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Public Infrastructure financing:

Submission to the Productivity Commission

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TAI

Technical Brief

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This submission is in two parts. Part A addresses the issues associated with the funding of infrastructure and Part B addresses the issues associated with the need for infrastructure in the first place.

Part A

Funding of infrastructure

Introduction

This part of the paper addresses issues associated with the question of the financing and provision of infrastructure. These tend to be economic considerations of a rather technical nature and simply take as given the need for infrastructure. However, this makes the decision as to whether or not to provide infrastructure a political decision and often reflects general predispositions on the merits of the public and private sector.

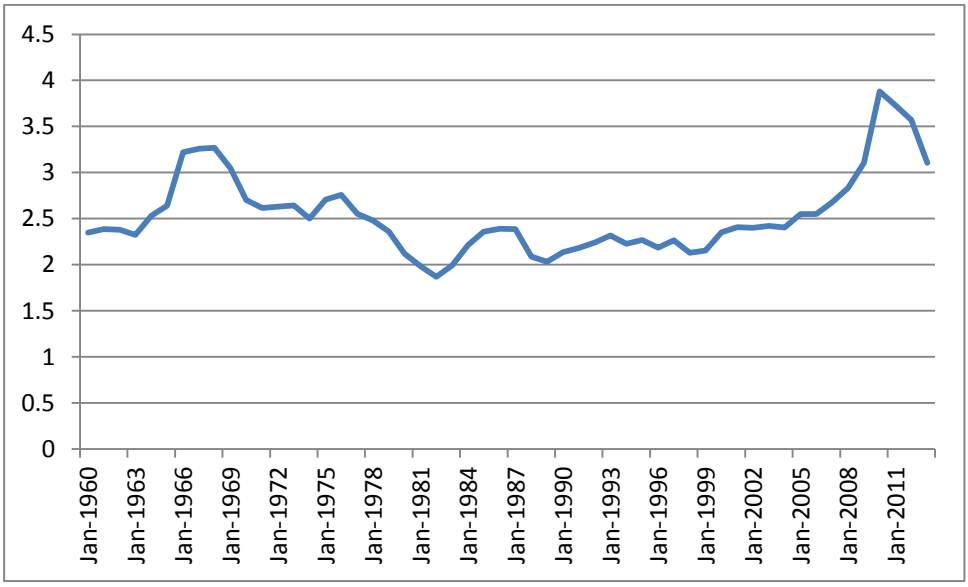
To borrow or fund out of consolidated revenue?

Government buildings and other structures are expected to last a very long time. The ABS for example works on the principle that non-dwelling construction assets will last an average 54 years while new government buildings are assumed to have the same average life as private commercial buildings of 65 years.[1] This raises the question of whether such long lived projects should be paid for by the present generation or by future generations who will also derive the benefits of the projects. Hence there are well-known public finance arguments to the effect that borrowing permits expenditures on long-lived projects to be shared across generations.

That approach seems useful when the question is one of financing a very large project relative to the population concerned. For example, a small community wishing to fund a large project may well wish to share the burden with future generations. However, in Australia it seems that there are numerous overlapping infrastructure projects that require not one-off approaches but a steady stream of expenditures. The profile of public investment in Australia looks much like any other category of government expenditure in that it is not particularly volatile as is shown in Figure 1.

[1] ABS (2012) *Australian system of national accounts: Concepts, sources and methods, Australia 2012*, Cat no 5210.0

Figure 1: General government fixed capital formation (% GDP)



Source: ABS (2013) Cat no 5204.0,

Figure 1 clearly shows that government infrastructure spending is fairly stable as a share of GDP with the exception of the stimulus following the global financial crisis and the temporarily high levels of spending in the mid-1960s possibly associated with peaks in spending on the Snowy Mountains scheme.

Given the actual profile of infrastructure spending we suggest a different approach is called for—one that takes account of the on-going nature of infrastructure spending.

Suppose the economy is growing at x per cent and we need to spend y per cent of GDP on infrastructure every year. Funding the infrastructure through borrowing is superior if the interest rate is lower than the annual growth in GDP. Conversely paying up front and taxing the present generation of taxpayers to raise y per cent of GDP is superior if interest rates exceed the rate of growth in the economy. That can be appreciated by using a numerical example.

For example suppose we need to finance projects worth 3 per cent of GDP every year. There are two extreme examples, first the government could raise all the money through general revenue with various taxes etc. In that case the revenue need would be 3 per cent per annum. Alternatively the government could borrow all its funding needs with a type of perpetual bond[2] but would need to raise sufficient revenue to cover the servicing costs. We can compare these two scenarios in the longer run.

Over the last 20 years GDP growth has averaged 6.35 per cent in nominal values. Interest rates on 10 year bonds have been around 3.5 per cent in recent times and averaged 5.1 per cent over the last decade. Over the last two decades they have averaged 5.96 per cent although that includes the period when interest rates were coming down from their very high levels of the early 1990s.

We can calculate the interest servicing costs and compare them with the costs of servicing the debt if all the finance comes from perpetual borrowing. Those comparisons are presented

[2] Or what amounts to the same thing, it would raise the money through say a 10year bond and roll over the bond as it comes due.

in Table 1. The cost of infrastructure financed through bond issues is calculated as the long run equilibrium value.[3] The scenario called 'optimistic outlook' refers to a possible scenario in which nominal economic growth continues at the average of the last 20 years (6.35 per cent nominal growth) and interest rates stay at roughly current levels of 3.5 per cent on 10 year bonds. The next scenario 'extrapolation from the last two decades', uses the same economic growth but uses the average interest rate on 10 year bonds over that period (5.96 per cent). The last scenario, 'pessimistic outlook', assumes the same economic growth but uses an interest rate of 7.5 per cent which is larger than the assumed growth in the economy (6.35 per cent).

Table 1: Cost of providing infrastructure; tax versus borrowing

	Cost of infrastructure: Share of GDP (%)
Financed through current taxation	3.00
Financed through bond issues	
optimistic outlook	1.65
extrapolation from last two decades	2.82
pessimistic outlook	3.54

Source: TAI calculations

Table 1 clearly shows that the cost of providing infrastructure depends on whether it is financed through taxation at the time of the investment or through borrowings. If financed through borrowing the actual interest rate is the critical factor. Financing through current taxation can be thought of as the reference case. Under the optimistic scenario interest rates are assumed to remain at roughly current levels (3.5 per cent). In that case the long term costs of servicing the debt is lower than raising the funds up front through current taxation. With interest rates of 3.5 per cent the costs of borrowing fall by almost half of the costs of the up-front taxation scenario.

Subject to interest rates being below the rate of economic growth we have to conclude that borrowing is superior to pay-as-you-go or up-front financing. That has been the case in the past and there is no reason to believe that the relationship will not persist into the future.

The argument so far has only considered the long run equilibrium position. It is also the case that even if we only consider one project at a time, so long as interest rates are below the rate of economic growth then raising taxes to pay interest on the debt will result in lower per

[3] The figures in Table 1 are actually the asymptotic values and are calculated by multiplying the infrastructure spending as a share of GDP by the interest rate and then dividing by the growth rate. We ignore the constant of integration in this exercise. Note that the method here is inspired by the argument Samuelson put forward for comparing the cost of pay-as-you-go social security systems with the alternative of a fully funded contribution scheme. See Samuelson P (1958) 'An exact consumption-loan model of interest with or without the social contrivance of money', *Journal of political economy*, Vol 66(6), pp 467-82.

capita tax burdens than trying to fund the projects out of current revenue. Of course the converse is also true; if interest rates are expected to be higher than the growth in the economy then debt finance involves increasing the per capita burden the longer the debt remains unpaid. That means that in principle governments should be flexible. However a sudden switch from debt financing to up-front financing would see the government effectively paying twice; it would be servicing the debt on existing infrastructure while fully funding new infrastructure. Taxpayers would be experiencing a larger burden than necessary over a fairly long transition period.

These considerations suggest that debt financing is likely to be the best approach in Australia. However, that assumes that the government would be responsible for infrastructure in the future. We now turn to the question of the extent of government involvement as distinct from private involvement in infrastructure.

Public or private funding?

