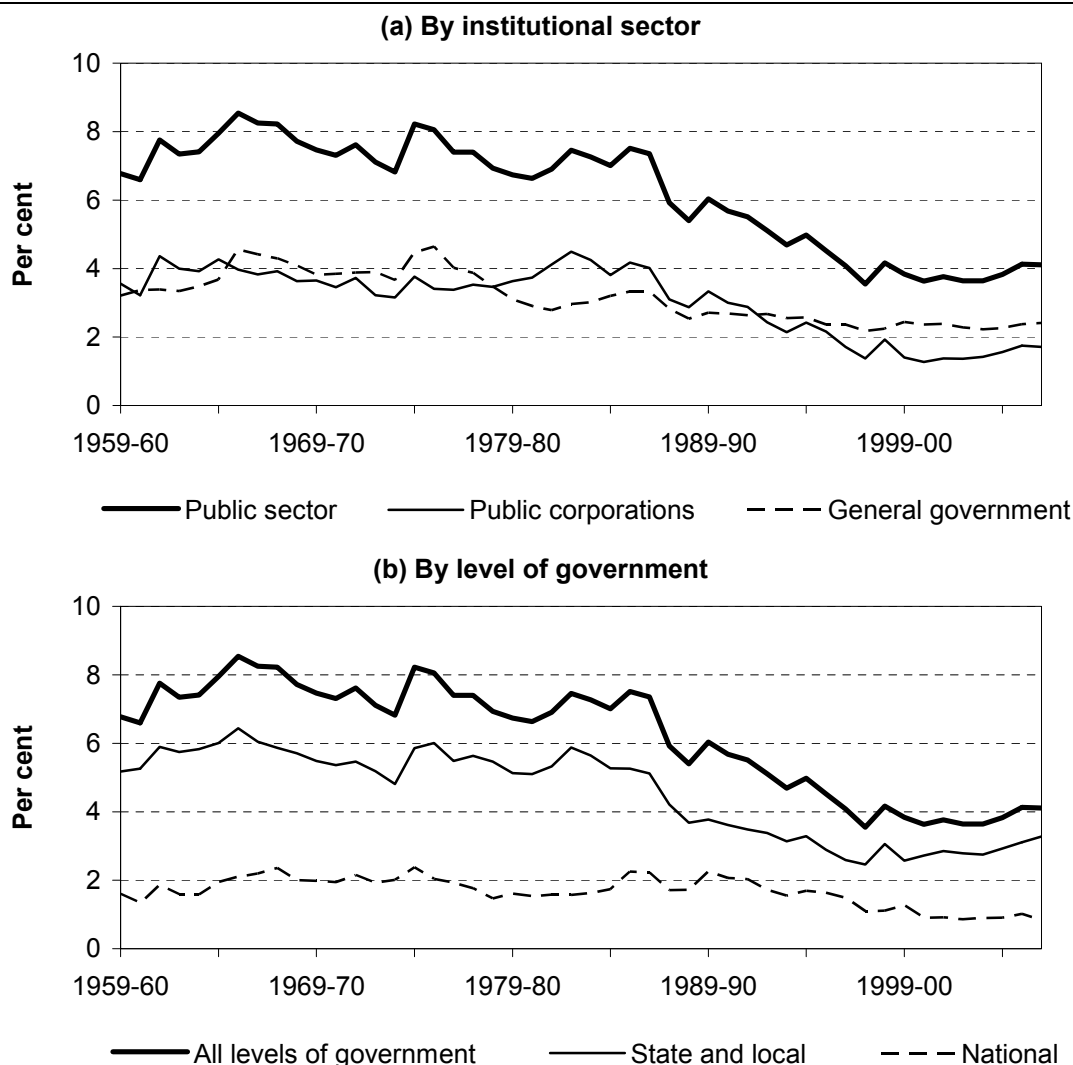
<i>Sector</i>	<i>Industry classification</i>			<i>Total</i>
	<i>Economic infrastructure</i>	<i>Social infrastructure</i>	<i>Other industries</i>	
Public sector				
General government	7.1	5.8	10.1	23.0
Public corporations	15.9	0.0	1.0	16.9
<i>Public sector</i>	<i>23.0</i>	<i>5.8</i>	<i>11.2</i>	39.9
Private sector	19.9	6.4	194.5	220.8
Overall	42.9	12.2	205.7	260.8

Source: ABS, Australian System of National Accounts, 2006-07, cat. no. 5204.0.

Though there is significant overlap between these two measures, they are useful for different purposes. Investment in infrastructure industries focuses on the role of investment in production. Public sector investment provides a gauge of the extent of government money being spent and so is more relevant for indicating budgetary pressures and choices.

In particular, public sector spending on investment should not be used to assess the economic impact of infrastructure investment nor the adequacy of current infrastructure investment because trends in public sector spending over time and across countries are affected by political choices to privatise existing businesses, encourage private sector competition in some industries and engage in public-private partnerships for the construction of new assets. In Australia, the public sector has been spending a decreasing share of GDP on economic and social infrastructure investment since the early 1980s, but much of this decline has been offset by increases in private sector investment (figure 3.2).

