

Infrastructure: What is needed and How do we pay for it?

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In 1880 Australia had the highest living standard in the world. For much of the following hundred years our rate of public investment was also just about the highest in the world. But despite this high investment in infrastructure, Australia dropped down the international league table of living standards. No doubt there were multiple causes for Australia's relative decline in GDP per capita, and part of our high investment was an inevitable response to the tyranny of distance. Nevertheless, this historical experience strongly suggests that too much of our infrastructure investment has been wasted in the past. And it is not difficult to think of examples – railways and irrigation schemes that never did nor could have even hoped to make a return, of which the Ord River scheme and Darwin to Alice Springs railway are only the most recent glaring reminders of our tendency to suspend our collective critical faculties when it comes to infrastructure investment.

So now we are being warned that once again we are facing yet another infrastructure crisis – I have even seen it referred to as our “infrastructure nightmare”! But should we believe these prophets of doom? There are after all a number of vested interests:

- The finance industry is experiencing very rapid growth in superannuation funds available for investment, and infrastructure is an especially attractive investment for these funds – offering a steady stream of returns with often low risks because of various forms of government risk sharing or guarantees

- The construction industry is particularly dependent on public investment, and
- There are political pressures – some of us will always remember that modest member of Parliament, Bert Kelly, who smelt another dam coming on every time a new election was announced

It is, of course, possible to point to particular instances where additional infrastructure investment would seem to be warranted, but do these instances add up to a general conclusion that we are significantly under-investing in total or just that there is some misallocation of the present investment? Certainly our ranking according to the World Economic Forum puts us not far from the top in terms of the quality of our infrastructure (see Chart).

So before we spend taxpayers' money on yet another infrastructure crisis I suggest that we need to start by answering some critical questions. How do we define a shortage of infrastructure and why does government need to intervene? How much infrastructure is appropriate, and how should the total of infrastructure investment be determined?

How should infrastructure investment be determined?

In a free market where price reflects the cost of production we can be reasonably confident that demand will equal supply, at least over time. When there is excess demand and a shortage, the price will rise and investment will fairly rapidly respond to the increased returns, so that the shortage disappears.

So what makes so-called infrastructure different? First, there are often externalities associated with infrastructure investment, so that the full

cost of the investment is not normally recovered only from the direct users. For example, the rest of society can benefit from investment in railways which leads to lower congestion, and accordingly the optimal amount of rail investment is likely to be more than the amount that passengers should be asked to pay for. The second problem is that public infrastructure is often associated with considerable economies of scale. These economies provide the conditions for natural monopolies that in private hands may provide some incentive to under-invest and thus achieve monopoly profits.

It is this combination of externalities and economies of scale that gave rise to our history of government provision of infrastructure and an absence of market tests. Instead infrastructure has often been subsidised or even provided for free and financed out of consolidated revenue. But when something is provided for free, we should not be surprised if there is apparently excess demand for its services. Instead we should be asking would there be a shortage of infrastructure if there were appropriate cost recovery through charges? Furthermore, proper pricing signals can often lead to more efficient use of infrastructure so that there is no need to build additional capacity. In other words do we face an infrastructure crisis or a pricing crisis?

The provision of economic infrastructure

I now want to explore these possibilities for using pricing more effectively, particularly to determine the investment in economic infrastructure. Indeed, a major thrust of public sector reforms since the mid-1980s, and especially under the Hawke and Keating governments, has been the development of a more market-oriented framework through corporatisation and sometimes the privatisation of public utilities, and the

introduction of competition wherever possible. My purpose is now to briefly discuss how these reforms have affected the provision of infrastructure in each of the energy, water supply, urban transport and communication sectors.

Energy

A national energy market has now been established and the wholesale price of energy is now set competitively. Although the retail price of energy is still controlled in most states, I believe that electricity and gas prices are being set high enough to ensure that the necessary investment will be forthcoming to maintain the supply of gas and electricity to those markets. Indeed, because the regulator is targeting a specific rate of return on investment when setting prices, this will remove some of the riskiness in that investment, so in theory this type of regulation can encourage a tendency to over-investment. On the other hand others would argue that regulation creates its own types of “regulatory risk”.