The pragmatic view suggests that where it is mainly financing costs that are the critical factor in infrastructure there is a strong role on the part of the government and indeed, the Commonwealth government can borrow more cheaply than other levels of government. As we show below, funds secured via corporate finance will require premiums of well over 100 basis points and could add another 50 per cent to the cost of a project.

Comments by one Australian banker put the clear view that with interest rates currently so low the government should in fact borrow to invest. Cameron Clyne, the CEO of the National Australia Bank, put the view that the government should be borrowing more and exploiting its good credit rating and access to cheap capital. In his view government can finance long-term roads, rail and ports 'far more effectively'. He also said 'we don't have enough [debt]. We have a lazy balance sheet…We have a unique window as a AAA nation with strong demand for AAA debt to issue that debt and divert it to productive infrastructure'.[4]

Mr Clyne is absolutely right. As already argued above, the government has been able to borrow at well below four per cent or well under two per cent in real terms. Periods of low interest rates are the perfect time for investing in capital intensive projects. The hurdle rates of return that projects need to generate is so much lower and the borrowing costs are easily serviced.

Renewable energy projects are the perfect example of capital intensive projects. Once built there is minimal expense required for their on-going operation. Routine maintenance is about the only on-going cost. Depreciation expenses are also minimal because the turbines, solar collectors and the installations tend to be long-lived.

Mr Clyne did not describe how we can distinguish what should be done by government and what should be done by the private sector. However, his was clearly a pragmatic view that suggests different types of infrastructure will be handled best by different sectors.

Reserve Bank figures give a series for 10 year bond rates for both the Australian government and the NSW Treasury Corporation, the borrowing arm of the NSW government. Over the last decade NSW has had to pay an average premium of 49 basis points over the Australian Government borrowing rate. Over the life of a 50 year, billion dollar project the difference could cost $245 million or just under a quarter of the cost of the project. It is likely that the smaller states would have to pay a premium even higher than that paid by the NSW government. Local government would be in an even worse position.

[4] Bennet M (2013) 'Clyne pitches big-picture view on debt' *The Australian*, 2 August.

Although the Australian government enjoys a lower interest rate on its debt than NSW, the NSW government still enjoys lower rates than those available to private corporations. For example over the last decade the bank lending rate for large business was 118 basis points above the Australian government 10 year bond rate.[5] Likewise RBA data give capital market spreads that indicate AA rated corporate bonds are typically well over 100 basis points above the government bond rate. Hence any form of indirect borrowing via the corporate sector is going to require a premium of well over 100 basis points and that would mean the whole of life cost of the project could be well over $500 million more expensive in the example examined above.

Those considerations suggest that government borrowing should be centralised and undertaken by the Commonwealth Government. However, the government could invent a new vehicle to attract loans from the public and there are historic precedents in Australia and overseas with special bonds designed to appeal to mom-and-dad investors. There is certainly a case for making it easier for such investors who want to purchase safe government paper in convenient sizes. But the design of government bonds takes us a long way from the topics at hand.

We now turn to the high rates of return in the private sector and why that is an argument against leaving the projects to the private sector.

High hurdle rates of return in the private sector

This section makes the point that there is a role for government in the provision of infrastructure and other services which can be profitably financed at the government bond rate but fall short of the very high rate of return hurdles that the private sector often sets for itself.

The lowest cost finance for infrastructure funding is available through commonwealth government borrowing. Australian infrastructure would be best financed by the general borrowing program—the regular issuing of government bonds. At the other end of the spectrum is privatising infrastructure development by giving responsibility for project investment and management to the private sector. This submission contends that the private sector tends to demand very high rates of return which would end up costing taxpayers dearly. (Or in the case of the provision of infrastructure financed by fee-for-service the commercial charge will be higher than the equivalent government charge because of the higher return on equity demanded by the private sector.)

A dramatic example of the role of rates of return in the government versus private sector came to light following the release of the report on the proposed very fast train. The report suggested a benefit cost ratio of over two and a commercial return of 0.8 to 1 per cent. However, it pointed out that:

> *An expected return of at least 15 per cent would be required at this stage of project development to be attractive to commercial providers of debt and equity to major infrastructure projects.*[6]

A 15 per cent hurdle is very high and it is therefore unsurprising that many investments are undertaken by government by default. The government can borrow 10 year money at less than 3.5 per cent so the opportunity cost of capital for the government is a much lower interest rate than the private sector. Press reports suggest that pension funds usually require

[5] That uses the RBA/APRA series the large business weighted average rate on credit outstanding.
[6] Grimshaw, KPMG, SKM, ACIL Tasman, Booz & Co and Hyder (2011) *High speed rail study: Phase 2 report*, p ix.

a return of 8 to 12 per cent on infrastructure investments.[7] By contrast governments should be prepared to invest when the rate of return exceeds the long term bond rate.

Note for example that the published expected rate of return to the government for its investment in the broadband network, NBN Co, is around seven percent.[8] By contrast Telstra earns a return on equity of 31.7 per cent[9] which implies a pre-tax rate of return of 45 per cent. Given the way companies like to brag about their return on equity there is simply no way that Telstra would contemplate investing in a broadband network with a return of seven per cent or that order of magnitude.

Years ago we had the big debate about banks closing down bank branches including in remote and regional centres that were ill-served by banking. A former governor of the Reserve Bank, Ian Macfarlane, made the point that by aiming for very high rates of return the banks were not investing in many things that would have been profitable, but were not able to reach hurdles of 18 to 20 per cent, or 26 to 29 per cent before tax. One consequence is that the big banks closed branches that while still profitable were not profitable enough.[10] Banks have made it less convenient for customers to undertake their banking even though the branches in question remain profitable.

This is a serious problem and is not unique to banks. Investment is major contribution to Australia's economic growth and the rise in living standards over time. In a competitive market we expect that business will invest so long as they make a reasonable return. However, the banks put such a high hurdle on investments that they ignore investment opportunities that would otherwise contribute to overall wellbeing in Australia. This illustrates one of the many ways in which the existence of monopolies and oligopolies acts as a burden on the economy as a whole. In that regard note that the Australian economy is dominated by big business to the extent that sales of just the top five non-financial companies by market capitalisation had operating revenue of $240.2 billion equal to 16 per cent of the Australian economy while the top 10 controlled $323.9 billion or 22 per cent of the Australian economy. The ABS defines a large business as having 200 employees or more. On that basis large businesses had sales and service income of $1,117.5 billion in 2010-118 or 80 per cent of GDP for that year.[11]

There are many other similar examples. The recent case of Macquarie bank arranging to sell its stake in Sydney airport is a case in point. Press reports suggest Macquarie Bank wanted to increase its return on equity which is around 8.7 per cent according to recent financial reporting.[12] Again, Sydney airport is profitable but not profitable enough to be held within Macquarie. Incidentally an effort to raise an 8.7 return on equity means trying to raise it above a 12.4 pre-tax return with is certainly healthy for most retail and other investors.

A government example is provided by the Clean Energy Finance Corporation. According to the last annual report of the CEFC is earning 7 per cent on its investments and well above

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[7] Coorey P and Anderson F (2013) 'Albanese backs airport before rail' *The Australian Financial Review*, 12 April.

[8] NBN Co (6 August 2012), *Corporate Plan 2012–2015*, NBN Co, p. 71. Press reports suggest that may now be revised down somewhat.

[9] Telstra (2013) *Annual Report*.

[10] See Macfarlane I (1999) 'Transcript of evidence', *House of Representatives, Standing Committee on Economics, Finance and Public Administration Inquiry into Reserve Bank of Australia annual report 1997–98,* Melbourne, Thursday 17 June. Available at: http://www.aph.gov.au/hansard/reps/commttee/R2365.pdf.

[11] ABS (2012) *Australian Industry, 2010-11*, Cat no 8155.0, 22 June.

[12] See Yates C (2013) 'Macquarie "returns to roots" as Sydney Airport share handout backed' *The Australian Financial Review*, 13 December.

the benchmark five year bond rate it uses. CEFC chair Ms Jillian Broadbent recently gave evidence to the Senate and stressed the importance of the fund for emissions abatement and that the financial aspects would contribute significantly to the budget balance.[13] Lending the full $10 billion would itself generate more than 50 per cent of the abatement required for the 2020 target.

