

A CENTURY OF AUSTRALIAN COST-BENEFIT ANALYSIS

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A CENTURY OF AUSTRALIAN COST-BENEFIT ANALYSIS: LESSONS FROM THE PAST AND THE PRESENT*

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It is almost de rigueur for North American texts on cost-benefit analysis to begin with some reference to the 1936 US Flood Control Act. Under this legislation, Congress required projects undertaken by the US Army Corps of Engineers to be preceded by an analysis of costs and benefits.

The implication of such references is that cost-benefit analysis was effectively invented in the 1930s in the United States within the context of flood control. However, the antecedents of cost-benefit analysis can in fact be traced much further back in time.

Gramlich (1981, pp. 1-2) reproduces a letter written in 1772 by Benjamin Franklin to his friend Joseph Priestley. Priestley has ostensibly asked for advice regarding a difficult problem that he faces, and Franklin responds by advising Priestley of his own approach to resolving issues.

To gain a comprehensive picture of all the relevant factors that need to be considered in conjunction with each other, Franklin recommends dividing a sheet of paper in two, with one column headed 'pro', and the other 'con'. The columns are populated with entries over 'three or four days', as relevant ideas come to mind. Reasons on either side of this ledger are then compared and struck out where various cons and pros seem to balance each other out. One 'pro' may be worth three 'cons', for example.

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Franklin concludes that, although ‘the weight of reasons cannot be taken with the precision of algebraic quantities ... I think I can judge better ...’ by bringing together all the considerations at one time. Franklin’s so-called ‘Moral or Prudential Algebra’ is an intuitive approach to cost-benefit analysis that has undoubtedly been used by many people, both before him, and since. However, it is also a good example of decision-making based on a qualitative analysis that is similar to many submissions by departments to ministers.

Dupuit (1844) elaborated a numerical approach to estimating consumer surplus. He is therefore often cited as having made the first formal presentation of a cost-benefit analysis using the example of access to a footbridge.

The American experience

Reuss (1922, p. 105) cites the 1808 Gallatin report as an early application of social analysis to public works. Congress is reported to have generally ‘supported public works whose benefits contributed an “annual additional income to the nation” ’.

Shabman (1997) argues that flood control benefit assessment began in the middle of the nineteenth century, rather than the twentieth. He also argues that benefit assessment techniques since then ‘have been selected for their consistency with national flood control project financing policy and with the existing political rationale and support for flood control project construction’. In the middle of the nineteenth century, argues Shabman (1997, p. 19):

... flood control benefits were associated with increased land prices and income potential. ... The economic justification for a levee was established when there was cooperative formation of a levee district and when that district was able to secure local tax receipts sufficient to pay for project costs. A calculation of economic benefits in relation to costs was not part of a formal economic justification.

Arnold (1988, p. 14-15) considers that the 1912 and 1913 Mississippi floods were instrumental in changing the direction of the federal government’s activities on the nation’s rivers, and led to the passage of the 1917 Flood Control Act. Until 1917, federal flood control spending had often been masked for constitutional reasons by Congress as navigation improvements. The 1917 Act also introduced formally the principle of ‘including the requirement for local financial contributions in flood control legislation’, and project assessments were carried out by the US Army Corps of Engineers taking into account not only navigation and flood control for entire watersheds, but also ‘water power’ and other related uses of the water.

In 1936, Congress passed the landmark Flood Control Act that contained the famous phrase that the Federal Government should improve streams for flood-control purposes

‘if the benefits to whomsoever they may accrue are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected ...’. Shabman points out it was in this period of the mid-1930s that ‘the federal agencies adopted the damages-avoided method for flood-control benefit assessment’.

Shabman (1997, p. 21) further refers to (only) one depression era agency – the National Resources Committee – arguing that comprehensive assessment should take account of broader social costs and benefits; possibly due to the influence of A.C. Pigou’s famous 1920 book, *The Economics of Welfare*. However, it was not until 1972 that federal agencies generally adopted the use of landowners’ willingness to pay as the basis for flood control benefit analysis.

A brief history of the rail unification debate in Australia

Although Australia never institutionalised the use of cost-benefit analysis in the way that the United States did in 1936, Australia too can be proud of a much-neglected heritage of early economic analysis.

The story of Australia’s incompatible railway gauges is usually cast around the hoary narrative of the Scotsman versus the Irishman. (Popular depictions claim that the responsible engineer in NSW was a Scot who copied Stephenson’s 4’8½” English gauge, while the Victorian engineer preferred the broader gauge of his native Ireland.) However, near-contemporary, well-placed commentators in both New South Wales and Victoria agree that NSW allowed the construction of a 4’8½” line despite having in place legislation mandating a 5’3” gauge (as previously agreed with Victoria) and against the advice of Earl Grey, Secretary of State for the Colonies (Deane 1902, p. 54; Kernot 1906, p. 75).