Figure 3.1 Public sector spending on investment in Australia
Per cent of GDP



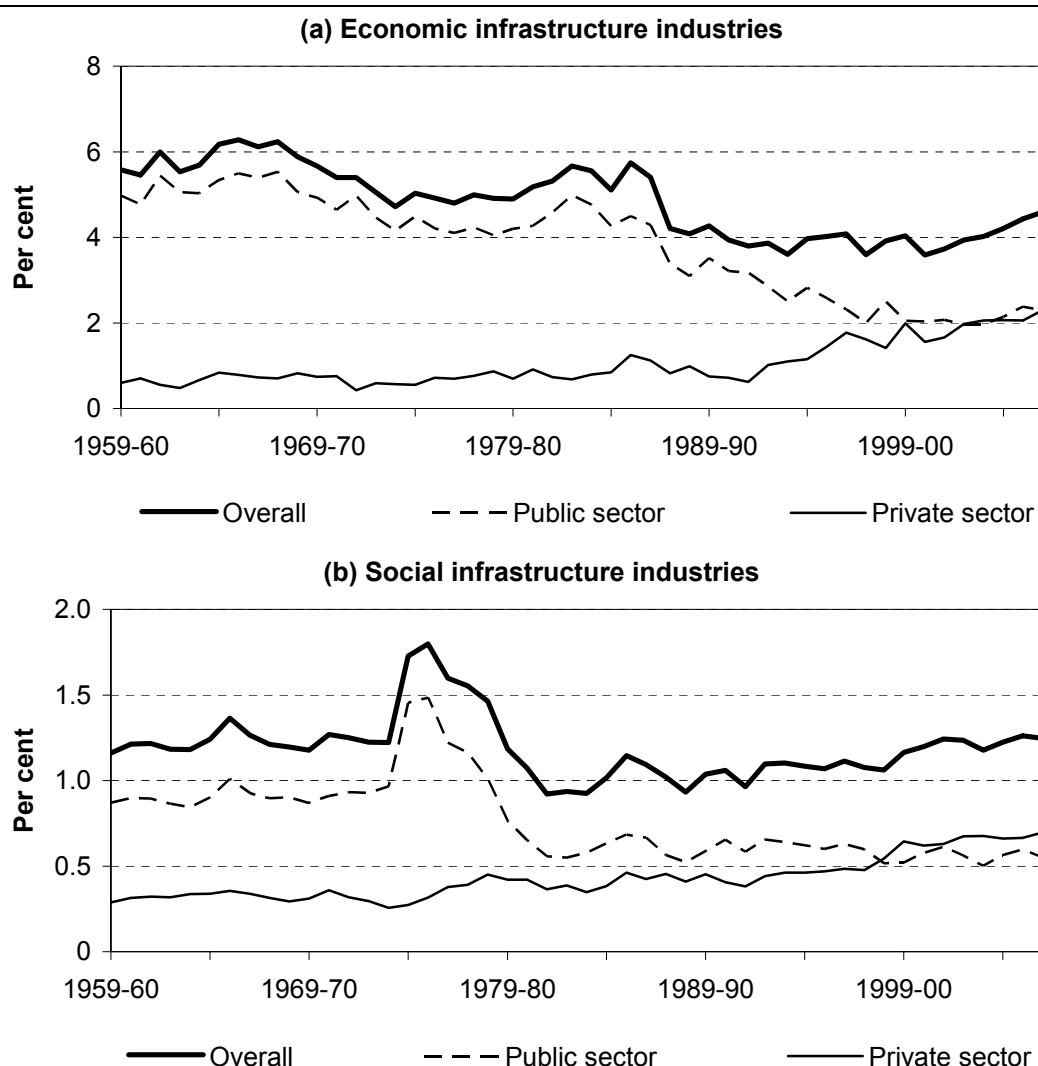
Source: ABS, *Australian System of National Accounts*, 2006-07.

International infrastructure investment trends

The next two sections of this chapter look at investment trends across countries and over time. The data are based on OECD statistics and are the best available that have been calculated in a comparable manner.¹ The two measures used are the

¹ To maintain comparability with the data presented in the current section, Australian data in the next two sections are sourced from the Australian Bureau of Statistics, although these data differ very little from equivalent data sourced from the OECD.