In its submission to the present inquiry Westpac says 'its infrastructure equity track record [through a subsidiary since 1992] has seen it produce returns after fees in excess of 12% per annum for its investors'.[14] That of course represents a very large hurdle and so it is likely there many projects that Westpac would reject but that the CEFC would accept.

These examples show that there are opportunities for government to improve the budget balance while improving national welfare.

The modern corporation was invented precisely so it could take on businesses or projects that are too big for individuals to undertake on their own. Governments tend to take on projects that are either too big for corporations or not commercially viable. However, there is clearly an intermediate role where projects are viable but not profitable enough for the private sector. In relation to the CEFC the Treasurer has effectively suggested we leave that decision-making to the market but the market wants higher returns than the CEFC is achieving. So profitable investments that would benefit the country as a whole will potentially go wanting because private investors want higher rates of return. There is no logic to the predisposition to leave everything to the market because there are bound to be cases where that does not advance the national interest.

Crowding out

The role of government activity has regularly been questioned on the grounds that government activity 'crowds out' private economic activity. Sometimes these arguments are also used to argue against government provision of infrastructure services.

It could be argued that we do not really want investments earning five or seven per cent crowding out bank projects that require 25 per cent or Macquarie Bank investment projects that require something well above the return on Sydney airport.

The case of the CEFC and the evidence to the Senate mentioned above raised questions of crowding out given that a Treasury official had asserted that the CEFC 'crowds out private investment and takes risk with public money'. The risk aspect can be dealt with separately below. Ms Broadbent responded to the suggestion by saying

I certainly don't think there's been any crowding out in any of our investments that we have made…In fact, there's been a crowding in, where we've had three international institutions who've participated in the market for the first time, encouraged by the fact that there was a government-owned entity there at the table and being a co-financier.[15]

Now in many cases the market has a solution for when big business turns down investments with a low return on equity and we have seen the community bank model sponsored by Bendigo and Adelaide Bank and indeed member-owned banks that provide facilities and

[13] ABC (2013) 'Jillian Broadbent defends the record of the Clean Energy Finance Corporation' *PM*, 27 November.
[14] Westpac (2013) *Submission 51 to the Productivity Commission Inquiry into public infrastructure*, December.
[15] ABC (2013) 'Jillian Broadbent defends the record of the Clean Energy Finance Corporation' PM, 27 November.

move into areas vacated by the big banks. However, that can certainly not be expected to occur in cases such as the national broadband network.

The problem with the crowding out thesis in the present context is that it cannot be used to suggest public debt is in any way worse than private debt when the context is how to finance a given volume of infrastructure.

More important than any of these considerations is the argument that any investment that generates a rate of return in excess of the risk free interest rate can be expected to generate net benefits compared to the alternative of not undertaking that investment. If such investments are not taken up by the private sector then the choice before the government is to either generate net benefits to the nation or not.

Risk

The quote from the Treasury official mentioned above suggested that the government should not take risks with public money. Prior to the global financial crisis there was also the argument to the effect that the private sector was better at managing risk and had developed a number of financial instruments that manage risk.

The idea that government should not incur risk on behalf of the taxpayer is a curious one to earlier generations of economists were brought up on the view that one of the advantages of government was the ability to pool risk. Just as insurers pool risk and so concentrate on the expected outcome of an individual contract so too governments should concentrate on expected returns. Indeed, governments tend to self-insure for precisely the reason that their pool is big enough. Note in this regard that general insurers in Australia charge premiums of 167 per cent of the value of the claims they meet based on the most recent figures for the four quarters ended September 2013.[16] Just as the government can profitably self-insure so it can pool the risks associated with the large number of investments in infrastructure projects that are undertaken each year.

The examples of toll-roads that have collapsed as a result of over-estimating patronage demonstrates that not only is the private sector no better at managing risk but that the public sector is obliged to step in and maintain the physical assets of failed ventures. The upshot is that now private interests want governments to eliminate patronage risk with public support irrespective of patronage. Governments have to seriously ask why they should pay a large premium on top of the government bond rate for private financiers who do not take on much of the risk.

Impact on taxpayers or consumers

The earlier discussion highlighted the large cost difference to governments when we compare the costs of borrowing by the Commonwealth and the NSW Treasury Corporation. It is useful to compare the cost to consumers of a long-lived project which is financed by the private sector on the one hand and the Commonwealth government on the other. It is assumed that the private sector seeks a 12 per cent return on equity whereas the government is happy with the bond rate which we assume to be four per cent. Both seek to cover their costs and realise their target rates of return over a 50 year period. The project is assumed to involve an initial outlay of $1 billion and ongoing maintenance and administrative costs of $50 million. Straight line depreciation is used in both. These figures are presented in table 2.

[16] APRA (2013) *Statistics: Quarterly general insurance performance, September 2013*.

Table 2: Hypothetical project data ($million)

	Private	Government
Invesment	1000	1000
annual operating costs	50	50
depreciation	20	20
target profit	150	40
Annual revenue	220	110

In the example chosen the private project operator has to recover twice as much revenue from customers as does the government. It also has a much larger revenue to expense ratio of 440 per cent compared with the government's 220 per cent.

This example may seem extreme but in very capital intensive industries we do find companies with very high revenue to operating cost ratios. For example, Telstra's annual report shows revenue to expenses is 170 per cent while the ASX financial results show the revenue to expense ratio is 422 per cent.

As an aside it is worth noting that most toll roads are designed to ease congestion in overcrowded roads. However, the imposition of a toll then acts as a device to ration access to the new road. To the extent that many road users prefer not to pay the toll then the original aim of easing congestion on other roads is compromised. And that aim is further compromised if the private operator charges in line with the higher target rate of return.

The range of private financing vehicles

So far we have really only examined some polar cases; government provision of infrastructure, private financing and private provision of infrastructure. Between these poles is a rainbow of different blends of public and private involvement in the finance and/or in direct service provision. The theoretical arguments above demonstrated that debt finance is superior if the rate of interest is less than the rate of economic growth. In Australia it is invariably the case that the least cost finance is government borrowing.

There are a large number of possible blends of government and private financing but the clear conclusion is that the more reliant the government is on the private sector, the higher the costs of providing the infrastructure will be. That remains the case whether the projects in question are financed by subsequent fee-for-service arrangements or government repayments. There are however distributional impacts depending on the type of financing used.

Private sector's superior efficiency?

Most of the communications networks, transport infrastructure and utilities have strong elements of natural monopoly or oligopoly. In that case as Milton Friedman suggested the least worst of what he saw as a bad lot of choices was to opt for government provision. He believed that in the case of a monopoly like telecommunications 'there is only a choice among three evils: private unregulated monopoly, private monopoly regulated by the state,

and government operation.'[17] The evil for Friedman in a private unregulated monopoly is that the community pays much more than the cost of delivering the service and delivers excess profit to someone who is in a position to exercise economic power.

Since then the fashion has been for the privatisation of enterprises that were formally thought to be natural choices for government operation. There is a strong view that the private sector will have greater incentives to operate more efficiently and so benefit consumers.[18] However, the evidentiary basis for those views are weak. For example there is no evidence that the privatisation and corporatisation agenda has provided benefits to Australian consumers. Instead there is evidence that electricity companies have wasted resources in sales efforts, marketing and other expenses as a result of policies designed to foster competition between alternative suppliers of an homogenous product—something that used to sell itself. Likewise suppliers have to appealed for high prices from regulators by padding their equity values and so boosting the profit obtainable at a target rate of return on equity.[19] Moreover, it is not clear that there is in fact a strong motive to invest in best practice technologies and other vehicles that would give benefits to consumers.

The coal ports of Dalrymple and Gladstone discussed below make a good case study. After the experience of Dalrymple the mining industry strongly argued against privatising Gladstone. Their experience was that giving the resource to a private company did not guarantee the appropriate increases in capacity at the port. Instead monopolists are inclined to enjoy the excess demand and charge whatever the market will bear. The experience with stevedoring company Patricks provided such a warning. According to the ACCC, since 1998 productivity on the Patrick docks has stagnated but, as costs have fallen, the rate of profit has increased from 10.6 per cent to 24 per cent [this is the figure for the duopoly together] Strangely, however, despite the ACCC finding that there has been a failure to invest in new equipment and no productivity growth,[20] the executives have been well rewarded with Patrick's CEO being paid a million dollars a year and the in-going and out-going CEOs of the parent company (Asciano) getting $7.4 million.[21]

There are many Australian examples of lazy monopolists that offer support for the hypothesis that monopolies are loathe to waste resources on cost savings that would put downward pressure on their profits, whether that might be due to pressure from regulators or consumers who might draw attention to their monopoly profits. (While customers are often in a take-it-or-leave-it position, there is always the threat of political and other types of social pressure.)