Whatever the facts, the two gauges had met at the Murray River border by 1883. Even so, when a lone delegate at the National Australasian convention in Sydney in April 1891 proposed that a Federal Government should be given control of railway systems, or at least power to establish a uniform gauge in the states, he was opposed strongly. Little change in sentiment appears to have occurred subsequently, because sections 53(xxxii) and 53(xxxiv) of the Australian Constitution, which was adopted in 1900, only permit the Commonwealth to control railway transport for military purposes and to construct railways within a state with the consent of that state.

Substantive consideration appears to have first been given to the issue of unification only in 1897. In April of that year, the Premiers of the colonies of NSW, Victoria, and South Australia agreed during the first session of the Australasian Federal Convention (Adelaide, March-April 1897) that their Railway Commissioners should consider the matter and make recommendations.

The issue of unification of gauges was seen at the time of Federation very much in terms of an investment project. Railway Commissioners and politicians were concerned with the expenses of converting their gauges and any additional revenues that the expenditure might generate. However, looked at from a broader, national perspective, imposition (by agreement between the states and the Commonwealth) of standard gauge can also be regarded as a form of a regulatory intervention. Estimating the costs and benefits of the ‘construction project’ of converting gauges thus provides an insight into the net benefit of the proposed ‘regulatory’ change.

Australian railway systems continue to operate on three different gauges: 3’6”, 4’8½” and 5’3”. However, a standard gauge (4’8½”) line now links the capital cities from Brisbane to Perth and north to Darwin. This has been accomplished by converting various sections at different times. Opened in 2004, the connection to Darwin was carried out despite several cost-benefit studies indicating that costs would exceed benefits. Conversion of other sections appears to have also been undertaken on primarily political grounds; probably in the absence of prior cost-benefit analysis.

Costs of unification of the gauges

At their meeting in Melbourne in August of 1897, the Railway Commissioners of NSW, Victoria and South Australia considered a report prepared by their Chief Engineers. Conversion of all 4’8½” gauge (primarily NSW) to 5’3”, including rolling stock, etc, was estimated to cost £4,260,000. By contrast, converting all 5’3” gauge in South Australia and Victoria to 4’8½” was estimated to cost only £2,360,500.

On this basis, the Commissioners concluded that the 4’8½” gauge was to be preferred. Subsequent valuations (for example in 1912-13) showed similar disparities in costs, although the overall costs increased substantially for both gauges.

Benefits

Three main perceived benefits of gauge unification can be gleaned from the extensive debates of the post-Federation period: reduced costs of transshipment of passengers and freight at break-of-gauge points (such as Albury), Defence, and drought relief.

In 1904, a meeting of Railway Accountants in Sydney estimated that the cost of transshipping passengers and freight in Albury was about £1,500 per annum. Discounted at 4 per cent per annum (the cost of borrowing for most railways at the time) over 20 years, this represents a present value of some £20,000 in benefits from the resources saved by unification.

It seems to have been generally accepted from the time of Federation until the second half of the twentieth century that unification of the gauges was a Federal responsibility. The key rationale appears to have been the Defence benefit to be gained; particularly in the light of Lord Kitchener's view that the Australian railway system would favour an enemy more than the defenders.

Prime Minister Billy Hughes certainly pushed the Defence argument strongly during the Premiers' Conferences of the early 1920s. However, the Commonwealth in 1921 was only willing to pay one-fifth of the total cost of a standard gauge (4'8½") intercapital line between Perth and Brisbane. It is therefore at least arguable that the Defence-related benefit of unification was valued at no more than one-fifth of the cost, even after a world war in which European railways had played a major role. Applied to the costs of converting to 4'8½" gauge in 1897, the Defence benefit would have been only £472,000 (an overestimate because the 1897 cost estimates were for standardisation of all lines, not just the intercapital ones).

Billy Hughes also argued that a unified rail system would permit feed to be shipped easily to drought-affected areas – a significant benefit during severe drought years such as 1920. However, NSW Treasurer Jack Lang threw some doubt on the validity of this argument during the May 1920 Premiers' Conference by pointing out that the lack of water in drought-affected areas would also limit the ability of steam locomotives to operate effectively.

It would be reasonable to expect positive network benefits from unification of gauge, with all colonies on the same gauge gaining from increased trade and growth in traffic. However, this possibility does not appear to have gained much prominence until the late 1920s, and was not considered particularly significant even then. Given the dominance of sea and river transport at the time of Federation, it is reasonable to expect that observers at the time would have ascribed small or minimal benefits to network effects.