Figure 3.2 **Investment in Australia by industry and sector**
Per cent of GDP

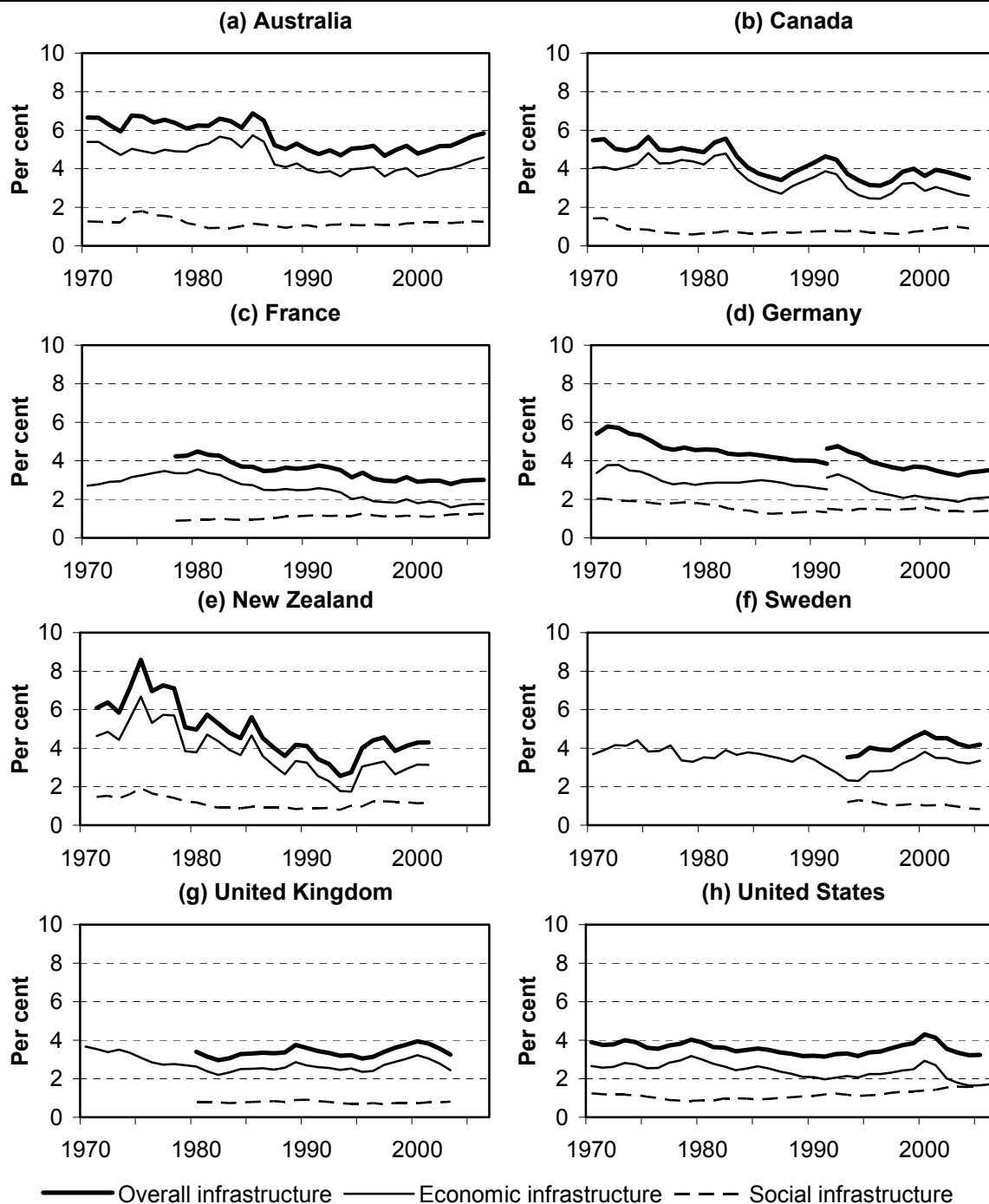


Source: ABS, *Australian System of National Accounts*, 2006-07.

overall investment in assets to be used by the economic and social infrastructure industries and total spending by the general government sector on investment (that is, the data do not include public corporations).

International comparisons are always difficult and inconsistencies could arise in the use of data from various sources because of differences in methodology, assumptions and definitions. The validity of international comparisons depends on which detailed industries are included in the ‘economic and social infrastructure industries’. Variation in relative prices may also affect comparisons. The data are presented in nominal terms as a percentage of GDP and indicate the proportion of a country’s production that was devoted to investment. Some caution is recommended

Figure 3.3 Overall investment in economic and social infrastructure
Per cent of GDP



Sources: Australian data are from ABS, Australian System of National Accounts, 2006-07. Investment data for other countries are from OECD STAN (2008 and 2005 editions) and GDP data are from the OECD Annual National Accounts. German data are for the former Federal Republic of Germany prior to 1991.

because differences across countries and over time may reflect differences in the prices of investment goods (e.g. the price of road or building construction) relative

to the price of final goods and services. No adjustment has been made for these differences.²

3.2 International trends in economic and social infrastructure investment

There is wide variation across the studied countries in the extent of investment in economic and social infrastructure (figure 3.3). Australian investment declined as a share of GDP in the 1980s and, to a lesser extent, in the 1990s, before increasing steadily in the current decade. Nevertheless, the total level of investment in Australia has remained towards the upper end of the group of countries since the 1970s because investment declined as a share of GDP in many other countries through the 1980s and 1990s, including New Zealand, France, Germany and Canada. France, the United States and the United Kingdom were towards the bottom end of the group of countries throughout the period, with each country investing an average of 3.5 per cent of GDP between 1981 and 2000, significantly less than the 4.8 per cent of GDP invested by Australia.

Investment in economic infrastructure was typically much higher than social infrastructure investment. Further, economic infrastructure investment appears to have been more volatile than investment in social infrastructure.

3.3 International trends in general government spending on investment

General government spending on investment has declined as a percentage of GDP in all the studied countries over the past four decades (table 3.2, figure 3.4). This downward trend has been fairly steady for most countries. Australia's experience has been typical — with spending falling from around 4.1 per cent of GDP in the decade to 1975, to 2.3 per cent of GDP in the decade to 2005 — so that the level of spending as a percentage of GDP has remained around the average of the studied countries throughout the period.

² The effect on trends over time may not be large. While capital good prices have generally been rising less rapidly than average prices in other parts of developed economies, this reflects trends in machinery and equipment and particularly computing equipment. The costs of constructing infrastructure assets, such as roads, have probably moved more closely in line with GDP deflators.