Where there are markets with a combination of public and private sector enterprises the evidence does not necessarily show that the private sector is more efficient. Well before the Australian experiments with privatisation and corporatisation US studies had shown that municipal electricity firms were more efficient than private firms even when the comparisons were controlled for size, access to hydro power and so on. Similar results were obtained for telephone companies. Similarly the performance of the state-owned Canadian National railroad company was the same as that for privately owned Canadian Pacific.[22]

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[17] Friedman M (1962) *Capitalism and Freedom*, Chicago University Press, 1962.
[18] For example, Durkin P (2014) 'ACCC calls for big asset sell-off', *The Australian Financial Review*, 6 January.
[19] See Richardson (2013) Electricity and privatisation: What happened to those promises? The Australia Institute Technical Brief, No 22, April.
[20] ACCC (2012) *Container stevedoring monitoring report, No 14*, October.
[21] Asciano (2013) *Annual Report*.
[22] Aharoni Y (2000) 'The performance of state-owned enterprises' in Toninelli PM (ed) *The Rise and Fall of State-Owned Enterprise in the Western World*, Cambridge University Press, pp 49-72.

There are good reasons why the government may well outperform the private sector even when there are no natural advantages. Our earlier discussion showed that the Australian economy is dominated by monopoly/oligopoly firms who are essentially comfortable, tend to earn good returns virtually without trying and so can indulge their non-commercial values, whether that is political activity, lavish boardrooms and lifestyle with CBD views, and so on.

It seems that for both private and state-owned entities it is the economic environment that affects their performance. Factors such as the degree of competition have been identified in the literature. According to one recent survey there is a view that private ownership is preferred to public when incentives to innovate and contain costs are strong with strong competition. But private ownership is not optimal when there is monopoly power, externalities and distributional issues. Also as argued in the survey:

private firms with large investors might underprovide quality or otherwise shortchange the firm's stakeholders because of their single-minded focus on profits, and a publicly spirited politician can then improve efficiency by controlling the decisions of firms.[23]

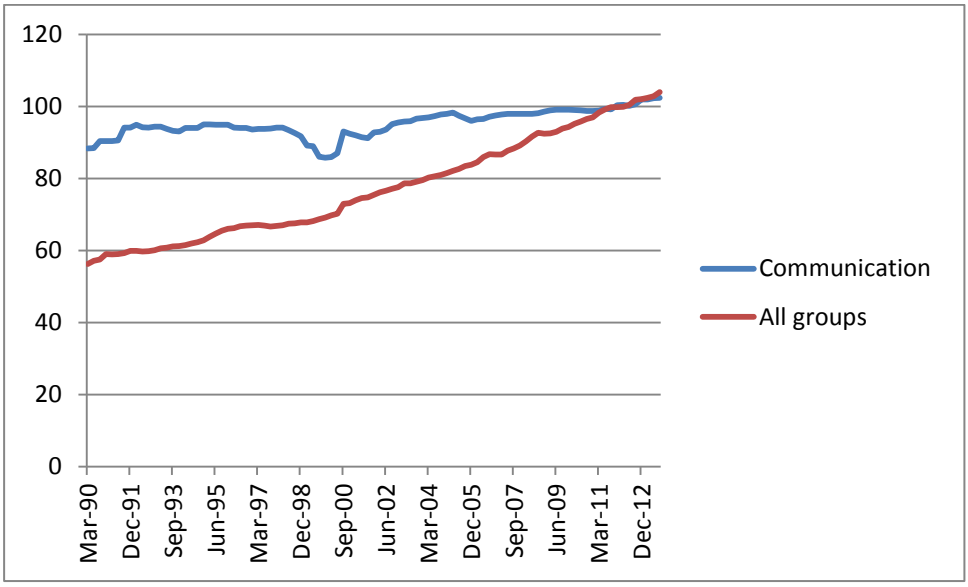
As an aside the Chinese model of allowing private enterprise but retaining state-owned enterprises meant that the competitive struggle would decide which would win. As a result the Chinese experiment has provided a useful opportunity to see which is 'best'. Recent research has shown that government owned and controlled firms do better on standard financial and productivity indicators except where the governance structure is weak. That is an important point in the debate about whether the private sector is 'better', other factors such as governance questions are likely to be important for both the private and public sectors.

The importance of competition as opposed to privatisation can be illustrated with the communications sub-category in the Australian CPI and comparing movements in the communications sub-group with the all groups index and with the policy initiatives taking place at the time, in particular the privatisation of Telstra. It will be recalled that there were suggestions that Telstra's staffing was twice as high as it should be as a result of public ownership.[24]

[23] Cornetta MM, Guob L, Khaksarib S, Tehranian H (2010) The impact of state ownership on performance differences in privately-owned versus state-owned banks: An international comparison, *Journal of Financial Intermediation,*Volume 19, Issue 1, January, pp. 74–94

[24] Cutler T (1996) 'Privatising Telstra: "the smile of the Cheshire cat"', *Privatising Telstra Conference*, Savoy Park Hotel, Melbourne, 28 June.

Figure 2: Prices in communication relative to all groups of the CPI.



Source: ABS (2013) *Consumer Price Index, Australia, Sep 2013*, Cat no 6401.0, 23 October.

Figure 2 shows that communications prices have been fairly constant since the early 1990s. Hence communications prices have fallen relative to the rest of the CPI. That is likely to reflect the rapid technology changes in communications equipment associated with rapid increases in computing power and switching technology. Communications prices fell following the introduction of full competition in July 1997. Privatisation followed with the first third of Telstra shares sold in November that year, a further 16.6 per cent sold in September 1999, 31 per cent in November 2006 and the final 17 per cent transferred to the Future Fund in February 2007. From the graph it is not really possible to show any major changes as a result of privatisation. The only unexplained bit is the temporary reduction in prices in 1998. If one third privatisation was the cause of that then it has to be explained why the later full privatisation seems to have not achieved cost savings for consumers. Moreover there is the remaining question of why the early gains in lower prices were not sustained. A possible explanation is more lax regulation based on the view that competition would be relied on to check communications prices. Of course it is possible that finer disaggregation would reveal more nuanced explanations but at the very least it should be conceded that there has not been an impact strong enough to give general benefits to consumers. In the meantime Telstra's pre-tax return on equity of 45 per cent suggests that Telstra is far from facing a serious competitive threat. Indeed, Telstra's financials suggest it typifies the very monopolists that Friedman had in mind in the earlier quote.

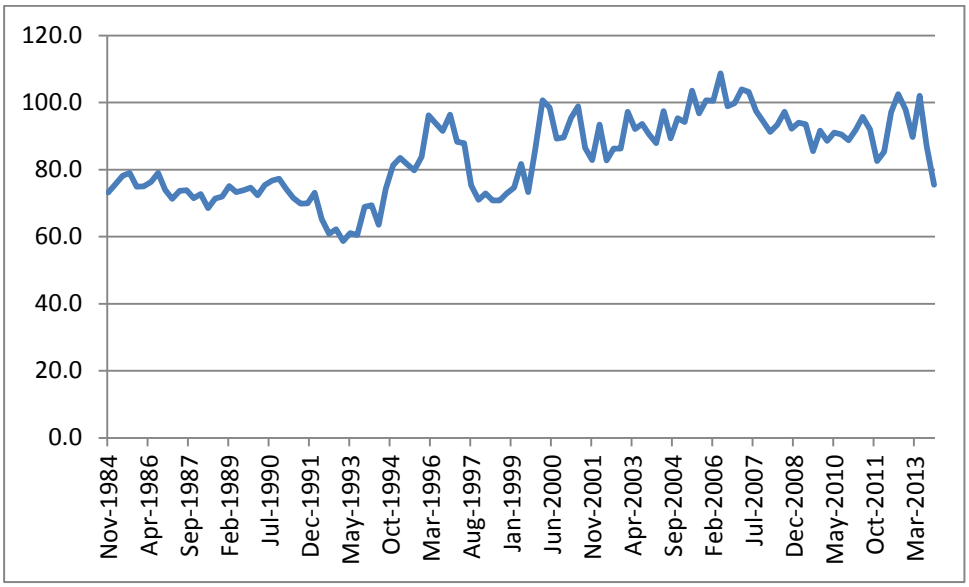
It is also possible to directly test the claim mentioned earlier that under public ownership there were twice the staff needed and that would be fixed with privatisation. It is true that Telstra's staff has fallen considerably from 76,522 full time staff in 1996 to 37,721 full time equivalents in 2013.[25] However, an examination of Telstra's annual reports shows that over the years there have been a number of initiatives including very large outsourcing projects beginning in the 1990s and the disposal of businesses over recent periods. Hence to compare staffing in Telstra now with its staffing almost two decades ago is to compare apples and pears. Telstra has completely restructured and so has the industry as a whole. The fact that Telstra has taken on new functions and shed old functions means that the critical issue is no longer staffing in Telstra but staffing in telecommunications as a whole. In 1996 Telstra was almost the whole industry and Telstra's full-time staff was 76,500 or 81 per

