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MEASURING UP: DIMENSIONS OF THE AUSTRALIAN INFRASTRUCTURE SECTOR

The broad and, at times, conflicting meanings given to these terms points to the need for a new, clear and comprehensive definition for this group of assets.

Infrastructure is widely regarded as a major asset class in Australia. Yet it is not recognised as a distinct group of assets in national financial accounts. What is the country's actual infrastructure investment and why is this important? Michael Regan looks at the meaning of the term 'infrastructure' and provides an estimate of the size and relative importance of these assets in national economic terms.

Infrastructure as an asset class is difficult to define and measure. There are several reasons for this. Firstly, the term 'infrastructure' is not defined for statistical or industry purposes nor is it recognised as a distinct group of assets in developed economies such as Australia. The term is used generically to describe the tangible and intangible resources of an enterprise or institution and in industries such as information technology, the term may have different and specialised uses and meanings. Everyone broadly knows what the term means but few can agree on its precise scope.

In Australia, the Private Infrastructure Task Force (PITF) adopted the OECD definition of public infrastructure that refers to transport, communication and electricity production facilities and transmission facilities for electricity, gas and water.[1] Movable plant such as railway rolling stock, hospitals and educational facilities were deemed outside the PITF's terms of reference. These assets are generally included in the definition of terms such as 'economic' or 'social infrastructure'. The term 'social overhead capital' also includes infrastructure assets as well as the human capital that delivers them.[2] The broad and, at times, conflicting meanings given to these terms points to the need for a new, clear and comprehensive definition for this group of assets.

Secondly, infrastructure is not recognised as a distinct asset class in Australia's national accounts and aggregate investment value is ascertained from historical data for the public and private sectors. A complication here is the different accounting standards and asset valuation techniques employed between public and private sector organisations and between government owned enterprises in different states and industries.[3]

Thirdly, infrastructure is a capital intensive investment and significant incremental expenditures are required to increase output and replace assets over long investment intervals. In many sectors, the extension, rehabilitation and upgrading of assets over the life of an investment may exceed the initial capital investment.[4] This is a characteristic of large networked assets such as water supply systems, suburban roads and rail networks. However, the classification of expenditures between capital investment on the one hand, and the maintenance, repair or renewal of existing assets on the other, is difficult to draw. This is exacerbated by differences between the public and private sectors in accounting, taxation and management reporting standards.

A further difficulty lies in identifying the organisations that actually constitute the infrastructure sector. Private sector investments are made by organisations from the contractor and finance sectors, by unlisted entities, joint ventures and unincorporated collective investment vehicles. Not all of these investments are captured by present data recording practices.

Why is it important to accurately measure Australia's infrastructure stocks and current rate of investment? There are three primary reasons: to ascertain whether we are investing enough, to com-

