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Victoria UNIVERSITY OF WELLINGTON Te Whare Wānanga o te Ūpoko o te Ika a Māui
SCHOOL OF GOVERNMENT Te Kura Kāwanatanga

Editorial Note

Nations cannot flourish without well-designed physical infrastructure. This includes transport infrastructure (e.g. roads, railway networks, cycle paths, seaports, airports and navigation systems), water management infrastructure (e.g. water supply, sewage collection and disposal of waste water, drainage systems, flood control and irrigation), energy infrastructure (e.g. generation plants, power grids and pipelines), and communications infrastructure (e.g. phone services, fibre-optic cable, undersea cables and satellites). Infrastructure is critical not only for the production and distribution of goods and services – and therefore for economic development and prosperity – but also for social interaction and connectedness, environmental protection and sustainability, and human well-being.

Yet the provision of infrastructure poses many complex and challenging policy issues. For instance, what is the appropriate level and mix of infrastructure investment? How should such investment be funded and managed? How should access to, and use of, infrastructure be rationed and priced? What discount rate should be used in evaluating the costs and benefits of particular infrastructure projects? Is it possible to avoid inefficient forms of path dependence, such as long-term 'lock-in' to antiquated technologies or undesirable patterns of human settlement? To what extent should infrastructure be designed to cope with potential long-term developments, such as the impacts of climate change (e.g. more severe storms, sea level rise, and heat waves)? And what lessons are there from both domestic and international experience about the strengths and weaknesses of different decision-making models with respect to infrastructure investment and management? In particular, is it possible to construct policy processes that reduce the tendency for negative externalities to be underpriced and for users of infrastructure to be inappropriately subsidized?

These and related questions were the subject of a well-attended workshop hosted by Motu and the Institute of Policy Studies on 13 July 2010 in Wellington. The workshop brought together researchers, policy advisers and decision makers from around the country. Amongst other things, the event provided an the opportunity to consider the findings and policy implications of a major research programme on infrastructure issues led by Motu and funded by the Foundation for Research, Science and Technology.

This special issue of Policy Quarterly includes most of the papers presented at the infrastructure workshop. It commences with two scene-setting contributions, both by Arthur Grimes. These papers summarize the aims of the research programme and its main empirical findings, and explore some of the major policy issues generated by the research – in particular, the problems of uncertainty, discounting, strategizing and priority-setting. Following this are five contributions covering a range of policy issues: John Boshier assesses various methods for evaluating infrastructure proposals; Stephen Selwood addresses the problem of project prioritization and the lessons from New Zealand's experience (especially in the transport sector); Andrew Coleman explores the problem of path dependence created by specific urban forms, and, with particular reference to Auckland, considers the challenge of increasing public transport use in low-density cities; Lew Evans discusses problems of decision-making with regard to infrastructure investments in the context of various kinds of uncertainty, such as rare events (like major earthquakes), and volatility in economic conditions (including uncertain demand for infrastructure services); Colin Crampton describes the approach of the New Zealand Transport Agency to planning and providing land transport infrastructure, using the state highway network as an example; and Michael Deegan outlines Infrastructure Australia's approach to improving the coordination and quality of infrastructure investment across the Tasman.

Collectively, these papers provide a rich source of information, evidence and analyses. They contain much wisdom, insight and practical advice. They deserve careful attention by all those involved in the funding, maintenance and governance of this country's infrastructure.

This issue of Policy Quarterly also includes three articles on three very different topics. First, Todd Bridgman explores the (limited) contribution of university academics in New Zealand to public debate about the global financial crisis (GFC) during 2008-09. His analysis is sobering. Despite the gravity of the GFC and the significant reservoir of relevant knowledge within the academic community, the public voice of the universities was decidedly muted. Few of those with relevant expertise – whether in accounting, economics, finance, law, management and public policy – contributed to public discussion. Instead, public commentary was led from elsewhere, in particular by economists employed by the major banks. Bridgman examines the reasons for the relative silence of academics, why this is inconsistent with the 'critic and conscience' role of universities, and what should be done to rectify the problem.