[25] Telstra (various years) *Annual Report*.

cent of the ABS estimate for the total industry. Today Telstra's staff make up only 43 per cent of the industry's employment.

Figure 3 shows the movement in staff in what the ABS defines as 'Telecommunications Services' since the figures were first collected.

Figure 3: Telecommunications services employees ('000 persons)



Source: ABS (2013) *Labour force, Australia, detailed, quarterly, Nov 2013*, Cat no 6291.0.55.003, 19 December.

The figures plotted in Figure 3 show no major structural shift in employment associated with the privatisation of Telstra. If anything significant was going on as a result of the changes in Telstra they should have shown up in Figure 3 which, at least until privatisation is dominated by Telstra's activities.

It would be useful to examine the categories of employment in telecommunications services over the same number of years. Those figures are not available however, telecommunications makes up around half of the employment in the ABS category 'information, media and telecommunications' and for that category a breakdown by occupations is possible. The figures before privatisation and the most recent are given in Table 4 .

Table 3: Employment in 'information, media and telecommunications' by occupation ('000 employees)

	Aug-96	Nov-13	Increase (%)
Managers	18	23	27.8
Professionals	52	75	44.2
Technicians and trade workers	49	24	-51.0

Clerical and administrative workers	51	36	-29.4
Sales workers	14	21	50.0
Labourers	10	4	-60.0
Others	4	2	-50.0
Total	198	185	-6.6

Source: ABS (2013) Labour force, Australia, detailed, quarterly, Nov 2013, Cat no 6291.0.55.003, 19 December.

Table 4 clearly shows that while there has been an overall reduction in employment in this industry group, there have been large increases in sales workers (50 per cent), professionals (44.2 per cent) and managers (27.8 per cent). People who directly provide the services have fallen; labourers by 60 per cent and technicians and trade workers by 51 per cent. These figures strongly hint that privatisation and competition in telecommunications has meant that the people who do the actual work of delivering telecommunications services are replaced by bigger sales forces, as well as professionals who include marketing and advertising 'experts'. The cruel joke seems to be that it is competition and privatisation rather than public ownership that results in excess employment in unnecessary labour categories and that confirms the earlier findings in the electricity sector which suggest corporatisation, privatisation and competition have created unnecessary duplication of functions and unnecessary expenses.[26]

Of course, prior to the privatisation of Telstra there were those who warned that privatisation was unlikely to generate the benefits that were expected by the advocates of privatisation. Two of the predecessors of the Productivity Commission are worth mentioning. An international comparison of economic indicators in telecommunications carried out by the Bureau of Industry Economics showed no association between economic indicators and the type of ownership of the main enterprise/s in the market. Examples often cited from that survey included the publicly owned Iceland state monopoly which had the world's lowest prices for a basket of business user charges. Likewise Switzerland's state monopoly topped the table with revenue per line and per employee.[27] These and other measures of performance have been studied, but without showing persuasive evidence for or against public ownership. The Industry Commission was also non-committal and took a neutral stance on issue of privatisation where firms face little competition.[28] It is of course the norm that most government business enterprises face little competition.

Before leaving this section an implication of the Telstra/NBN Co experience must be stressed. Had Telstra remained in public ownership could have simply been told to invest in a world-class high-speed national broadband network but instead the government has had to enter into costly processes and duplication of many of the functions of Telstra in order to deliver high-speed broadband. That suggests a critical question that needs to be addressed

[26] See Richardson D (2013) Electricity and privatisation: What happened to those promises? *The Australia Institute Technical Brief No 22*, April. In a commercial sense the need to sell and market services to get an edge on the competition may seem completely sound. But that is the point. These are essential services that sell themselves.

[27] Bureau of Industry Economics (1995), *International Performance Indicators: Telecommunications, 1995*, Canberra: AGPS.

[28] Industry Commission (1994) Improving the Efficiency of GBEs, Information Paper, May.

before contemplating private ownership—are the owners likely to keep Australia abreast of world best practice? Private monopolists/oligopolists seem to have a bad track record in that regard.

Case study: The Dalrymple and Gladstone ports

The Queensland Government has rejected some the recommendations of the Costello Commission of Audit that involved selling government assets. In part that reflected the need for the Newman Government to distinguish itself from the former Labor Government and their privatisation program, especially the sale of Queensland Rail and other assets.

The debate on the Gladstone Port is interesting since it comes up against the strong vested interests represented by the mining industry. The Costello report recommended leasing the commercial parts of the port to private operators. [29] The government subsequently rejected that recommendation [30] but prior to the release of the report the miners had already expressed concerns about the potential sale. Queensland Resources Council chief executive Michael Roche said

Our experience with privatised ports has not been a good one… our industry has not been happy about the Beattie government's sale of Dalyrmple Bay and the subsequent regulation of the port. It has struggled to meet its capacity. It was supposed to be 85 million tonnes [a year] but it doesn't do that.[31]

It seems the new owners of Dalrymple, at first Babcock and Brown Infrastructure, were not prepared to increase capacity much to the annoyance of the miners who wished to open new mines in the region. Dalrymple Bay was one of those ports where often there were dozens of idle ships at sea waiting for their turn to enter the harbour. The costs of the delays was borne by the miners and buyers but the excess demand made it easy for Babcock and Brown Infrastructure to earn a healthy profit. Babcock and Brown Infrastructure, a spin-off from Babcock and Brown – a merchant bank, were happy to exploit the excess demand rather than expand to meet the local needs.[32]

The Costello Commission of Audit does not really address that issue except to recommend that the government should 'reserve the right to take action to prevent delays in port development, to enable increased capacity to be developed by Government or other users in the event that a leased port does not wish to invest to meet such capacity'.[33] Of course the Costello report is right to mention this reservation but how it would be implemented in practice is not discussed. It sounds like the sort of problem that could tie up the legal system for years. But the wider importance is the recognition that neither society nor industry can necessarily rely on commercial incentives to get what they need out of a certain company. Note too that in such a case everyone is reliant on the particular quirks of the company concerned. You can argue that where there is an incentive to do something it will be done in an ordinary market economy. But where you rely on a company which has a monopoly on the relevant market we rely entirely on the incentives that that particular company faces. If it

[29] Queensland Commission of Audit (2013) *Final Report – February 2013*, 30 April (Costello report).
[30] Queensland Government (2013) *A Plan: Better Services for Queenslanders, Queensland Government Response to the Independent Commission of Audit Final Report,* 30 April.
[31] Ludlow M and Cranston M (2013) 'Miners wary of another port sale in Queensland' *The Australian Financial Review*, 4 March.
[32] Babcock and Brown Infrastructure held the assets put together by Babcock and Brown an investment bank that was often described as a 'Mini Macquarie' the much larger investment bank. BBI was subsequently Prime Infrastructure Holdings and Dalrymple is now part owned by it and Brookfield Asset Management.
[33] Queensland Commission of Audit (2013) Final Report – February 2013, 30 April (Costello report), p 2-147.

seeks to maximise return on equity, as we have seen in examples above, the company may have a distinct incentive to limit supply so as to increase the scarcity value of the product or service. The important thing is that when we deal with imperfectly competitive markets we are dealing with the idiosyncrasies of whoever happens to be one of the main players in the market. Privatisation generally takes place in imperfectly competitive markets. Indeed there is an argument that idiosyncratic players will not survive in a competitive market.[34]

Conclusions to Part A

The overwhelming conclusion of this part of the submission is that government provision of infrastructure and financing via ordinary bond issues is likely to be optimal.