Table 3.2 Total general government spending on investment

Decade average, per cent of GDP

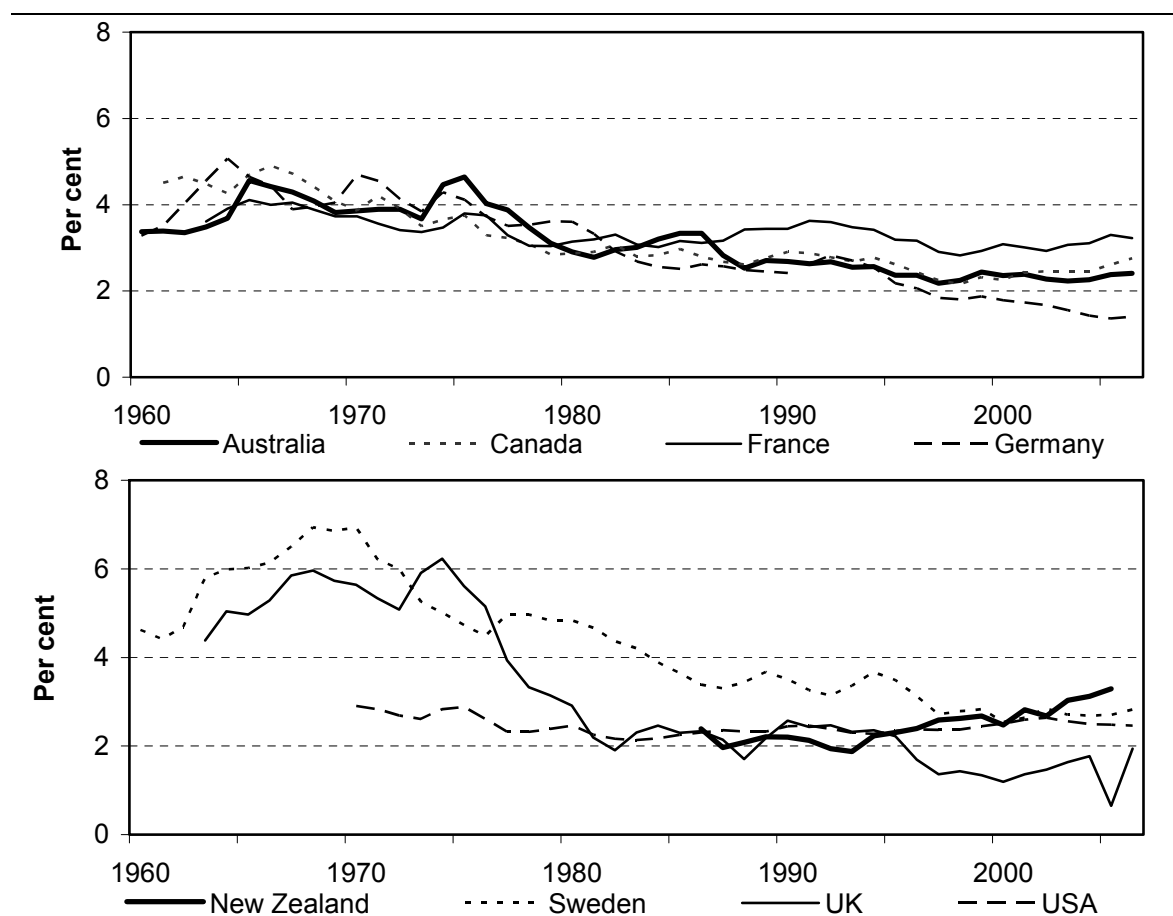
	1966-1975	1975-1986	1986-1995	1996-2005
Australia	4.1	3.3	2.7	2.3
Canada	4.1	3.0	2.7	2.4
France	3.7	3.2	3.4	3.0
Germany ^a	4.2	3.2	2.5	1.7
New Zealand	na	na	2.1	2.8
Sweden	6.1	4.5	3.4	2.8
United Kingdom	5.7	3.0	2.3	1.4
United States ^b	2.8	2.2	2.4	2.5

^a Data are for the former Federal Republic of Germany prior to 1991. ^b The first observation is for the period 1970 to 1975. na Not available.

Source: Australian data are from ABS, *Australian System of National Accounts*, 2006-07. US and NZ data are from OECD Annual National Accounts. Other data are from OECD, *Economic Outlook*, No. 83 (June 2008).

Figure 3.4 Total general government spending on investment, 1960–2006

Per cent of GDP



Source: Australian data are from ABS, *Australian System of National Accounts*, 2006-07. US and New Zealand data are from OECD Annual National Accounts. Other data are from OECD, *Economic Outlook*, No. 83 (June 2008).

There is not a close relationship between changes in government spending on investment and changes in investment in economic and social infrastructure (discussed in the previous section). Declines in general government spending in some countries have been quite sharp and have not been reflected in declines in economic and social infrastructure investment. For example, general government spending on investment declined particularly rapidly in the United Kingdom during the late 1970s and early 1980s and again in the late 1990s with little effect on investment in economic and social infrastructure. Similarly, the increased investment in economic and social infrastructure during the past decade in Australia occurred during a period of decline in general government spending on investment as a share of GDP.