Harshan Kumarsingham poses a very different question: has the move to proportional representation since 1996 really diminished the power of the executive, including that of the prime minister, or does New Zealand remain, in effect, an 'elected dictatorship'? Drawing on various recent examples, Kumarsingham argues that the power of the executive remains very much alive, and goes on to consider some of the ways in which this power might be better checked and fettered. The prospects, however, do not look good – all the more so given recent events, such as the enactment in September 2010 of the Canterbury Earthquake Response and Recovery Act which, amongst other things, gives ministers the power to exempt, modify or extend virtually any statute by Order-in-Council in pursuit of the general purpose of facilitating a response to the earthquake.

Finally, Clair Mills explores how economic recessions affect health outcomes, and in particular the implications for inequalities in health. Overall, the evidence suggests that recessions impact negatively on the key determinants of health, such as employment and income, and that the effects fall differentially on population groups, with the least advantaged suffering most. Appropriately targeted policy measures can help to mitigate such outcomes, but fiscal pressures and limited political will are likely to constrain their application. Reducing health inequalities, therefore, can be expected to remain a perennial challenge.

Jonathan Boston

Arthur Grimes

INFRASTRUCTURE
New Findings for New Zealand

Research programme

Infrastructure is a crucial input into economic production, and provision of infrastructure is a key avenue through which government may materially raise economic productivity. Recognising the importance of infrastructure investment, the Foundation for Research, Science and Technology granted Motu and its research partners a four-year research grant to examine the impacts that infrastructure investments have on New Zealand's economic development.[1] The programme has resulted in a range of empirical research studies that examine the impacts of specific and general infrastructure investments in this country. It has also resulted in contributions addressing theoretical and funding aspects related to infrastructure investment.

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This article summarises the aims of the programme and its key empirical findings, relating these findings to prior theoretical and empirical work. A companion article in this issue ('Planning new infrastructure: some issues') examines some of the theoretical and funding issues raised by the programme.

At the time the programme was devised, it had become widely recognised that the quality of New Zealand's infrastructure had fallen behind that of many other developed countries. The 2004 OECD report on New Zealand raised significant questions about the quality of land transport, electricity and telecommunications infrastructure. The World Economic Forum *Global Competitiveness Report* ranked New Zealand 20th of 29 developed countries for overall infrastructure quality.

As a New World country, infrastructure had to be built largely from scratch from the early 19th century onwards. Without modern economic tools, strategic judgements were made about which investments to undertake. The infrastructure investments of Julius Vogel in the 1870s stand out as transforming the New Zealand economy. Factories and mines mushroomed around the railways, and

whole provinces and industries opened up for production (Grimes, 2009b). Since then, productive infrastructure (including roads, rail, bridges and telecommunications) and social infrastructure (including schools, hospitals, community facilities) have further transformed our economy and our society.

Prior to the current programme, there had been little evaluative work examining the benefits (relative to the costs) of investing in many of these infrastructure projects. The research programme aimed to conduct a range of evaluations in order to help answer questions such as: Do we have too much, just enough, or too little infrastructure investment? How large are the costs to productivity and to broader well-being of having the wrong amount, or the wrong type, of infrastructure? Is inadequate infrastructure placing a material constraint on New Zealand's economic and social development? What would be the pay-offs to relieving those constraints?

Land values rose considerably (relative to comparable land elsewhere in Auckland) in areas closely adjacent to the new motorway exits, with this effect tailing off to zero at around 7 kilometres from an exit.