A social cost-benefit perspective

Drawing together the costs and benefits identified with unification of rail gauges at the time of Federation, it is possible to posit the quantified summary in the table below. For brevity, only the results for conversion of all 5'3" to 4'8½" gauge are presented.

Table 1 Costs and benefits of converting all 5'3" rail gauge to 4'8½"
circa 1900

<i>Costs</i>	<i>£ '000</i>	<i>Benefits</i>	<i>£ '000</i>
Alter permanent way (Vic)	350	Transshipment at Albury	20
Alter permanent way (SA)	139	Reduced delay to Defence Forces	472
Alter permanent way (NSW)	4	Time saving to passengers	-
Alter rolling stock (Vic)	1,257	Reduced passenger inconvenience	0 ^a
Alter rolling stock (SA)	567		
Alter rolling stock (joint Vic & SA)	3.5		
Temporary workshops and machinery	40		
<i>Total cost</i>	<i>2,361</i>	<i>Total benefit</i>	<i>492</i>

^a Mark Twain (1897) gives the journey time from Sydney to Melbourne as 17 hours, but it is not clear how long it took to change trains (and go through Customs) at Albury. The number of passengers passing through Albury is also unknown, so no estimate has been made of the 'time saving to passengers'.

Sources: Australasian Railways 1904; Commonwealth of Australia 1920, 1921.

A sanity check on the result

Despite popular wisdom over the last century about the benefits and desirability of standardising the Australian railway gauges, considered economic analysis shows that any benefits at the time of Federation would have been outweighed significantly by the costs. This finding should not come as too much of a surprise if we take into account some key features of Australian railway systems at the time of Federation:

- Most Australian rail lines at the time ran inland from ports on the coast. The pattern can be seen particularly clearly in the eastern states. These transport routes were designed largely to bring agricultural produce from the hinterland to ports for shipment overseas or to other states. Adoption of a single gauge for such purpose-dedicated lines would have been unlikely to produce the same level of benefits as for the networked railway systems that connected cities in Europe or the USA. (See for example Puffert 2000, including footnote 52, p. 956)
- Most interstate transport still used the 'saltwater highway'. Intercapital railways had some advantage in terms of speed and convenience for the mail and passengers, but freight generally went by sea. It would not have been obvious to contemporary observers that rail would necessarily supplant ships. Indeed, the transition did not occur fully until late in the twentieth century.
- Relatively cheap labour at the time of Federation meant that transshipment costs were not significant (Blainey 1966, p. 251-2).
- In years of sufficient rain, riverboats on the Murray-Darling systems competed with the railways for the carriage of wool and general merchandise (Mudie 1965, p. 72; Blainey 1966, p. 240)

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- Defence-related benefits were probably limited. Some commentators at the time pointed out that differences in gauge could be as much a hindrance to an invader as to the defenders. Queensland Railways Minister Fihelly drew the attention of Billy Hughes at the May 1920 Premiers' Conference to the fact that unification of gauge at 4'8½" in the southern states was of little consequence to the defence of Australia north of Brisbane where the gauge was universally 3'6".

Some lessons from history

The problem of incompatible gauges, and hence the implied wisdom of unifying the various railway lines is embedded in the Australian psyche. The various debates, conferences, studies and calls for unification since the 1890s reflect this belief, as do various publications and popular depictions of the issue: for example Coleman & Tanner (1967, p. 91, 1920 cartoon 'Exorcising the Australian Devil' of break-of-gauge), Blainey (1966, p. 245).

However, considered analysis shows that, given the initial blunder of different gauges, unification, at least at the time of Federation, would not have been sensible. Whether the balance of costs and benefits would have swung the other way in later years is a moot point: the costs of standardisation also rose dramatically in the early 20th century because of increasing wage levels, a Commonwealth tariff on steel (and hence rails) and more extensive railway networks.

The clear lesson is that there is no substitute for rigorous economic analysis as an input into informed decision-making. This is most particularly true for large, 'nation-building' projects where it may seem perfectly obvious to the man in the street that they should proceed.

A second lesson is that Australia, as well as the United States, was capable at the time of Federation of producing analyses that come very close to today's use of formal cost-benefit analysis. The unfortunate aspect of the lesson, however, is that the figures produced by the Railway Accountants in 1904 on the benefits of unification were totally ignored. Subsequent government sponsored studies into unification of rail gauge focused solely on the issues of cost of standardisation, and which gauge was to be preferred, although at least several state governments did do their own internal sums on the financial implications to them.