3.4 Possible drivers of observed trends

Differences in the relative level and volatility of overall economic and social infrastructure are observable in the trends presented in section 3.2. There was also a general decline in the relative level of total general government spending on investment across the studied countries (section 3.3). In this section, some of the possible reasons for these observed trends are discussed.

Factors influencing relative levels of infrastructure investment

Country variance in overall infrastructure investment as a percentage of GDP can be the result of differences in demographic and geographic circumstances, factor endowments that affect costs, and the take-up of technology. Institutional and regulatory settings can also play a part in determining the underlying cost of providing infrastructure.

Changes to the structural composition of the studied countries' economies could also have led to differences in investment over time. This can result from changes in demand for infrastructure services derived from activities elsewhere in the economy, or from changes in the aforementioned supply conditions — such as differences in population growth and the rate of regulatory reform.

Improved efficiency of service delivery and investment outcomes in the public sector would also have influenced the observed trends in overall infrastructure investment. However, this is likely to have been of lesser significance.

Demographic and geographic factors

Population characteristics in the studied countries can have an important bearing on the relative level of investment in infrastructure. For example, countries that have a large population size potentially benefit from economies of scale and scope, and of agglomeration (PC 2006a). In addition, population trends — such as the rate of migration and trends in fertility and morbidity — can lead to a requirement to invest more heavily in infrastructure in absolute terms, but this might not show up in GDP terms if the economy is also growing.

Infrastructure requirements can also be affected by the composition of a country's population. An aging population and lower birth rates, for example, can change infrastructure priorities with higher demand for health and aged-care facilities and lower demand for schools.

Demographic and geographic factors set Australia and Canada apart from most other OECD countries. For example, both countries have among the lowest population densities in the OECD. France, Germany and the United Kingdom, in contrast, have relatively high population densities.

Population density and distribution can affect the necessary level of investment in infrastructure. For example, it was found that the average cost of providing local landline telephone services is high in Australia compared to other countries because it has a relatively large proportion of its population, and hence telephone lines, in areas with low population densities (Cribbett 2000).

Other geographic factors that can play an important role in determining the cost of infrastructure include climatic variations, topography, soil type, stability of the land mass and types of raw materials available for constructing infrastructure (Coombs and Roberts 2007).

Regulatory policy

Private-sector investment in infrastructure is influenced by economic conditions. As noted by Pindyck (1991), government policy that creates economic stability and credibility can stimulate investment to a greater extent than tax incentives or interest rate reductions. Conversely, '... a major cost of political and economic instability may be its depressing effect on investment' (Pindyck 1991, p. 1141).

One important factor is regulatory policy. 'Good' regulation can improve efficiency and provide a stable investment environment. However, regulators with wide discretionary powers can affect stakeholder expectations about the regulatory outcomes achievable, thereby creating stronger incentives for disputation,

uncertainty and a higher probability of inconsistency in the application of regulation (PC 2004a). As noted by Gómez-Ibáñez (2003):

Many proponents of private infrastructure view the problem as one of establishing a commitment to a fair and stable set of rules governing the relationship between the government and private infrastructure providers. The usual concern is that the government will renege on commitments to private infrastructure rather than vice versa. Private companies are vulnerable because infrastructure requires expensive, durable, and immobile investments ... that private owners can't withdraw if the government changes the rules. (p. 2)

Various regulations have been imposed on government and private-sector infrastructure businesses across the studied countries in an attempt to curb market power, facilitate competition and promote efficiency. These regulations include:

- Price regulation — arrangements established to oversight the prices charged by infrastructure service providers that retain monopoly power. For example, OECD countries have increasingly adopted price-cap regulations which set maximum allowed prices.
- Access regulation — rules which enable potential competitors to gain access to the services of significant monopoly infrastructure.

Price regulation, or the threat of such regulation, can be a deterrent to private investment in public infrastructure. If prices are set too low over the long term, public infrastructure projects will not be able to generate the revenue necessary to finance new projects or maintain existing facilities.

More significantly, the complexity of access regulations and the degree of regulator discretion can result in errors in pricing determinations. This, along with any suppression of capital returns for facility owners, potentially has a 'chilling' effect on investment.

Another relevant factor is uncertainty about how regulations will change over time. For example, there has been uncertainty in many OECD countries over how climate change policy will evolve, thus creating an additional source of risk for investment in long-lived capital in the energy sector. Any changes to the cost of emissions can influence the economics of whether coal or gas is used to supply base-load power (PC 2007b).

Regulatory uncertainty can result in delays to investment in an attempt by investors to minimise the cost of regulatory risk and retain a range of options. As noted by the Productivity Commission (PC 2004a):

An investor's subjective judgment of risk should include an assessment of how risk would change if investment was delayed (Dixit and Pindyck 1994). This is because delaying an irreversible investment until more is known about future market conditions

can reduce risk and so make a project more attractive. That is, it is worthwhile for investors to consider the timing of an investment, and this requires a subjective assessment of how risk will change over time. (p. 100)

It should be noted however, that the ‘public’ costs of delay — forgone services and any associated spillovers to the broader community and economy — increase over time. There is thus a trade-off between the private benefit to the investor of delay, and the public cost (PC 2008).