The programme has included analyses of: transport infrastructure (Grimes, 2007; Grimes and Liang, 2010; Grimes and Young, 2010a; Fabling, Grimes and Sanderson, 2010); telecommunications infrastructure (Grimes, Ren and Stevens, 2009; Grimes, 2010b; Howell and Grimes, 2010); water infrastructure (Grimes and Aitken, 2008); social infrastructure (Roskruge et al., 2010); primary processing infrastructure (Grimes and Young, 2009); impacts of legal (planning) constraints on infrastructure outcomes (Grimes and Liang, 2009); infrastructure impacts on national and city productivity (Maré, 2008; Maré and Graham, 2009); and effects of local authority infrastructure investments on economic outcomes (Cochrane et al., 2010). Analyses of funding mechanisms (Coleman and Grimes, 2010a and 2010b) and theoretical issues involved in *ex ante* assessments of infrastructure (Grimes, 2009a, 2010a) have addressed additional conceptual issues.

Importance of infrastructure

New infrastructure is normally designed to increase the productivity of firms and/or increase amenity values for people who make use of the facility. The investment may relieve an existing bottleneck (e.g. a

new road may reduce traffic congestion) or may create new opportunities (e.g. a fibre broadband connection may open up the possibility for international electronic marketing). As discussed in the companion article, the latter may create increasing returns to scale opportunities that lead to enhanced benefits. However, even the former type of investment may lead to increasing returns, especially if co-ordinated with other investments servicing the same community.

In either case, if the investment has a localised effect it will raise land values in the affected locality, since firms and/or households will be prepared to bid more to locate in that area. In such circumstances, the change in land value consequent on a new infrastructure investment can be taken as a measure of the net present discounted value created by that investment (Roback, 1982; Haughwout, 2002). The insight that changes in land values reflect value creation has been used in a number of the studies in the programme.

Other forms of infrastructure have more widespread impacts that are not confined to a defined local area. Investment in telecommunications technology that enhances broadband access is one such form of investment. To measure these benefits, one can examine impacts on individual firm productivity to assess the productive benefits arising for firms. The benefits of social investments may be examined by recourse to survey data on individuals; we utilise these approaches in some of our studies.

Empirical findings: specifics

Transport

The programme examined three specific transport investments and provided background information about transport issues in general (Grimes, 2007). The three specific investments related to Auckland: the Northern Motorway extension from Albany to Silverdale (Orewa), the upgrade of Auckland's Western Line passenger rail service, and the opening of Port of Tauranga's inland port at Southdown.

The Northern Motorway research (Grimes and Liang, 2010) utilised the change in land value methodology, comparing relative changes in land values according to their degree of proximity to the newly-opened motorway exits. *Ex ante* cost-benefit ratios for the motorway extension were favourable, with benefit-cost ratios of around 5. The difficulty that such *ex ante* analyses face is that they may not adequately capture the full range of benefits that a major new investment offers, especially where options for as yet unknown activities are created (see 'Planning new infrastructure: some issues', *infra*). By providing motorway access from the heart of Auckland to the Whangaparoa Peninsula, new work, leisure and residential opportunities were greatly expanded.

While there were major cost overruns on the project, we find that there were also extra benefits relative to what were expected *ex ante*. Population and employment growth, especially around the Peninsula and around Warkworth, were very strong. More generally, areas within 3 kilometres of new exits experienced strong rises in population and employment. Land values rose considerably (relative to comparable land elsewhere in Auckland) in areas closely adjacent to the new motorway exits, with this effect tailing off to zero at around 7 kilometres from an exit. These responses are as one would expect to observe if the new infrastructure were highly valued.

Our assessment of the benefits was such that the benefit-cost ratio of the extensions was estimated to be at least 6, and possibly as high as 20, even after the considerable cost overruns were accounted for. The high ratios imply that initial analyses of benefits were conservative.

Similarly, we find benefits from upgrading the Western Line passenger rail service to Waitakere City (Grimes and Young, 2010a). We find that the price of houses near existing Waitakere City stations rose in the order of 6% to 8% at the time of the announcement of Auckland's rail upgrades; properties near the urban redevelopment at New Lynn rose by up to 10%. The upgrades will substantially improve the frequency of Western Line services and improve amenity values associated with the New Lynn town centre.