It is always possible that the provision of infrastructure out of current spending is superior. However, it was argued here that so long as interest rates in Australia are lower than the rate of economic growth then borrowing imposes a lesser burden on taxpayers than current funding through general revenue. The evidence in Australia suggests that has indeed been the case in Australia. Indeed, on realistic figures if we extrapolate from recent decades the burden of servicing debt-financed infrastructure is 2.82 per cent of GDP compared with direct outlays that would cost 3 per cent of GDP. Using more recent interest rates gives even lower servicing costs of 1.65 per cent of GDP.

It is possible that most of the infrastructure the government has in mind could be financed and/or directly provided by private interests. However, an examination of the cost of corporate finance and the hurdle rates of return required by the private sector suggest that private involvement will be a much more expensive option than government provision. Indeed, the fact that there are very high rates of return required in the private sector suggest there are many projects that generate internal rates of return above the bond rate but below the private sector hurdles. For the government not to take up those opportunities means forgoing opportunities to provide net benefits to the nation.

The arguments here raise the general question of whether government or the private sector is inherently superior. That is important because it might be possible to acknowledge that yes the government can borrow more cheaply but that is offset by the inherent greater efficiency in the private sector.

There are many examples of lazy private monopolists who, if anything, seem motivated to avoid world's best practice. Some of the examples given here included an important stevedoring company, Telstra and a private port. Privatisation was touted as a means of improving efficiency with benefits to consumers. That was based on the view that public corporations were inherently inefficient. However, the evidence is that privatisation does not necessarily bring benefits to the consumer.

[34] This was the argument that Gary Becker used to suggest that racial discrimination cannot persist in a competitive market because an employer who indulges in discriminatory behaviour will often miss out on the opportunity to employ the person most suited for the job. See Becker GS (1971) *The economics of discrimination (2nd Ed)*, University of Chicago Press. Arguments that competition will drive out all but the least cost supplier have little relevance in imperfectly competitive environments. That applies quite generally in that a very competitive environment would many corporate indulgences such as corporate jets and boardrooms with harbour views.

Part B.

Infrastructure cost pressures due to population growth: capital concerns and the looming infrastructure deficit.

Introduction

The terms of reference go directly to the question of how to reduce infrastructure construction costs. Population pressure has to be tackled directly as a major driver of the gap between the infrastructure in place and that which is needed.

There had been renewed concern about population pressures with both main parties in the 2010 election supporting a reduction in migration levels and a more sustainable growth in population. The environmental, congestion and other costs of high population growth seem to be getting more recognition.

By contrast there has been an argument that a high population growth may ease the burden on a future Australia faced with an increased proportion of older people. The argument is that a high immigration rate and/or a high birth rate provide an increase in the cohort of younger taxpayers that make it easier to finance the burden of an aging population.

This part of the paper takes up the neglected aspects of the intergenerational problem. Specifically the aim of this paper is to consider some of the capital problems associated with a higher population—problems associated with maintaining and enhancing the necessary infrastructure associated with a rising population. Among those capital problems we focus on the public capital stock, much of which is the social and economic infrastructure essential for the day to day life of ordinary Australians.

There is a strong possibility that over the next 40 years Australian governments will both maintain high a population growth without building the infrastructure required by population growth. This presents the prospects of an ever increasing infrastructure deficit which will be experienced as increasing congestion on roads and other transport modes, increased overcrowding in schools and hospitals and the failure to take up business opportunities will full capacity in commodity storage and handling.

Is the capital stock adequate?

It seems obvious that high a higher population should be associated with a higher capital stock and, if it is not, then something must suffer. More people requires more places of work, more transport facilities, more places of entertainment, more shops, health facilities, a bigger housing stock and so on. Some areas will be catered for by the private sector, some by the public sector and many by a blend of private and public facilities.[35]

A greater capital stock can also be associated with economic progress. Adding capital which increases the amount of capital per worker is referred to by economists as ‘capital deepening’ as distinct from capital widening which refers to adding more equipment because there are additional workers (see box).

[35] Transport capital is a mix of public roads, private trucks, public airports, private aeroplanes, private cars and buses and public trains and buses, and so on.

Capital deepening and capital widening

'Capital deepening' refers to increases in capital per worker so that each worker works with more capital. By contrast 'capital widening' refers to the provision of capital to more of the workforce and, in the context of an increase in the population, refers to the increase in capital required to keep capital per worker constant. When a worker uses a piece of machinery we refer to the capital labour ratio in production. We can use these concepts in the context of the population as a whole. The concept can also refer to other capital items such as houses and, in that case, the housing stock per person is relevant.

Higher output per person is associated with capital deepening. Generally the more capital used per worker the higher is the productivity of the worker. So over time capital deepening tends to be associated with higher living standards.

As a nation we tend to save a certain amount which can be used for capital widening or capital deepening. The higher is population growth the higher is the amount of investment required for capital widening—to maintain the existing capital to worker ratio. If the capital to worker ratio is allowed to fall then there is a risk that living standards may deteriorate. So the higher is population growth the more investment is needed for capital widening—just to stand still so to speak.

If Australia's savings is limited[36] then additional capital widening may 'crowd out' capital deepening or vice versa. High population growth implies that a good deal of additional investment is required just to maintain a constant capital per head—capital widening. But the more investment is taken up by capital widening the less is available for capital deepening. It is capital deepening that is associated with higher productivity and rising living standards.

At this point we turn to consider the orders of magnitude involved. For Australia as a whole the value of the capital stock at June 2010 was $4,087 billion, and in the year to June 2010 gross fixed capital formation was $360 billion while consumption of fixed capital was $208 billion.[37] Hence net investment was $152 billion or approximately 12 per cent of GDP. It is that 12 per cent of GDP that is available for capital deepening plus capital widening.

From those figures the roles of capital deepening and widening can be examined. The above figures imply a capital output (GDP) ratio of 3.2. If population is growing at 2 per cent then, to maintain a constant capital per head, net investment should be approximately $77 billion or 6 per cent of GDP just to maintain the capital output ratio at a stable figure. That implies a gross investment of $275 billion to maintain constant capital per head ($77 billion net investment plus replacing consumption of fixed capital of $198 billion). So gross investment of 21 per cent of GDP is required just for capital widening and to replace the capital stock as it wears out. The amount left over for capital deepening is also $76 billion or 7 per cent of

[36] By 'savings' we really mean the resources that are still available for investment after consumption, government expenditures and net exports. If there are unemployed resources then investment can be higher still so that our definition of 'savings' should refer to the resources that would still be available after consumption etc in a fully employed economy. If there is genuine full employment then additional investment could only be at the expense of something else and so capital widening investment is likely to compete with capital deepening investment.

[37] ABS (2010) *Australian System of National Accounts, 2009-10*, Cat no 5204.0, 29 October. 'Gross fixed capital formation' is the investment taking place while 'consumption of fixed capital' can be thought of as depreciation or the value of the work that needs to be undertaken to replace or fix up deteriorations in the capital stock. 'Net investment' is the difference between total investment and depreciation which would actually add to the capital stock.

GDP. If population growth were zero and the total investment were unchanged, then the amount available for capital deepening would be double.

Foreign investment

There is an alternative, rather than capital widening squeezing out capital deepening the alternative is that foreign investment increases along with increased foreign debt and foreign ownership of Australian industry. In a sense over most of the years since white settlement Australia has imported both people and capital with the latter following the former.

It is possible to argue that foreign investment may substitute for private domestic savings and so any capital deepening that was profitable would be undertaken by foreigners who would make up for any deficiency in local investment. In that case population growth leads to an increase in foreign investment resulting in higher foreign ownership and/or foreign debt but otherwise capital deepening may still take place. However, it is unlikely that foreign investment would fully compensate for the need for higher domestic investment.