The existence of regulatory risk and uncertainty also has direct implications for financing. The public sector is likely to be in a better position to ameliorate the consequential risk and reduce the risk premium or compensation payouts that the private sector would demand with any change in policy (Hepburn et al. 1997).

Within a country, varying institutional arrangements and regulatory regimes can distort investment decisions across sectors.

Changes in structural composition

Changes in the composition of economies can lead to different levels of infrastructure investment as a percentage of GDP. Coombs and Roberts (2007), in assessing the impact of structural change on investment trends, found ‘... [t]he evolving structure of the Australian economy has changed both the level and composition of infrastructure investment, creating ebbs and flows in investment over the past half century’ (p. 7). Moreover, as noted by Smith (1992):

The necessary level of infrastructure investment is also influenced by a number of structural factors ... Structural change within the economy will mean that some parts of the existing capital stock will be less in demand, while other areas may need to be augmented. To the extent that resources move into areas or activities where the existing infrastructure is inadequate, more investment may be needed. This will be offset, to some extent, by reduced needs in other areas. (p. 21)

Structural change is in part driven by technological progress that reduces the prices of factors of production, extends the economic life of infrastructure, makes some services obsolete, and facilitates new services.³ For example, increased demand for high-speed internet access has resulted in the need to increase bandwidth capacity, with investment moving from copper wire to fibre-optic cable.

³ Technological progress plays a role in the development of all infrastructure, but its importance varies across infrastructure sectors. For example, in an assessment of future demand for infrastructure investment in OECD countries, Stevens, Schieb and Andrieu (2006) considered technological progress to be particularly important in telecommunications and water infrastructure, though less significant in the electricity and transport sectors.

The absorption of such significant technological developments has occurred at different times across the studied countries. For example, fibre cabling has been rolled out to around 2.9 million homes in Germany by the end of 2006 (IDATE Consulting & Research 2007) compared to a relatively limited number of homes in Australia, France and the United Kingdom. In other countries, such as Japan and South Korea, there has been a more rapid deployment of fibre networks because of large government subsidies and high population densities that lower average costs (Ofcom 2004).

Volatility in relative levels of infrastructure investment

The strong patterns of volatility in overall infrastructure investment — particularly investment in economic infrastructure — experienced in some countries over time can be attributed to fluctuations in economic growth.

The level of investment in infrastructure is, in part, dependent on the level of overall economic growth, as investors decisions are based on — among other considerations — expectations about changes in economic conditions, including forecast changes in demand and factor prices.⁴ Consequently, fluctuations in actual and expected economic activity can result in investment volatility.

Typically, *private* investment levels over time have generally declined during years of economic recession and tended to increase in periods of economic growth. However, trends in *public* investment do not appear to have been affected to the same extent.⁵ One possible reason for this in the past is that during periods of slow growth, governments have increased capital expenditure in an attempt to stimulate economic activity.

Economic growth can affect governments' ability to raise revenue, with important implications for financing infrastructure projects through general budget appropriations (chapter 4). For example, government tax, which is the major revenue source for appropriations in most countries, typically rises and falls with the level of economic activity.

⁴ As noted by Hall and Taylor (1996, p. 298), '... [w]hen investment rises it may be the result, not the cause, of increased spending elsewhere in the economy'.

⁵ This is supported by Barro (1997) who, in examining the role of investment during periods of recession in the United States from 1960 to 1994, found overall investment to be volatile and strongly procyclical to GDP. Further, it was found that private investment accounted for the bulk of the fluctuations in GDP, and total public investment was not systematically related to recessions.

Why has public investment declined?

For most OECD countries, much of the basic infrastructure was built in major expansionary periods — particularly post World War II. Having built the infrastructure, the rate of investment typically decreased because of the long replacement cycle of the assets. Also, the role of governments in infrastructure provision has generally shifted in recent decades, reducing their role in economic management that was previously conducted through their ownership of infrastructure.

During most of the twentieth century, the public sector in many OECD countries was extensively involved in the provision of economic and social infrastructure. The existence of natural monopolies, the sheer scale of many projects and insufficient depth in capital markets were factors that led to the public sector providing those services.

From the 1980s, governments were increasingly under pressure from concerns about levels of public debt. A frequent response was to reduce the impact of infrastructure spending on government budgets (Kay 1993). In addition, at this time, it was widely acknowledged that considerable scope existed for improving the efficiency of infrastructure procurement and service delivery through broader microeconomic reform, and increased private-sector participation in economic activity (Makin 2003).

Fiscal policy constraints

By the start of the 1980s, governments in a number of OECD countries had introduced fiscal rules applying to taxation, expenditures and borrowings in response to concerns about the consequences of budget deficits and the public debt burden. The application of these policies of fiscal restraint has implications for the use of the various financing vehicles for public infrastructure development.

The amount of spending financed by budget appropriations, including for public infrastructure investment, is limited by the decisions of governments to establish fiscal rules (chapter 4). Reduced investment in infrastructure could reflect the political reality that it is easier for governments to decrease this investment than other categories of public outlays. Moreover, the long-run consequences of reduced government investment are not always noticeable in the short term (Sturm 1998).

As a consequence of such fiscal constraints, governments have been exploring alternative financing vehicles to raise the initial capital for infrastructure projects — such as through private-sector participation.