Unlike the USA in 1936, Australia never institutionalised the use of economic analysis as an input to the political decision-making process. It is not entirely clear how much the USA has benefitted by requiring its regulatory agencies to undertake cost-benefit analysis before proposing regulations, for example. Fuchs and Anderson (1987) conclude that, despite a decade and a half of presidential decrees, cost-benefit analysis

had not become institutionalised in the regulatory process at the agency level, with only 1 per cent of rules being subjected to analysis by the agencies. Hahn and Tetlock (2007) claim that agencies often fail to comply with Office of Management and Budget guidelines for analysis, and raise the possibility of legislative mandating of cost-benefit analysis for important regulations.

However, it would be reasonable to speculate on whether the current burden of red tape in Australia could have been significantly lower had we taken a similar path to that of the USA. It is instructive to read Roger Clarke's (1994) passionate examination of the abortive introduction of the Australia Card scheme by the Minister for Social Security. An excerpt is worth quoting at length:

The over-enthusiasm of the Department for the program is of historical interest. Of ongoing concern, however, was the Department's failure to apply conventional cost/benefit analysis principles to the exercise. Indeed, there was evidence of failure to even understand the concepts involved. In the 1992 [Annual] Report, for example, net present value techniques were not applied, hardware and maintenance costs were overlooked, no costs were imputed for the efforts of other agencies and clients (which in the case of a program of such wide scope is essential), and the bases on which savings were projected into the future were not stated. The most glaring error was the complete omission of the staff costs involved in 137,000 manual examinations of files, 18,000 actual reviews, 10,000 actions against clients, 1,300 queries by clients, 150 formal appeals, 1,500 debt recovery actions (of which 700 involved negotiations with the debtor), and 100 briefings of the Director of Public Prosecutions. This omission was despite statements that 'the real cost has been in the time and effort of staff administering the program' and 'the reporting requirements are stringent and a lot of time and effort is needed to comply with them'...

The Privacy Commissioner expressed similar concerns, albeit more gently ... An external audit [by the ANAO] of the Parallel Data Matching Program also criticised the quality of cost/benefit analysis undertaken, and pointed out that the Act 'requires the tabling of a comprehensive report in both House of Parliament ... Sufficiently comprehensive cost/benefit information had not been included in either Report ...'

Clarke's example highlights the importance of requiring comprehensive analysis of the costs and benefits of regulatory programs. More importantly, it demonstrates that mandating the use of rigorous cost-benefit (or other) analysis will not be effective unless the bureaucracy understands the underlying principles, and applies them of its own volition. Cultural factors are more important, therefore, than formal guidelines and rules.

Current use of Cost-Benefit Analysis in Australia

Ascertaining the extent to which cost-benefit analysis is used by Australian governments is difficult; not least because such analyses are rarely published even if – or particularly if – they are used in the political decision-making process. One example of a well written, published report is that of the Auditor General of the Australian Capital Territory (2002), on the V8 Super Car races that examined the claimed economic benefits of the event.

Despite media and Parliamentary interest over a period of some years about shortcomings in the Regional Partnerships program in the then Department of Transport and Regional Services (DOTARS), little serious economic analysis appears to have been undertaken. There is no evidence of the use of cost-benefit analysis, despite its feasibility being demonstrated by Dobes (2007). Further, the Australian National Audit Office (2007, vol. 2, pp. 413-415) found that departmental officials rarely made use even of basic discounted cash flow analysis to evaluate projects or to advise ministers; partly because of lack of any guidance in the internal procedures manual. Since no cost-benefit analysis was conducted by the Department itself prior to the establishment of the program, its national benefit has never been established.

A comprehensive overview is not possible, but discussions were held with three Australian Government departments – the then DOTARS, Defence, and Health and Ageing – in September and October 2007 in order to obtain a cross-sectional perspective on current practice. AusLink (DOTARS) deals with large infrastructure projects, Defence has a range of large projects that involve significant uncertainty of outcome as well as difficulty in measurement of benefits, and the focus of Health and Ageing is on regulatory activity.

AusLink (Department of Infrastructure, Transport, Regional Development and Local Government)

Australia's federal system has meant the involvement of three tiers of government in the planning, funding, construction and maintenance of roads. Modern roads are not subject to gauge constraints like railways, but even road construction requires a degree of coordinated planning and implementation. Proposals to increase weight limits for trucks in the 1990s, for example, led to the sudden realisation that bridges on local roads might not be strong enough to take weights regularly used on national highways.

Following publication of Green and White Papers in 2002 and 2004 respectively, the Australian Government and the states have adopted a joint approach to planning and developing the land transport component of AusLink within 24 designated 'strategic' transport corridors. Within the framework of these designated corridors, the states are

to identify projects which will be subjected to a broadly based merits test by the Australian Government. The merits test will include some basic cost-benefit analysis, with further, more detailed analysis undertaken during the scoping and development stages.