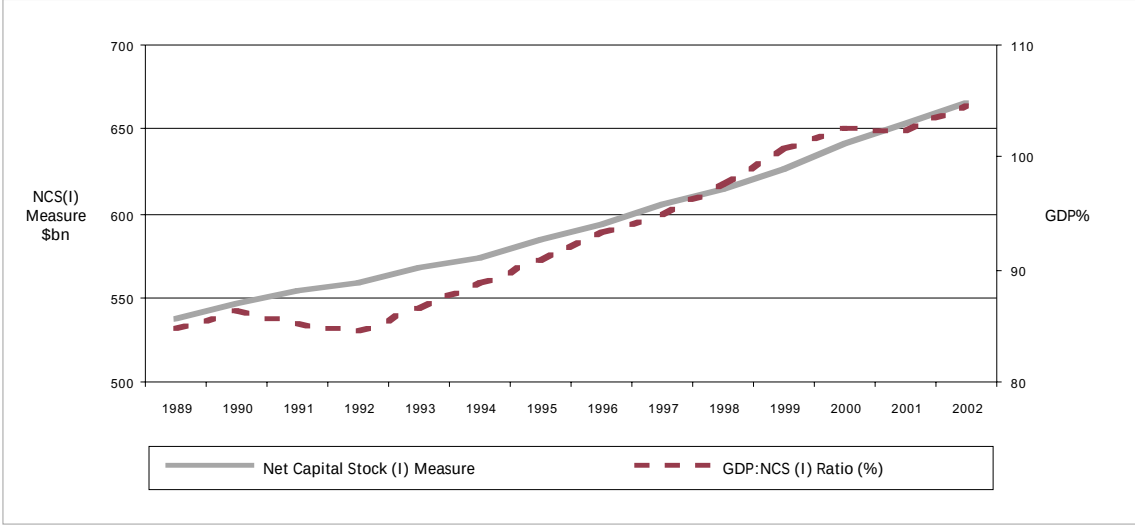

Figure 1 Net capital stock (I) measure, Australia 1988-89 to 2001-02, Source: ABS 5204.0 2000, 2001, Notes: Chain volume measures (ref. year 1991).

pare Australia's performance against international benchmarks and to begin to identify an optimal level of current investment rate if we are to plan for the future.

CURRENT ESTIMATION METHODS

Infrastructure is generally measured using two indicators – capital stock and gross fixed capital formation. Australia's inventory of capital assets is recorded as Gross Capital Stock (GCS) which is the replacement value of a basket of tangible and other assets in use at 30 June each year. Net capital stock (NCS) is GCS less depreciation of fixed capital assets and is used to identify the aggregate value of the Australian economy's capital stocks in its national accounts.[5]

At 30 June 2002, NCS stood at $1, 843 million or around 2.6 times Australia's Gross Domestic Product (GDP). The main components of NCS are commercial buildings and structures (41 per cent), dwellings (38 per cent), plant and equipment (18 per cent).[6] NCS by definition refers to a large number of assets across all industries including livestock, artistic originals, software and asset transfer expenses. The PITF estimated the value of Australia's infrastructure by aggregating NCS data for the public sector and the ANZSIC classifications for the utilities, community services and transport industry groups of the private sector.[7] Using 2002 data, this method suggests that economic and social infrastructure accounted for around 34.6 per cent of NCS which valued Australia's infrastructure stocks at around $637 billion (see Figure 1).

Alternatively, if data is calculated for government, utilities (electricity, gas and water), transport and storage, communications, health and community services sectors (described as NCS-I), the aggregate in 2002 was $665 billion or 37.8 per cent of NCS which equates to around 96 per cent of GDP in that year.[8] This approach suggests that infrastructure is one of Australia's largest asset classes (see Figure 2). However, the GDP: NCS-I ratio indicates that in the past thirteen years, Australia's growth in infrastructure stocks was not keeping pace with growth in GDP.[9]

	A$billion
Non-Dwelling Buildings	765.3
Dwellings	713.3
Listed Domestic Equities	699.8
Infrastructure	665.1
Managed Funds	645.0
Term Debt Securities	441.1
Plant & Equipment	335.0

Figure 2 Capital value of asset classes, Australia 30 June 2002 Source: Regan 2003 Appendix 1, Table 5 (see endnote 11).

The PITF and NCS-I indicators are consistent with asset surveys which indicate total investment in economic and social infrastructure in 2002-03 at around $645 billion.[10] At 30 June 2002, Government and government owned enterprises (GOEs) accounted for 40 per cent and 32 per cent of NCS-I respectively, listed infrastructure companies 3.3 per cent and the private sector 26 per cent.[11]

The NCS indicator is criticised because it doesn't accurately record real depreciation rates, recognise financial lease transactions nor revalued or privatised assets.[12] NCS is not accounted for on a uniform basis between countries and accordingly does not provide an accurate measure for international comparisons.

... in the past thirteen years, Australia's growth in infrastructure stocks was not keeping pace with growth in GDP.

Recent studies suggest that the composition and quality of operation of a nation's infrastructure is as important as, and possibly is more important than, the aggregate investment as a driver of productivity growth.