In actual fact in NSW, which is the market that I know best, I think the evidence shows that the rate of return incorporated in the retail electricity price, and the conservative approach to forecasting the future wholesale electricity price, will be sufficient to provide the necessary incentive for future investment, including in new generation capacity. Indeed, that is happening.

Urban Water

Possibly even more interesting have been the changes in the provision and pricing of urban water; although some jurisdictions are still seeking Commonwealth funding and have not accepted that urban water can and

should be fully cost recovered. In any event, with the exception of Hobart all our capital cities are presently embarking on major investments in the provision of urban water in an attempt to drought proof these cities.

In Sydney the desalination plant and other re-cycling schemes that are presently being built will be fully cost-recovered and should be sufficient to ensure that Sydney will not experience water scarcity for at least ten years. The regulator, IPART, has just determined that this cost recovery will involve an increase in the price of water from its present \$1.34 kl to \$1.83 kl over the next four years in real terms. The water and sewerage bill for a typical household will then increase by \$203 pa or at an annual average rate of 6.3 per cent. While this may sound a high rate of increase, the price of \$1.83 for a thousand litres of tap water compares with a similar price for a single litre bottle of water at the super market.

Most importantly, this price of \$1.83 kl equates to the long run marginal cost of future additions to the water supply. It should thus provide an adequate incentive for future investment in Sydney's water supply, including by the private sector. I suggest therefore that this investment and associated pricing in Sydney's water is an example of infrastructure investment where a market test can be applied, and as a result we can be reasonably confident that the investment will be forthcoming in the future without the need for any subsidy.

As you know the choice of desalination has been contested by some, but in some Australian cities desalination is the most viable strategy to increase urban water supply, as its cost is equal to or lower than the costs of transporting traditional rain/river water supplies from further away. However, there are some other cities, such as Melbourne and

possibly Adelaide, where if trading of rural water were encouraged, then it may well be cheaper to purchase rural water than to invest in new sources of urban water.

Rural Water

The much more difficult case is the appropriate provision of infrastructure for rural water. In recent times drought has put rural water at the top of the policy agenda with the announcement of a National Water Plan which provides for expenditure of \$10 billion on irrigation in the Murray-Darling basin. This plan has been warmly welcomed and has bi-partisan support. Approximately \$6 billion will be spent on improving the supply of water to irrigators by efficiency improvements. So far there has been no suggestion that the cost of this extra water will be recovered from the irrigators, despite the requirement in the National Water guidelines, agreed by COAG, that there will be full cost recovery. But is this investment justified if we apply these cost recovery guidelines?

For example, in NSW – and I don't think the situation differs materially in other states – because of the write-downs of past poor investments, in 2006-07 the regulatory asset base for NSW State Water was only \$340 million of which the irrigator's notional share was a mere \$84 million. Assuming that NSW maintains its share and that roughly half of the proposed \$6 billion under the NWP is eventually spent in NSW, and that most of this expenditure benefits irrigators, then under that national water guidelines the regulatory asset base for the return on and of capital to be recovered from NSW irrigators could increase from \$84 million to as much as \$3000 million plus – that is up to thirty times. Even if most of the extra NWP funding were attributed to the environment – which seems unlikely – the capital base attributed to NSW irrigators would still rise

approximately tenfold. Furthermore, water supply is very capital intensive, so unless this latest investment produces a lot more extra water than all previous irrigation schemes then prices could also be expected to increase by not much less than the increase in capital.

Obviously these numbers would need to be refined, but they are sufficient to prompt the question how many irrigators would support this proposed \$6 billion expenditure on irrigation infrastructure if they had to pay for it? My strong suspicion is that this is a major infrastructure investment that would be better avoided or at least massively scaled down. The money saved could be better used buying back water licences which would then cost less if their value were not inflated, as they will be, by the provision of more free water.