A more realistic answer is that foreign investment will not increase to the extent needed to replace domestic investment and so some capital deepening will not take place. That means that indirectly population growth may actually slow down the long term trend towards higher living standards. Either that or not all the warranted capital widening takes place and we see evidence, for example, in greater congestion in our hospitals, roads and shopping arcades.

It should be pointed out that if population growth does indeed increase foreign investment into Australia, a consequence will be the reduction in net exports. The mechanism here is that the inflow of foreign investment acts to drive up the exchange rate which reduces the competitiveness of Australia's exports and encourages imports. Australia has witnessed much the same thing as the result of the resources boom, massive increases in investment have encouraged foreign investment which has driven up the exchange rate and reduced the competitiveness of Australian manufacturing, tourism and other industries that depend on international sales.[38] Moreover, whenever investment threatens to promote excess demand conditions it is likely the Reserve Bank of Australia will intervene, raise interest rates and so slow down investment itself.

So far the discussion has related to investment in Australia's capital stock generally. In this part of the submission we are chiefly interested in public infrastructure and the implications of population growth.

Public infrastructure and other public fixed capital

Government spending on investment including a lot of Australia's social and economic infrastructure is a special case of the above discussion. For a start, much of this falls to the public sector by default. The public capital stock is different in that, no matter how valuable the capital stock may be, it may not be commercially viable or not reach the high rates of return demanded of private investments (see discussion in part A) and so falls to the public sector. For example, much of the road system may be very valuable but could not be easily supplied by the private sector—or if it was it would involve unacceptable toll charging arrangements that interfere with the actual use of the road. Indeed, many of the toll ways now operating have the effect of reducing demand and so divert traffic back to the congested

[38] See Richardson D (2010) Minerals in the Australian Economy: Presentation to the Peak Minerals Forum, The Australian Museum, Sydney 29 April.

roads that the toll roads were supposed to assist. In other cases it may simply be preferable to supply the infrastructure as a public utility rather than as a commercial venture.[39]

Public investment in infrastructure is critical to economic growth in two main ways. Infrastructure services are used as final consumption by households and as intermediate consumption by firms.[40] Of course in many cases the same infrastructure is used in both ways; roads are used almost exclusively as final consumption on the weekends and mainly as a business input during the middle of work days.

The following table sets out figures for government capital expenditures over the last decade.

Table 1: Government Capital Expenditure

	Depreciation (General Government: Consumption of fixed capital)	**Gross investment** (General government: Gross fixed capital formation)	**Net Investment** (General Government: net fixed capital formation)	**GDP**	**Net investment**
	$ billion	$ billion	$ billion	$ billion	% GDP
Jun-2000	15	20	5	664	**0.74**
Jun-2001	17	21	5	709	**0.67**
Jun-2002	17	23	5	759	**0.67**
Jun-2003	18	23	5	804	**0.61**
Jun-2004	19	24	5	865	**0.56**
Jun-2005	20	26	6	926	**0.67**
Jun-2006	21	30	8	1001	**0.82**
Jun-2007	23	32	10	1092	**0.88**
Jun-2008	24	38	14	1186	**1.15**
Jun-2009	26	42	16	1255	**1.27**
Jun-2010	27	54	27	1285	**2.07**

Source: ABS (2010) Australian System of National Accounts, 2009-10, cat no 5204.0, 29 October and TAI estimates.

[39] This the case when for example commercial supply would result in a monopoly provider with the potential for the exploitation of monopoly power.

[40] Snieska V and I Simkunaite I (2009) 'Socio-economic impact of infrastructure investments', Economics of Engineering Decisions, (3) pp. 16-25.

Note that the figures for general government net fixed capital formation are obtained by taking gross fixed capital formation and deducting consumption of fixed capital. The latter, as explained above, can be thought of as depreciation, the wear and tear on the capital stock that requires maintenance. Hence the figures for the year to June 2010 show depreciation of $27 billion, gross investment of $54 billion and so net investment of $27 billion. Of course that does not mean that all necessary maintenance has taken place. Just that depreciation must be deducted to get an idea of the net investment.

The table clearly shows that until 2007-08 government net fixed capital investment was typically less than one per cent of GDP over the period considered in the table. By contrast the population of Australia has been growing at 1.3 per cent per annum since the late 1970s.[41] We would expect that in the long run the increase in the value of the public sector capital stock should be roughly equal to the increase in the population. Anything less than that over an extended period means that the Australian population has to make do with ever decreasing infrastructure per person.

There is evidence that the Australian population already faces an unsatisfactory level of infrastructure. Our ad hoc observations suggest infrastructure in Australia is either badly in need of maintenance or repair (eg urban roads) or is crowded and needs additional investment (eg Australia's ports and hospitals). The former Minister for Infrastructure, Transport Regional Development and Local Government, Anthony Albanese, claimed that the 'infrastructure deficit' in Australia was $770 billion before the global financial crisis. He claimed that the value of the infrastructure deteriorated by 20 per cent under the former Howard Government.[42] According to a Gallop poll of 32 OECD countries Australia has the 28th lowest proportion of people satisfied with their public transportation system. We rank 19th on satisfaction when people are asked about roads or highways in their area.[43] On both counts Australia ranked below the US and while the authors of the study were concerned about the implications for US productivity and international competitiveness, the implications are an even greater concern for Australia.

In passing we note that if there is a shortage of other goods and services the market usually has mechanisms such as price signals that can address the shortage by showing that additional supply is profitable. However, there is generally no direct way that frustrated users of infrastructure can signal their need for improvements.

To return to our main argument, the population has been growing at more like two per cent per annum in more recent years.[44] Given the value of the government capital stock, $510.4 billion at June 2010, that means net investment in the government capital stock should be running at approximately $15 billion per annum. That implies gross investment in the government capital stock should be around $42 billion or approximately 3.3 per cent of GDP. Net investment should be running at around 1.2 per cent of GDP. That however, investment at those levels would not put a dent in the Albanese infrastructure deficit.

To eliminate the infrastructure deficit by 2050 would require additional net investment of $19 billion per annum in today's prices. That then would require gross investment in the government capital stock at $61 billion per annum. Despite the stimulus package the government's performance was well short of that with total gross investment in the

[41] ABS (2008) *Australian Historical Population Statistics, 2008*, cat no 3105.0.65.001, 5 August.
[42] Albanese A (2010) 'The building decade: The infrastructure challenge facing Australia', *Address to the Financial Review's Infrastructure Conference*, 27 April
[43] Department of the Treasury and Council of Economic Advisors, (2010) *An economic analysis of infrastructure investment*, 11 October at http://www.whitehouse.gov/sites/default/files/infrastructure_investment_report.pdf

[44] ABS (2010) *Australian Demographic Statistics, Dec 2009*, cat no 3101.0, 24 June.

government capital stock at $54 billion. However, if population growth was much lower the required gross investment in the government capital stock would also be significantly lower and the government would have actually exceeded that value in 2009-10. Instead of requiring $61 billion, with zero population growth the required gross investment in the government capital stock could have been reduced to $46 billion.

Despite the stimulus package, government fixed capital formation at $40,720 million in 2008-09 fell a long way short of the required figure. The above figures also suggest that with a population growth of 2 per cent, government gross fixed capital formation has to be roughly double what it would be with zero population growth. However, an important qualification needs to be made.

A critical assumption here is that the size of the government capital stock should be proportional to the population. This discussion has assumed that a certain proportionate increase in population requires the same proportionate increase in infrastructure. There will of course be examples where a higher population will mean some of the infrastructure will be used more efficiently so that a doubling of the population would require something less than a doubling of the infrastructure. In other cases a doubling of the population may require more than a doubling of the infrastructure.[45]

The figures here cannot be used to say that a particular council should make sure its roads investment should be so much per annum or that a particular bicycle track needs to be enhanced by 2 per cent per annum. All of those decisions have to reflect detailed engineering and other studies and may or may not relate to specific public assets. However, the figures here are indicative of the orders of magnitude of the problem and we can be confident that our arguments are correct in a qualitative sense.

Before leaving this section it should be pointed out that the international studies on the influence of public infrastructure investment on economic growth is usually found to be very high. The same seems true of Australia. A Treasury study[46] cites an IMF study that finds that a one per cent increase in the public infrastructure stock would increase output by about two thirds of one percent. The Treasury study makes the point that the result is implausibly high. The reason is that on present Australian figures every additional $1 million in infrastructure assets would be associated with an increase in GDP equal to $1.7 million; an ongoing return of 170 per cent per annum. Incidentally that could mean that government expenditure is recouped in additional taxation after a payback period of less than two years. While that particular estimate may be unrealistically high the point remains that public infrastructure investment generates higher economic growth by increasing the productive capacity of the economy.