Government business reforms

As part of their broader economic reform efforts, the studied countries have embarked on significant organisational and operational changes to their government business entities (chapter 6). Reforms, such as the commercialisation and corporatisation of government businesses, have generally imposed more market discipline on public-sector investment in infrastructure in many OECD countries.

Requirements for government businesses to produce a commercial rate of return, and abide by competitive neutrality principles, have gone some way to ensuring efficient investment outcomes. Improved external governance arrangements — such as clearly defined and transparently funded non-commercial objectives — have made investment decisions more accountable. However, the performance of some government businesses in Australia suggests that there is further scope for improvement (PC 2008).

Whereas such reforms aim to draw on market forces, public infrastructure providers are generally not exposed to the actual capital market pressures facing private investors.⁶ Moreover, government businesses do not face the same threat of takeover or bankruptcy, and have some protection from declining credit status, as borrowings are explicitly or implicitly guaranteed by governments. This can lead to an inefficient allocation of investment funds in the form of either under- or over-investment in infrastructure.⁷

Privatisation

Privatisation has been a central facet of public policy in many OECD countries since the early 1980s. There is a wide variety of motives for governments to pursue privatisation, including a view that private ownership tends to raise the internal efficiency of previously government-owned businesses engaged in commercial activities (Kain 1997).

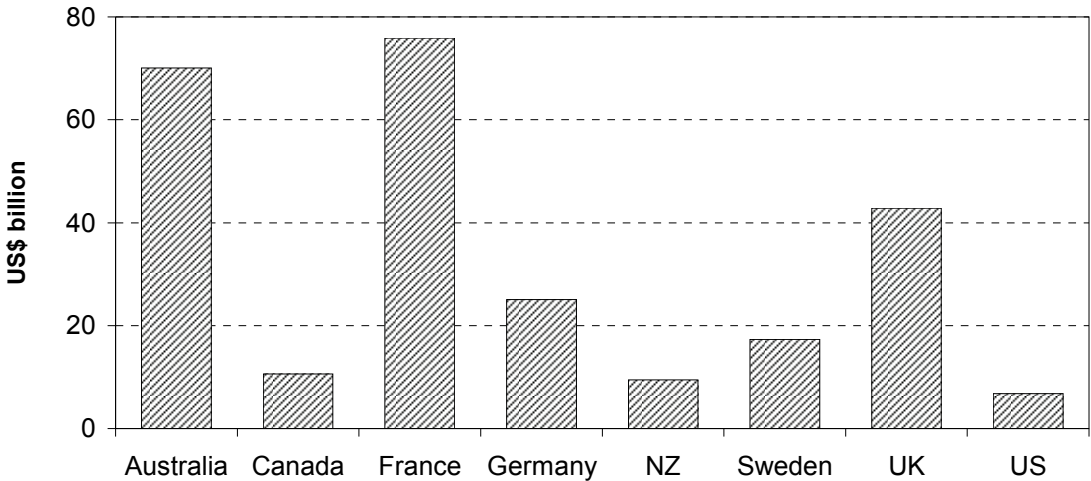
⁶ Debt guarantee fees introduced under competitive neutrality reforms aim to expose GTEs to the commercial borrowing costs in line with private sector competitors.

⁷ Both under- and over-investment in infrastructure are costly to the community. First, such investment represents a drain on community resources for the initial investment and for the upkeep of services which it does not want. Second, inefficient investment ultimately increases the cost of living and production (Smith 1992).

The first countries to commit to privatisation were Germany, starting in the early 1960s, and the United Kingdom at the beginning of the 1980s.⁸ Almost all other OECD countries followed, especially during the 1990s, and reduced the size of their public enterprise sectors (OECD 2005a). In the final decade of the twentieth century, Australia was one of the most active ‘privatising nations’ among the studied countries, particularly considering the relatively small size of its economy (figure 3.5).

Internationally, privatisation of infrastructure has historically been concentrated in the energy, transport and communications sectors. From 1980 to 2001, telecommunication sales were the largest source of privatisation revenue in OECD countries.⁹ Indeed, by the beginning of 2001, telecommunication companies in most OECD countries had been either fully or partially privatised (OECD 2002a, 2003).

Figure 3.5 Gross proceeds from privatisation for selected countries over the period 1990 to 2001^a



^a Gross proceeds from privatisation are in nominal terms. Estimates for the year 2001 are provisional.
 Source: OECD (2002a).

⁸ During the 1980s under the Thatcher Government, the United Kingdom privatised a number of large government businesses, including British Petroleum, British Telecom, British Gas, British Airways, Rolls Royce and the British Airport Authority.

⁹ Over the period 1980 to 2001, telecommunications accounted for roughly 40 per cent of all proceeds raised. Further, public utilities (electricity, gas and water) and transportation accounted for around 14 per cent and 10 per cent of proceeds from privatisation respectively (OECD 2003).

Levels of both public and private infrastructure investment (as a proportion of GDP) across the studied countries have been influenced by:

- transfer of ownership of infrastructure stocks from the public to the private sector
- new private investment in areas formerly the preserve of government, in part as new technologies have reduced ‘natural’ monopolies and facilitated introduction of user charges
- changes in the rate of investment — for example, private owners might be more inclined to delay investment until there is confidence that a commercial rate of return can be generated¹⁰
- technological change and improved productivity in the provision of infrastructure services.