Urban Transport

As I indicated earlier there are good reasons for not seeking full cost recovery for most forms of transport. Economies of scale mean that the marginal cost of roads, for example, is typically well below the average cost. Indeed, where there is excess capacity, the marginal cost from an extra user of an existing road is typically close to zero. Full cost recovery where prices equate to average cost would then result in less than optimal road use, and users failing to take up that spare capacity. But that is not a reason for failing to evaluate the benefits relative to the average costs of any new road investment.

In the case of rail investment, I have already referred to the external benefits from public transport in reducing congestion, pollution, and improved safety. Consequently we cannot rely on a pure market test when it comes to determining the adequacy of much of rail investment.

Again it does behove us, however, to undertake proper cost-benefit analysis on a project by project basis, and not rush to accept that every squeaky wheel needs oiling with new investment.

But notwithstanding the need for that detailed analysis, I think we can also attempt a broad assessment of the returns from more investment in urban transport. In particular, a commonly touted figure used to justify increasing transport investment is that the costs of congestion in Australia now amount to more than \$9 billion¹. But that begs the question of how much difference the various investment proposals would make to the amount of congestion, and whether there are other more cost-effective alternatives. For example, investment in urban arterial roads too often just shifts the point of congestion rather making much difference to the overall rate of congestion.

In response the advocates of public transport argue that instead of road investment, congestion requires more investment in urban rail systems. While I personally have no doubts that there are useful investments that could be made in urban rail projects in Australia, we need to be highly selective. The hay-day of rail was before the arrival of the motor car and rail transit works best in those cities whose basic form and structure was determined before the arrival of car transport. Thus a critical problem facing rail investment in new lines in urban Australia is that rail is not well suited to serving the highly dispersed patterns of housing and employment characteristic of Australian cities. Indeed if experience in the US is any guide to our future, it is worth noting that by 2006 fewer than 1 million US workers commuted to work by rail compared with more

¹ Bureau of Transport and Regional Economics, 2007, *Estimating urban traffic and cost trends for Australian cities*, Working Paper 71

than 2 million in 1980, and this fall was despite substantial investment, including in new systems, and a 150 per cent increase in the real cost of government aid to cover rail transit operating deficits². The problem is that urban rail systems are directed to bringing commuters into the CBD, but over the years our cities have re-structured so that the proportion of jobs in the CBD is steadily declining.

To further illustrate my point I want to explore the returns on investment in City Rail in Sydney. As you will know, Sydney is our most densely populated city, and the number of rail passengers carried in Sydney is about 50 per cent and 470 per cent more than in Melbourne and Brisbane respectively, while the extent of their suburban rail networks is only a little less than Sydney's. So Sydney is probably more suited to rail transit than other Australian cities.

The return on investment in Sydney's urban rail system can be characterised as the external benefits less the operating losses sustained. The external benefits include not only the reduction of congestion, but also environmental benefits – such as less pollution – and the increased safety of rail travel. In addition, some analysts would also add to these external benefits, the consumer surplus captured by users who experience a welfare gain when they pay prices that are less than their willingness to pay.

Work commissioned by the NSW Railcorp suggests that the external benefits from Sydney's CityRail were of the order of \$984 million in 2006-

² Winston, C and Maheshri, V, 2006, "On the social desirability of urban rail transit systems", *Journal of Urban Economics*, pp.362-382

07³. This compares with a reported government subsidy to cover the operating loss of \$1650 million – clearly much more than the estimate of external benefits, even after including rail's impact on the reduction of congestion in Sydney. Furthermore, this reported operating loss of \$1650 million only allows for a relatively small amount of depreciation, so there is no recovery of much of the past investment, and there is no provision for any return on capital.