The AusLink arrangements raise a number of issues in terms of cost-benefit analysis. For example, distributional weights to incorporate equity considerations or to favour freight traffic over passengers (eg by assigning zero value to passenger travel times, but not to trucks) may be used in presenting a business case for a project. An example given in Australian Transport Council (2006, volume 3, p. 82) is that of weighting of benefits by geographic area: benefits accruing to regional residents are multiplied by a weight of 1.5 compared to urban areas whose weight is only 0.5. It is professionally accepted practice, where cost-benefit analysis is adjusted in an arbitrary way such as this, to present both adjusted and unadjusted results to ensure transparency; but this course of action does not appear to be recommended by the Australian Transport Council.

Another major issue is the fact that Commonwealth funds are allocated to road and rail projects within designated corridors. It is possible that other road and rail projects – for example, within congested cities – would generate greater national benefits than those within the corridors, but these are not considered because they fall within the purview of the states. Allocation of funding on the basis of jurisdictional differences risks the achievement of second-best outcomes nationally, even if AusLink funding decisions are based in future on genuine cost-benefit analysis.

In some ways, the proposed implementation of cost-benefit methods under the second stage of AusLink from 2009-2010 is simply a catch-up to the 1936 United States Flood Control Act. Nevertheless, the AusLink approach to infrastructure investment is a major step forward. It can only be hoped that similar approaches can be adopted in other areas of Commonwealth-State funding and regulatory policy.

The health sector

Discussion with senior officials of the Department of Health and Ageing indicated that the dominant analytical paradigm in the health sector is cost-effectiveness analysis, rather than cost-benefit analysis. Indeed, the Department has only one or two officers with a background in cost-benefit analysis.

Recommendations on listing drugs under the Pharmaceutical Benefits Scheme, for example, are made by committees on the basis of qualitative judgement, or using measures such as Quality Adjusted Life Years (QALY). QALYs are measures of health that combine the time that a person can be expected to survive and the state of

health that the person can expect to enjoy till their death. Drugs and other treatments are compared in terms of cost per QALY. Boardman (2006, ch. 17) and Drummond (1997, chs. 5-6) provide more detailed expositions.

In general, cost-effectiveness analysis (CEA) compares the cost of a particular action or treatment with a single output such as a QALY. For specific treatments, outputs can also be more specific measures such as reduced blood pressure, or the improvement in cholesterol levels. CEA is more limited in scope than cost-benefit analysis because outputs are not monetised. In particular, CEA provides ratio measures only (cost/output), so that comparisons between treatments may be bedevilled by scale effects (see Boardman 2006, ch. 17). More seriously, CEA does not permit comparisons between projects with different outputs: for example, a hospital versus a school.

It is possible that decision-making in the health sector is subject to a form of path dependence. The phrase ‘path dependence’ – sometimes referred to as ‘lock-in’ – has come to have multiple meanings; from the broad concept of ‘history matters’ to the more narrow one of ‘institutions are often self-reinforcing’. A popular example among economists (eg Krugman 1994, ch. 9) is the QWERTY keyboard: it has been claimed that the keyboard was designed to slow down typists, to avoid jamming in early mechanical typewriters. But the keyboard has persisted into the electronic age because typing schools have continued to teach on that basis, and despite the well publicised existence of a more efficient Dvorak keyboard in the 1930s. Much of this view is debunked by Liebowitz and Margolis (1990), but the debate about similar cases continues.

Because past analyses and decisions in the health sector have been based predominantly on cost-effectiveness analysis, academics and government advisory committees are more familiar with it, and may consider it to be the ‘correct’ approach from the perspective of the health sector. Another factor that probably results in path dependence is that the data and information collected by health bureaucracies continues to be tailored to the needs of cost-effectiveness analysis (because that is what is used), but does not include the sort of data (eg willingness to pay) that is required for cost-benefit analysis. So switching to cost-benefit analysis would take a lot of effort compared to continued use of cost-effectiveness analysis.

The health system therefore continues to perpetuate the use of cost-effectiveness analysis. Yet it is clear from the academic literature that cost-benefit studies are in fact feasible, despite the relative neglect of the method. Studies such as that by Abelson (2003) are still fairly rare.

An aversion to placing monetary values on (statistical) life is sometimes claimed to be an impediment to the use of cost-benefit analysis in the health sector. While some

reluctance on the part of medical practitioners is understandable, health administrators routinely make decisions that determine the provision of treatments and hence the probability of saving lives, or at least affecting the quality of life. So in actual fact, implicit values are placed on human lives by medical administrators and government medical committees.

An example of implicit valuation of human life used by medical practitioners is the triage system. In resource-constrained emergency situations triage may require a trade-off that allows some lives to be lost in order to preserve others. Similarly, a hospital may purchase a sophisticated machine to treat a relatively small number of patients who have rare life-threatening disease; possibly at the cost of increased risk of loss of life in other sections of the hospital due to a shortage of drugs or other less iconic equipment.