What if we continue to under-invest in infrastructure?

The figures given earlier in table 1 showed that net public investment was just over 0.5 per cent of GDP for the first 6 or 7 years covered. The present emphasis on getting the government sector back into surplus suggests there is a danger of returning to low or zero net public investment in infrastructure. It has been noticed elsewhere that during times of fiscal constraint it tends to be capital works that are most often sacrificed by governments. As one commentary puts it,

[45] For example where infrastructure requires the acquisition of inner city land which has increased in value due to population growth. Another example would be the need for public transport solutions that use new and novel pathways such as Bangkok's sky train which operates at about the fourth floor of most of the surrounding office buildings.

[46] Coombs G and Roberts C (2001) 'Trends in infrastructure' Economic Roundup, Summer pp 1-16.

It is operationally easier to reduce capital than current expenditure, simply by allowing capital assets to depreciate more quickly by reducing maintenance expenditure, or by stopping a few large infrastructure projects. Current expenditure instead tends to be focused on entitlement-based programs, public sector employment, wages and pensions, which are politically harder to reduce.[47]

It might be suggested that the infrastructure may be able to cope with some stress. For example, one year's population growth at two per cent may not put too much pressure on the infrastructure. But over 40 years, the period studied in the 2010 intergenerational report,[48] two per cent per annum amounts to an increase of 120 per cent in the required capital stock which, if not addressed, will certainly put stress on infrastructure.

With population growth of around two per cent and if there is no further *net* spending on Australia's infrastructure, in other words if public investment just covers annual depreciation, then the value of the capital stock per head will fall by 55 per cent. In the meantime per capita GDP is likely to have increased by a significant amount. If productivity growth is 1.5 per cent then in 40 years per capita GDP would be higher by 81 per cent with the same labour participation rate. Without net investment in public infrastructure it is likely that people will experience a large imbalance between their command over private goods and services and their enjoyment of publicly provided goods and services. John Kenneth Galbraith years ago drew attention to the simultaneous private affluence and public squalor.[49]

Having outlined the nature of the issues involved it is clear there is a very important relationship between population growth and the effort required to maintain the quality of the capital stock including the public capital stock. The issues surrounding population growth and its composition and their implications for the Australian economy have been the subject of the government's intergenerational reports which are now in their third incarnation.[50] The focus here is on the last of these reports.

What does the 2010 Intergenerational Report (IGR10) say about all this?

The IGR10 clearly recognises the importance of the issues discussed here. For example, it says:

Australia's population will continue to grow over time, though at slightly lower rates than experienced over the past 40 years. This will put pressure on infrastructure, services and the environment.[51]

Population growth puts pressure on infrastructure and services, but will continue to contribute to economic growth. It can be socially and environmentally sustainable provided governments plan and invest, well ahead of time, for a larger population.[52]

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[47] P Toigo and R Woods (2006) 'Public investment in the United Kingdom', *OECD Journal on Budgeting*, Vol 6(4), pp 63-102.

[48] Australian Government (2010) *Australia to 2050: Future Challenges, Intergenerational Report 2010*, February.

[49] Galbraith JK (1958) The Affluent Society, Boston: Houghton Mifflin

[50] Australian Government (2002) *2002-03 Budget Paper No 5: Intergenerational Report, 2002-03*, 14 May, Australian Government (2007) *Intergenerational Report 2007*, April, and Australian Government (2010) *Australia to 2050: Future Challenges, Intergenerational Report 2010*, February.

[51] Australian Government (2010) p. vii

[52] Australian Government (2010) p. xv

This of course is obvious and is entirely consistent with the focus of the present paper. The IGR10 however, also talks as if infrastructure spending will increase productivity in the economy for example:

Policies that support higher productivity, including investments in nation building infrastructure and skills and education, will raise economic growth, improve living standards and enhance Australia's capacity to fund the fiscal pressures of an ageing population.[53]

This passage seems to refer to capital deepening while the former passages refer to capital widening. The IGR10 also cites IMF and OECD evidence that the investment in infrastructure is consistent with long term increases in GDP and productivity. However, it is also the case that the models used by the IMF and OECD imply that falling public capital to labour ratios will reduce productivity and GDP per head.

As the argument of this part of the paper has shown, a rising population means that a certain level of infrastructure spending, capital widening, is required just to keep the infrastructure to population ratio constant. It is not clear that the discussion in IGR10 appreciates the distinction between capital deepening and capital widening.

While the need for investment in infrastructure is mentioned[54] it is certainly not formally included in the modeling, indeed, the discussion in the modeling section puts infrastructure with 'other payments' and explicitly says 'These areas of spending do not have a clear link with demographic factors'.[55] That seems an extraordinary thing to say and clearly contradicts other passages cited above that acknowledge the necessary link between population and infrastructure needs.

Where IGR10 does acknowledge a relation between infrastructure and population it is only in regard to infrastructure items that are now often provided by the private sector or commercialised government agencies—electricity, gas, water and waste services, transport, postal and warehousing and information media and telecommunications.[56] Capital investment in these sectors is undertaken and financed according to commercial criteria and, perhaps for that reason, it is ignored by the IGR10. While those investments may well be commercially undertaken the fact that population growth requires greater investment in these and other sectors is still a concern, not least for the additional foreign investment that is often involved as shown above.

IGR10 wants to be consistent with the fiscal strategy under the Rudd/Gillard Government which constrains real growth in government spending to 2 per cent until the budget returns to surplus. Therefore in the modeling 'other payments' which include infrastructure, are assumed to be compressed to meet the constraint and in the long run are assumed to fall by one per cent of GDP. Not only is it assumed that there is little consequence for government-provided infrastructure but it assumes that, at least at the Commonwealth level, the government can get away with even lower contributions to infrastructure spending.

Conclusion to Part B

Advocates of high population growth have concentrated on the benefits of having a lot more taxpayers around to help fund a higher proportion of older people and the consequent increase in age-related expenditures. However, any benefits from a higher population growth

[53]Australian Government (2010) Australia to 2050: Future Challenges, Intergenerational Report 2010, February.p. 21.
[54] Australian Government (2010) p 34 and elsewhere.
[55] Australian Government (2010) p 153.
[56] Australian Government (2010) Chart 2.7, p. 33.

have to be offset against the costs; including the costs of providing for a much higher infrastructure. That is the concern of this part of the submission; the capital costs of a higher population and especially on the public infrastructure.

Basically a higher population should be associated with a higher capital stock and, if not, then something must suffer. Even if the population increase is provided with a higher capital stock something else may well suffer. In particular, investment in capital 'widening' (more investment to cope with more people), will be at the expense of capital 'deepening' (more investment per person that increases labour productivity).

A higher investment in capital widening may also be met by a higher foreign investment with higher foreign ownership and/or foreign debt. One of the mechanisms involved here also acts to squeeze out some exports and import-competing industry.

Public infrastructure is of particular concern in the present paper because that is the responsibility of Australian taxpayers. Australian figures show that government net fixed investment is around one per cent of GDP. That figure includes the result of the public sector stimulus in response to the global financial crisis. For most of the decade government net fixed investment has been under one per cent of GDP. That is not sufficient to keep up with the present growth in population at around two per cent recently.

To some extent the public sector infrastructure can be stretched a little, one year of population growth at two per cent may make very little difference. However, two per cent over 40 years is 120 per cent. There are already stresses in the infrastructure and while another two percent population may make an imperceptible difference, a 120 per cent increase in population would seem very much worse.

The pressures and benefits implied by population growth were dealt with in the government's Intergenerational Report. However, while lip service was paid to infrastructure costs they escaped proper scrutiny and were certainly not part of the economic modelling undertaken by the authors of the report. It is not the purpose of this paper to compare the infrastructure costs of population growth with the relief from the costs associated with the aging of the population. However, what we can say is that by excluding infrastructure the costs of population growth have been very much underestimated by the IGR10 and may ultimately require taxpayers to fund a doubling in the gross investment that would be required with zero population growth.

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