CURRENT INVESTMENT

The current rate of investment is measured using the gross fixed capital formation (GFCF) indicator which is the economy's annual investment in physical assets such as roads and docks, dwellings and non-residential buildings, plant and machinery. In 2001-02, GFCF in Australia was $158 billion.[13] GFCF in the utilities, communication, transport and general govern-ment sectors (described as GFCF-I) increased in nominal and GDP terms in the thirteen years to 2001-02. Governments and GOEs contributed around 73 per cent of GFCF-I in 2001-02 which is consistent with public sector NCS-I data.[14]

The GFCF-I data for the thirteen years to 2001-02 indicates that private sector investment is growing at a much faster rate than for general government, and infrastructure accounts for a growing share of recent investment spending. Although infrastructure investment in the past ten years has kept pace with growth in the general economy, the long-run trend suggests a steady decline in investment.[15] Around 65 per cent of GFCF-I is accounted for as depreciation of existing capital stocks and the average age of NCS has steadily increased since the 1950s (see Figure 3). Present measurement techniques raise two issues. Firstly, are financial estimates for cumulative and current investment an accurate indicator? Most research and international comparisons are based on NCS and GFCF aggregates.[16] However, this data has attracted criticism.[17] In particular, it is claimed that financial aggregates do not take into account significant differences in asset valuation practices, rates of depreciation, congestion, urbanisation, efficiency of use or the pricing of infrastructure provision between countries and between regional economies. For example, recent evidence suggests that in transition economies, less than half of investment capitalisation is converted to tangible assets.[18]

ALTERNATE MEASURES

Recent studies used physical measures of infrastructure stock in the form of kilometres of road and railways, the number of telephones and electricity generating capacity.[19] Sanchez-Robles used both financial and physical measures in a comparison of developed and developing economies and identified a negative correlation between economic growth and monetary proxies for infrastructure investment but a robust positive relationship using physical measures. The author attributed the difference to errors and distortions inherent in international comparisons using financial measures of investment.[20] Can some of the long-run decline in investment be explained by greater efficiencies in the use of existing assets?

Efficiency operates to influence infrastructure at three levels. Firstly, there is the efficacy of the investment as measured through the net investment rate or the amount of total project costs that finds its way into productive assets. In developed economies,