Further, the National Health and Medical Research Council (2001) reports monetary thresholds per life-year gained that are used as guidelines by the Pharmaceutical Benefits Advisory Committee to recommend pharmaceuticals that qualify for government subsidies. In other words, the guidelines specify maximum costs per life saved as a means of deciding whether a specific drug is sufficiently cost-effective to approve. A similar approach is used in the UK where the National Institute for Health and Clinical Excellence 'rarely accepts that drugs are cost-effective if they cost more than £25,000-35,000 per QALY' (*The Economist*, 25 February 2006, p. 53).

Greater use of cost-benefit analysis in the health sector would simply make explicit currently implicit values placed on (statistical) life. However, even if this were a step too far, it is not clear why the health sector uses relatively unsophisticated forms of cost-effectiveness analysis. In particular, greater use could be made of Data Envelopment Analysis (see below) which permits comparisons between treatments or projects with multiple inputs and outputs.

Defence

The allocation of Defence resources between the many competing (and sometimes complementary) demands for weapons platforms, training, ammunition, infrastructure, repair and maintenance facilities, etc, is best viewed from the perspective of three broad levels:

- The Strategic Outlook (what are the threats to Australia?)
- Force Structure and Capability (how to address the threats?)
- Acquisition (which specific equipment?)

Greater attention has been given in recent years to increasing the efficiency of acquiring equipment: the lowest, ‘procurement’ level in the decision-making hierarchy. In particular, the Defence Materiel Organisation has pursued a more commercial approach to managing the process of procurement. A few analytical studies have also appeared, including those by Ergas and Menezes (2004), Throsby and Withers (1999), and Thomson (2003) on Defence spending.

Force Structure and Capability Analysis, however, appears to be largely based on qualitative analysis by various committees. Although the process is not transparent to external observers, anecdotal material gathered from various sources suggests that relatively rigorous cost-effectiveness analyses – let alone cost-benefit analysis – are seriously lacking. Given the development and use of some of these techniques under United States Defense Secretary Robert McNamara in the 1960s (Hitch, 1967), and the contributions of McKean (1963), this is surprising.

As the need for better integration of weapons systems in the three Services grows, there is an increasing probability of a form of path dependence unduly influencing the purchase of equipment, or the disposition of forces. Replacement of radio equipment by the Army, for example, may well be constrained by the type and capabilities of existing older equipment used by the Navy or Air Force unless all are replaced together on the basis of common, complementary objectives. This implicit constraint on obtaining compatible equipment could in effect condemn the Defence Forces to ‘fighting the last war’.

While a purely budgetary perspective or constraint might conclude that it is possible to only replace the Army radios, a full cost-benefit analysis that took into account the benefits of full communications inter-operability, as well as newer technology for all three Services, would be more likely to provide a better guide to overall Defence priorities. In particular, unless a technique such as cost-benefit analysis is used, there is a risk of large ‘nation-building’, iconic projects crowding out the ‘boots and bullets’ that are essential for on-the-ground support of personnel in conflict situations. A similar problem appears to have beset American forces in Iraq: although well equipped to fight conventional high-intensity wars, they, initially at least, lacked the intelligence resources and counter-terrorism capability necessary for low-level urban conflict.

Like the health sector, Defence relies on committees to make recommendations, presumably based mainly on qualitative or purely budgetary analysis. Despite the complexities, however, it is at least arguable that considerable scope exists to undertake cost-effectiveness analysis.

About 30 outputs are identified in the Defence budget. The cost-effectiveness of increasing specific outputs could be assessed using some index of their contribution to achieving overall strategic objectives, or their destructive capacity (sometimes

expressed as ‘kill capability’). Focus groups of experts could be used to generate such indexes; that is, using a form of the Delphi method (http://en.wikipedia.org/wiki/Delphi_method).

Data Envelopment Analysis (DEA) could also be used where there are changes in more than one output or outcome. Using linear programming techniques, DEA measures the productive efficiency of different decision making units (which could be a weapons platform, or set of outputs) relative to a common production frontier. See, for example, Coelli et al (2005). In effect, DEA is a form of cost-effectiveness analysis that permits comparisons of more than one output at a time.

Cost-benefit analysis may also be feasible for some Defence projects or issues. So-called contingent valuation methods (essentially questionnaires designed to estimate the ‘willingness to pay’ of respondents) can be used to estimate non-market items such as the preservation of Kakadu National Park or the reduction of risk to life. Boardman et al (2006, ch. 14) provide a good overview of the approach. The Defence Science and Technology Organisation (1999) appears to have at least proposed work to assess the use of insensitive munitions using contingent valuation methods, but little other material of a similar nature appears to be available for defence-related studies.