The third transport project that we have examined concerns freight: the opening of Port of Tauranga's inland port (Metroport) in Auckland at Southdown (Fabling, Grimes and Sanderson, 2010). This new port facility opened up the opportunity for Auckland (and Northland) firms to ship their goods to a port in the southern part of Auckland rather than all the way to Tauranga, in addition to the option of using Port of Auckland (which subsequently also opened an inland port, in Wiri). The analysis shows considerable uptake of the new port by existing export firms, particularly by larger firms and those exporting lower value-to-weight cargoes (e.g. commodities). Many existing exporters chose to add Metroport to Port of Auckland (rather than switching ports entirely), so increasing their shipping options (i.e. increasing the frequency of ships that they can access for their exports).

... firms with broadband had higher productivity than firms without broadband, after controlling for observable differences across firms.

Telecommunications

New Zealand firms and households can access the internet through a number of means: dial-up, copper wire-based broadband (ADSL), mobile broadband and multiple forms of cable/fibre. Current policy is to substantially upgrade the fibre offering across the country so that the bulk of consumers can gain access via a fast fibre connection. Because this is a new technology, it is difficult to measure the benefits that may flow from such an upgrade; by contrast, the (large) costs are apparent.

The infrastructure research programme attempted to provide new information to address the benefit side of the equation by examining differential effects of internet access on individual firm performance (Grimes, Ren and Stevens, 2009). This research was enabled through access to Statistics New Zealand's prototype Longitudinal Business Database (LBD), and particularly to the 2006 Business Operations Survey (BOS), a Statistics New Zealand survey of approximately 6,000 firms. The research provided descriptive statistics of how firms with different types of internet access utilised the internet for their business operations, and estimated the impact on firm performance arising from a switch to broadband from dial-up access, or a switch to fast (cable/fibre) broadband from slow broadband (ADSL/mobile).

The descriptive statistics showed that firms with cable/fibre connections made much greater use of the internet for business purposes than firms with other forms of broadband. These latter firms in turn made greater use of the internet than those with only dial-up (or no internet access at all). Firms with cable/fibre were especially over-represented amongst firms that had a web page, purchased goods and services on the internet, sold goods and services on the internet, had high ratios of international sales as a proportion of internet sales, had high tourism-related sales, and entered new export markets.

The research identified that firms with broadband had higher productivity than firms without broadband, after controlling for observable differences across firms. However, it could find no additional impact of cable/fibre relative to other forms of broadband access on firm productivity. This latter result may be because: (a) recent adoption of cable/fibre means that productivity benefits had not yet materially affected firm performance for many firms; (b) fast broadband may have benefited only a small subset of firms in 2006, so did not materially influence the overall results; (c) the data did not allow for a clear delineation in speeds between differing measures of broadband type; or (d) there may in fact be little or no effect of switching from one type of broadband to another, at least for most firms. The study could not differentiate between these explanations.

Discussion of the implications of these results (see Grimes, 2010b; Howell and Grimes, 2010) notes that major investments in 'new technology' projects such as a fibre roll-out must consider the factors that are likely to lead to large benefits accruing to firms. The ability to access the internet at a reasonable speed through adoption of ADSL without tying up a firm's phone line (as with dial-up) may have a much greater effect on productivity for many firms than the marginal benefit of sending through the same information at a faster pace using a fibre connection. However, for some types of firm that are reliant on very heavy data traffic and high customer expectations, the move to fibre may open up major opportunities (e.g. for international sales). Currently, only a minority of firms may be in this latter group, but the portion of firms comprising that group in future may rise. The creation of an 'option' (potentially for firms that have yet to be created) through judicious investment is therefore relevant. The unknown, at this stage, is just how large the pay-off will be from investing in this option and whether the benefit exceeds the cost.

... investment in productive infrastructure and amenities that appeal to the young may be used as a mechanism to attract a younger population to a local area.