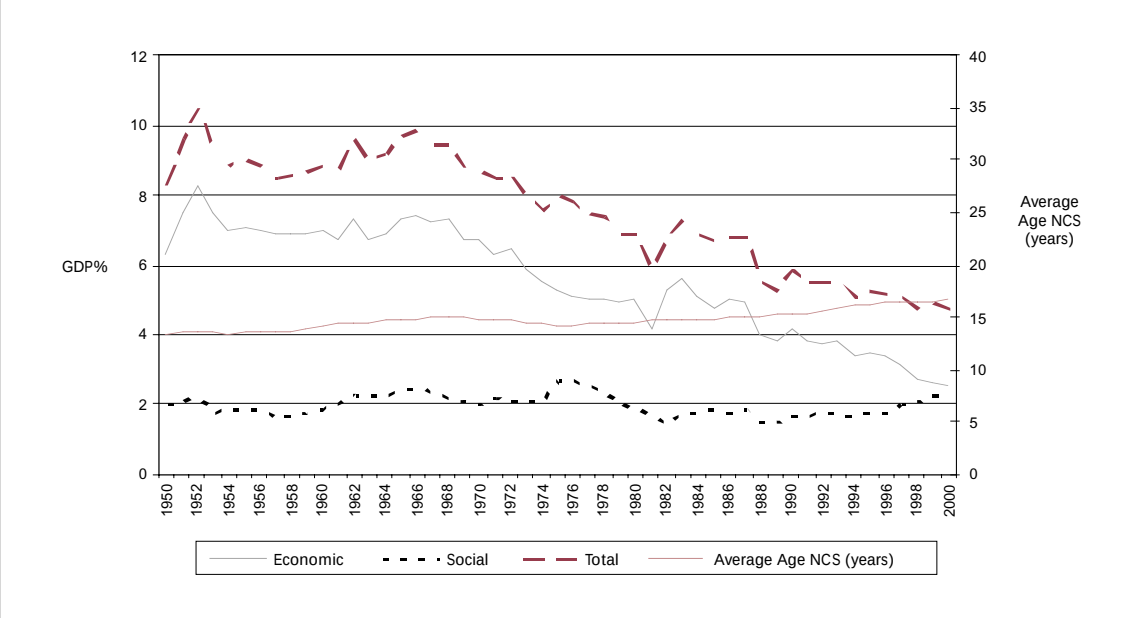

Figure 3 Infrastructure investment 1950-2000. Sources: EPAC Private Infrastructure Task Force, Interim Report, AGPS, Canberra, 1995; ABS, Australian System of National Accounts 2001-02, Cat. No. 5204.0, 2002.

the net investment rate is typically in the range 70-80 per cent and around 50 per cent in many developing economies.

Secondly, the efficiency of the enterprise that houses and operates the business of infrastructure service delivery is critical to achieving a reasonable return. Recent studies suggest that the composition and quality of operation of a nation's infrastructure is as important as, and possibly is more important than, the aggregate investment as a driver of productivity growth.[21] The empirical evidence also suggests that low and middle-income economies that use infrastructure inefficiently also pay a significant growth penalty.[22]

Thirdly, investment in some infrastructure sectors will generate better returns than in others. Studies show that investment in transport and communications assets and services has greater positive effects on output, growth and productivity at national and regional economy levels than investment in other sectors.[23] Investment in these sectors was also correlated with higher private investment and returns at the enterprise level.[24] Investment in social infrastructure generates lower returns than core economic infrastructure although both social and economic externalities are difficult to measure.[25]

AGING INFRASTRUCTURE

The available data suggests that economic and social infrastructure is one of Australia's larger asset classes. However, investment in capital stock has steadily declined over the past 50 years. Whilst the current level of investment is keeping pace with GDP growth, only 35 per cent is incremental investment. The average age of Australia's capital stocks is increasing and independent assessment suggests that Australia's core economic infrastructure is in poor condition.[26]

The data and methodology available to calculate Australia's infrastructure capital stocks and current investment is simply inadequate for this important asset class. The substitution of physical measures of specific groups of assets is an alternative. Nevertheless, measurement is also a problem at the enterprise level in terms of both data capture and individual asset performance. Whilst considerable progress has been made, the prospect of uniform accounting and asset valuation standards between the states, the Commonwealth and the private sector is some time away. This limits the opportunities for financial and operating comparisons and it serves as an impediment to coordinated long-term planning and development of a national infrastructure strategy.

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Although infrastructure investment in the past ten years has kept pace with growth in the general economy, the long-run trend suggests a steady decline in investment.

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14 ABS 2002 see note 10.

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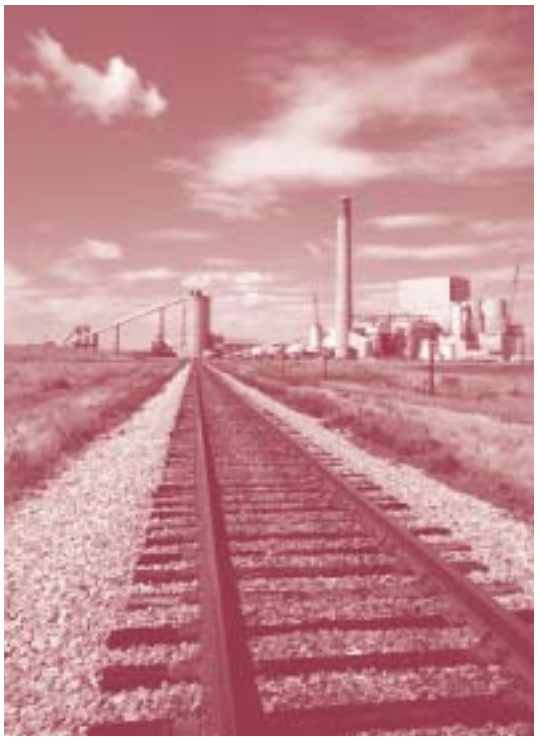

MEASURING UP...

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