Time for a renaissance of Cost-Benefit Analysis?

Apart from the perennial debate over national Defence, Australia faces major issues such as Climate Change and an ageing population in the near future. Soon after its election in November 2007, the Australian Government signalled its intention to address education, provision of health services, increased infrastructure investment, provision of faster broadband services, water supplies, mitigation of greenhouse emissions, etc. These issues encompass a very wide range of competing and major calls on national resources.

Unless some form of comprehensive, analytically consistent and comparable decision-making process is adopted, resources will not be used in the most efficient way possible, reducing Australia’s standard of living unnecessarily. Given the number and magnitude of issues facing us, this is not an inconsequential matter.

Cost-benefit analysis is the only method that allows comparisons between sectors such as roads, hospitals, Defence, etc, as well as being capable of comprehensive analysis that takes into account factors such as environmental effects and other social costs and benefits. It is therefore best placed for ‘whole of government’ determination of spending priorities.

Fostering increased use of Cost-Benefit Analysis

Even if the desirability of applying cost-benefit analysis to government decision-making about projects and regulatory proposals is generally accepted, implementation of such a policy is likely to be far from easy.

One means of introducing the use of cost-benefit analysis into the provision of public service advice to ministers would be to mandate its use for all proposed regulations or projects.

But compulsion is always problematic. Monitoring and enforcement of rules or regulations is generally resource-intensive. And, more often than not, bureaucracies treat rules as mere impediments, or, at best, a necessary evil that needs to be recognised formally but circumvented in practice: ‘public checking in, private checking out’ in the management argot.

Boyfield (2007) summarises the reasons for the failure of Regulatory Impact Assessments (RIAs) in Britain to live up to expectations:

- RIAs are often executed as a bureaucratic, routine task rather than being used to shape and inform the whole regulatory approach.
- Cost-benefit analysis of proposed regulations can be poor.
- RIAs are treated, in the words of one trade body affected by burdensome regulation ‘as a bolt-on extra designed to justify a regulation’.
- Too many RIAs fail to assess the impact of non-compliance with regulation.
- Parliament is failing to scrutinise adequately many of the Statutory Instruments (the mechanism by which most regulations are enacted).
- There are few incentives for civil servants to undertake rigorous RIAs.

An analogous situation in Australia has been the creative approach of the bureaucracy to evading the more prescriptive procurement guidelines imposed on it in January 2005. There is similarly little hope of positive outcomes from imposing the use of cost-benefit analysis on a potentially uncooperative Australian Public Service.

If the use of cost-benefit analysis is to become a genuinely organic part of government decision-making processes, it needs to become a naturally desirable and accepted part of the bureaucratic culture. However, adoption of a relatively persuasive approach – rather than compulsion - is likely to require a sustained effort over a lengthy period of time. And even if the bureaucracy ultimately comes to appreciate the utility of cost-benefit analysis, it is necessary to also overcome any scepticism or resistance at the political level. It is often at the political level where the findings of an objective cost-

benefit analysis can be the least welcome when a government has a specific, predetermined agenda.

Conceptually, there are two major approaches to fostering an increased usage of cost-benefit analysis in Australia. The costs of producing and using cost-benefit studies can be reduced (a shift downwards of the supply curve for cost-benefit studies), or demand for such studies can be increased (a shift upward of the demand curve). Achievement of reduced costs and increased demand can be promoted in a number of ways.

Reducing the cost of producing cost-benefit analyses

1. One reason why cost-benefit analysis tends to be relatively costly is the lack of readily available ‘plug-in values’. (They are sometimes called ‘canonical’ shadow prices, where ‘shadow prices’ refers to estimated costs and benefits in areas where undistorted market prices are unavailable. One example is the social cost of noise imposed by an aircraft on residential areas.) An important initial step would therefore be to develop a database of useful ‘plug-in’ values relevant to Australian conditions. There is no apparent reason why the database could not be used by the public (including academics), or why credible (perhaps screened) values could not be contributed by academics and others to a government database.
2. Training in cost-benefit methods would be unlikely to create instant experts in the Australian Public Service, but it would help more public servants to understand the analytical framework. Even if public servants were to rely on specialist consultants for some time, they would gain the advantage of a better understanding of the results produced. Public servants would then more easily be able to interpret and translate results into forms more meaningful and useful to Ministers.
3. Handbooks of cost-benefit analysis have been produced by a number of state agencies, as well as by the Commonwealth Department of Finance and Administration (2006). While these handbooks are useful in themselves, and help raise general consciousness about the technique, they necessarily provide only a summary of the theory that is already extensively available in various textbooks. A particularly useful extension for many agencies, however, would be a manual that contained a collection of practical (even if simplified) examples of cost-benefit analysis to allow agencies to gain confidence by being exposed to real-life techniques that can be easily copied.
4. Some degree of standardisation of methodology and ‘plug-in values’ across agencies is likely to be required if ministers are to be able validly to compare projects in different sectors of government activity. For example, North American practice seems to favour inclusion of the cost of deadweight loss due to taxation (marginal excess tax burden), but Australian cost-benefit analyses do not appear to include it: guidance on a ‘correct’ approach would be useful. Design and use of

Contingent Valuation Method surveys, values of statistical life and guidance on the level of discount rates would also reduce search costs for agencies.