The proceeds from privatisation have also been used by governments to reinvest in public infrastructure. Notably, some governments justified privatisation on the basis of financing capital expenditure in other areas of the economy. However, sale proceeds in Australia and the United Kingdom, for example, have mostly been used to restore fiscal rectitude and finance tax cuts (Quiggin 1996b).

Increased private-sector involvement in the provision of infrastructure would have contributed to the general decline in public investment for the studied countries. For example, Pollitt (2002, p. 67) found that privatisation of government businesses in the United Kingdom had resulted in the transfer of as much as 15 per cent of total investment from the state to the private sector.

Private-sector investment in infrastructure appears to have supplanted public infrastructure investment for a number of countries, including Australia and Sweden.¹¹ As noted by Makin (2003):

... to suggest that considerable scope exists for increasing public infrastructure spending to earlier levels ignores the fact that since the 1990s relatively lower public capital spending has been more than offset by relatively higher private capital expenditure in the economy. This is consistent with the increased involvement of the private sector in the provision of infrastructure services in the electricity, transport and ICT [information and communications technologies] sectors. (p. 36)

¹⁰ Conversely, privatisation could lead to increased investment in areas of infrastructure in which governments were previously unwilling to commit substantial funds (ACG 2005).

¹¹ In Sweden, economic infrastructure investment was predominantly undertaken by the public sector from 1993 to 1995, though from 1996 to 2005 private investment overtook government involvement (Statistics Sweden 2008).

Public–private partnerships

Similar to privatisation, public–private partnerships (PPPs) have contributed to the shift of investment from the public to the private sector (though on a smaller scale). As noted by Clark, Elsby and Love (2001):

It may be that some of the recent decline in public sector investment reflects the increased role of the Private Finance Initiative (PFI). The PFI sees a private company undertaking investment on behalf of the government, which then pays the company an income stream over several years. These payments are not classed as capital spending, so public investment appears lower than it would have been under traditional public procurement — even though the total level of publicly sponsored investment may be no different. (p. 3)

As defined by the ABS (2000), infrastructure projects are classified as public or private sector according to the expected ownership of the project at the time of completion. Accordingly, projects undertaken as PPPs would be classified as private-sector investment although ownership of the asset could eventually reside with the public sector (chapter 8).

An alternative to PPPs is public provision through competitive tendering and contracting (CTC). Under CTC, the government provides most of the finance, though investment in maintenance and replacement could possibly be required by private operators in capital intensive industries.

In addition to the impact on the relative levels of public and private investment, private operation could have led to efficiencies in the delivery and maintenance of infrastructure and, hence, reduced the financial burden of new or replacement investment. For example, the use of government franchises through a competitive selection process could bring enhanced incentives to promote efficiency and innovation in asset management (chapter 9).

3.5 The adequacy of investment

The general decline in total public investment has prompted some observers in OECD countries to express concerns about the adequacy of infrastructure, given the potential impacts on economic growth and productivity. *Prima facie*, falling public investment could be an indicator of inadequate investment. However, there are a number of limitations to inferring that the relative level of investment is inadequate for a country as a whole by simply observing such trends.

As noted above, there are many factors that could have influenced public infrastructure investment. In particular, increased private-sector investment has largely offset the decline in public investment.

Judgements on the adequacy of investment levels in public infrastructure have to be made on a case-by-case basis, using rigorous benefit–cost analysis to establish priorities among competing projects. For example, investment in industry sectors with capacity constraints and bottlenecks should be assessed appropriately before it is undertaken by governments, with consideration of ‘local’ requirements and possible alternatives — including congestion management measures.

The existence of a significant number of potential projects with high rates of return would suggest the existence of impediments and inadequate investment. As noted by Munnell (1993), ‘... [t]o argue infrastructure is underprovided is to argue that the rate of return to public capital exceeds the return to other investments ... and that additional infrastructure spending should be undertaken until the rates of return are roughly equal’ (p. 37).

Rate of return measurements, however, are difficult to assess if prices for infrastructure services do not reflect supply costs.¹² Also, there is a lack of comparable data on the nature and condition of infrastructure in many OECD countries. As noted by the Exports and Infrastructure Taskforce (2005), in Australia:

... Given this lack of data, the taskforce had to rely to a large extent on ad hoc reports and anecdotal evidence of the condition and adequacy of infrastructure and associated regulatory arrangements. (p. 23)

In collecting the necessary data to review the adequacy of infrastructure, it is important to establish sound assessment frameworks that are capable of supporting project benefit–cost analysis to assess whether additional investment is economically justified. Moreover, any review of adequacy would ideally be undertaken independently by a single collection entity to facilitate objectivity, and to establish and maintain a database of nationally consistent information.

On 21 January 2008, Infrastructure Australia was established as a statutory advisory council with members from industry, government and local government. A key function of Infrastructure Australia will be to conduct regular audits to determine the adequacy, capacity and condition of nationally significant infrastructure (including transport, energy, communications and water infrastructure). From the

¹² Another possible explanation for low profitability of government businesses, for example, is that governments are not prepared to fully fund non-commercial objectives, possibly to avoid public scrutiny of the extent of the subsidy or transfers between consumers (PC 2007a).

analysis of this information, Infrastructure Australia will develop a national infrastructure priority list for the Council of Australian Governments to consider.