The NSW Railcorp work also estimates that the consumers' surplus amounted to just over \$2 billion, which is then deemed sufficient to generate an overall net benefit to the Sydney community. However, even if that judgement were accepted, the vast bulk of that net benefit clearly is captured by the minority of the community who are rail users. Interestingly the extent of this net benefit is shown to be rapidly declining, mainly because of the cost of recovering the rapid build up in new investment by the NSW Government to improve and upgrade the rail network. The problem is that this rate of investment build-up is so far not being matched by the rate of increase in patronage.

In addition, although I think it is legitimate to write off much past investment in rail systems because of past poor investment decisions, this work does underline the caution that should accompany proposals to expand the network. Instead new investment will usually be more successful if it carefully targets those projects which are frequently not very expensive but which can make a dramatic difference to the capacity of the existing system.

³ Karpouzis, G, Rahman, A, Tandy, K and Taylor, C, 2007, "The value of CityRail to the NSW community 1997-98 to 2006-07", paper delivered to the 30th Australasian Transport Research Forum

In these circumstances governments should develop a regulatory framework for setting transport prices that encourages a proper consideration of investment proposals. I am pleased to say that in this respect I believe the NSW Government is now providing a lead with the reference that it has given to the Independent Pricing and Regulatory Tribunal for the future regulation of rail fares. But I also think that instead of being constantly held to account for alleged under-investment in transport infrastructure, if governments are seriously concerned about congestion problems then they will need to consider how they introduce various forms of congestion pricing.

In this regard, I think that in future we will need to pay much more attention to the structure of pricing, as well as to the rate of cost recovery. Especially in the case of transport there is a strong case for peak pricing to encourage demand to shift to times of the day when capacity is less strained. This peak pricing is, of course, already common in much of public transport, but it needs to be extended. For example, stevedores work 24/7 when loading and unloading containers from ships, but the road transport industry would prefer to work mainly in business hours when their customers are open to take delivery. The net result is much under-used infrastructure in some hours, and excess demand in peak hours. The solution according to some road carriers is more investment by the stevedores in cranes, but a better solution would be to auction loading slots so that their price reflected their scarcity value. In that case demand would probably shift to be spaced more evenly over the whole 24/7 period. In addition, rail would then become more competitive with road, thus also easing congestion.

Communications

The communications industry is now largely privatised and prices are set competitively to reflect market conditions. In most respects that should not lead to any shortage of infrastructure, but it would seem that governments are still tempted to intervene, although the nature of the market failure that governments wish to address is not clear. The risk is that governments will seek to extend the use of the most advanced technologies to areas where that is quite uneconomic, and where other much cheaper technologies will give almost the same benefits.

Third Party Access

An alternative justification for government intervention in the provision of communications infrastructure, as well as in rail, water, energy, is that investments in trunk systems and associated networks, such as broadband, do give rise to enormous economies of scale. Accordingly governments have tried to promote third party access to these networks. This third party access has, for example, been successful in allowing access to the rail and energy networks, and has promoted competition. Recently the NSW Government has legislated to similarly allow third party access to the water and sewerage pipeline systems. In addition, to promoting efficiency through competition it is hoped that this will encourage new entrants to the water industry who will propose more new innovative solutions, leading to overall savings.

However, experience also suggests, particularly in telecommunications, that there can be considerable difficulty in achieving a price that will encourage both third party access to the network while providing an adequate return to the original investor. Thus in the long run the best solution may be some form of structural separation which separates that

part of any supply chain where there is a natural monopoly. The different producers and retailers can then access that monopoly distribution system on equal terms.

Conclusion

The micro-economic reforms of the past two decades or more were particularly focussed on building more competitive markets for the provision of infrastructure services. Where elements of natural monopoly unavoidably remain, regulatory regimes have been introduced that are intended for the most part to replicate the results that would have been obtained through competitive markets. In these circumstances prices and the return on assets should determine the optimal amount of infrastructure investment. This market oriented approach will certainly provide a far better guide to future infrastructure investment than relying on the unproven and unprovable claims of an infrastructure crisis. Claims that are most likely to lead to a perpetuation of the white elephants of the past and the poor returns on investment that have undermined our economic performance and productivity of capital.