5. A library of cost-benefit studies commissioned by all state and Commonwealth governments would provide a very useful resource for agencies. More importantly, a library would help increase transparency. Ideally, the 'library' should be fully open to the public, although particularly sensitive studies could be quarantined for internal government use only.

Encouraging greater use of cost-benefit analysis

As well as lowering the cost of cost-benefit studies, demand for them can be encouraged in a number of ways:

1. Just as training courses can assist public servants to familiarise themselves with cost-benefit analysis concepts and methodologies, focused presentations to ministers and their staffs would be a useful first step in promoting a wider community of knowledge and interest.
2. Greater attention to the needs and requirements of ministers would ensure presentation of results in ways of greater relevance and interest to them. Distributional impacts (by income, state, occupation, etc), including estimates by electorate if necessary, would assist decision-making, as well as increasing demand for cost-benefit analysis.
3. Another example is the provision of 'comparators' to ministers, rather than presenting isolated results from a single study. This approach would help ministers appreciate the opportunity costs of their decisions in Cabinet. For example, a study of a road project could be presented together with one previously carried out for a hospital or school to illustrate the order of magnitude of forgone alternatives.
4. Areas such as Defence lack a tradition of cost-benefit analysis, and hence of established methodologies and plug-in values. Formation of an Expert Group of interested economists could be an avenue for developing 'lateral' approaches that can be applied in ostensibly unrelated areas. One example of a lateral approach is the application by Dobes (2007) of transport analysis to regional issues to make the analysis tractable. Another possibility that may bear further exploration is to develop 'kill capability' indexes along the lines of the QALY method used in health to analyse the effect of competing Defence projects.
5. The Department of Finance and Deregulation has recently begun to evaluate a selection of major programs. Use of ex post cost-benefit analysis, where appropriate, as an evaluation tool, would be a useful extension.

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6. A regular forum of practitioners from diverse backgrounds (eg health, transport, regulators, etc) could help sharpen agencies' focus on issues of common concern and increase cross-fertilisation of ideas on analytical methods.

Institutional considerations

Fostering a cost-benefit analysis culture in government would be more likely to succeed if supported by appropriate institutional arrangements. Some possibilities include:

- Designate a Minister to 'champion' the use of cost-benefit analysis for decision-making within government
- Charge an agency like the Office of Best Practice Regulation (transferred to the Department of Finance and Deregulation in December 2007) to be a repository of information and to provide basic technical support and training to public servants.
- Ensure that all agencies collect appropriate data that is required as input to cost-benefit analyses in their areas of responsibility
- Publish all cost-benefit studies on a government website to ensure transparency
- Establish a central database of 'plug-in' values to facilitate the conduct of cost-benefit studies
- Establish or designate a single source of datasets for key assumptions regarding variables such as past and expected inflation, GDP growth, population growth, etc.
- Establish basic standards such as reporting of calculations, assumptions made and data used; to the extent that others would be able to replicate the results, if required.
- All studies should identify both the resource and financial costs of undertaking the study
- Establish a group of experts to monitor or 'peer-review' cost-benefit studies
- Provide guidance on shadow prices to be used (eg discount rates) with departures from standards requiring an explanation that is supported by the Office of Best Practice Regulation
- Establish an awards scheme to encourage agencies to produce best practice cost-benefit analyses

Concluding remarks

Just as individuals maximise their income from investments in shares by choosing those with the highest expected net yield, governments can maintain social returns on

expenditure (and hence the standard of living of the community) at the highest level possible by choosing projects and policies with the highest levels of net present value.

Because governments depend on considered advice from their officials in making decisions about expenditure, they will be best served by a Public Service that is comfortable with commissioning, or itself undertaking, economic analysis that complements purely budgetary perspectives.

However, considerable cultural change is a prerequisite for the successful implementation of improved analyses of alternative uses of government funds. Training, data collection, and a degree of standardisation in approach are essential. But sustaining such a change in the long term also requires a more open approach, including publication of results of cost-benefit studies in order to make them familiar to the public and to help governments to justify their expenditure decisions.

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