Water

Plentiful water is one of New Zealand's greatest resources, but in some parts of the country it is already over-allocated; Canterbury is the most seriously affected region in this regard. Irrigation and water storage can considerably increase the water available to productive enterprises, but existing water allocation mechanisms (water rights) are based largely on a 'first-applied, first-allocated' basis. It is difficult, under current legal arrangements, to trade a water right with other parties who may have a greater use value for that water.

In order to ascertain whether there are gains from trade to be had from better use of water in Canterbury, the programme included a study on the value of water consents to farms in the Mackenzie district of South Canterbury (Grimes and Aitken, 2008). It found that water was more highly valued on farms that were flatter and on more poorly draining soils than on other farms (possibly because the water is retained for longer on those properties). Farms that are situated close to town derive especially strong benefits from irrigation, since these units are most likely to have potential water-intensive land uses such as dairying and cropping that require access to processing facilities and/or urban labour pools. Accordingly, farms with irrigation are, on average, located closer to town than farms with no irrigation.

The study found that reasonable variations in the size of water right and in farm characteristics can give an estimated premium of at least 50% for irrigated properties relative to similar unirrigated properties. Thus, there can be high net returns to irrigation in a drought-prone region such as the Mackenzie district. Farms that have a water right are more valuable than similar farms without water rights. However, the full value of water is not being realised, since returns differ significantly according to farm characteristics, and differing valuations of water cannot be fully capitalised upon where restrictions on water trading exist. This result is indicative of a more general issue for infrastructure policy: poor pricing of infrastructure can lead to

severely sub-optimal allocations and to poor investment choices.

Local social and economic infrastructure

Local authorities make considerable investments in both productive assets (e.g. roads, ports) and amenities (e.g. social infrastructures such as community facilities, parks, etc). Similarly, private firms invest in facilities, some of which have similar properties to public infrastructure; primary processing plants that are locationally fixed and available for use by many local firms (farmers and/or foresters) are an example of the latter. A number of studies in the programme examined impacts of such investments.

Investments in amenities are undertaken by local authorities in order to improve social outcomes for the local population. One council objective may be a desire to facilitate a high degree of participation in community activities by local community members. By encouraging such participation – for example, through providing community facilities that complement private endeavours – councils may raise the community's 'social capital' and assist community solutions to existing community challenges.

One study in the programme (Roskruge et al., 2010) examined such issues, modelling the impact of local government community facility expenditure on individuals' participation in community activities. The study found a complex impact of such expenditures. Greater funding was found to increase the number of community activities that active participants were involved in, consistent with building community social capital. However, a free-rider effect was also found to operate: increased funding reduced the likelihood that an individual participated in community activities. Thus, the greater effort of some individuals appears to have enabled others not to participate and instead enjoy the fruits of others' exertions. These results have a more general corollary: the effect of a particular investment may extend beyond the immediately measured impacts to indirect, but nonetheless substantial, effects that may be complementary or contrary to the impacts of the immediate effects.

A study of the productive impacts of local government infrastructure expenditures (Cochrane et al., 2010) similarly found effects extending from local government investment choices. After controlling for induced infrastructure expenditures arising from factors such as past population growth, the study found that new infrastructure expenditure had positive growth effects on the local community. In particular, there was support for the 'build it and they will come' notion: new infrastructure expenditure (over and above what was required to service past and expected growth) leads to an influx of extra population to a community, and may also raise incomes and land values as people and firms bid to establish themselves in the growth area. These findings are in keeping with the insights of the Roback and Haughwout models cited earlier.

Private investment in rural processing infrastructure is similarly found to have considerable impacts on community outcomes (Grimes and Young, 2009). The study examined impacts of two surprise meatworks closures: Pātea (1982) and Whakatū (1986). Pātea and Whakatū represent contrasts, one rural and one peri-urban (Hastings). Consistent with the findings on local infrastructure investments, the closures resulted in substantial immediate losses of employment in each community; however, the longer-term impacts differed considerably between the two cases. The loss of employment in Pātea was permanent given the lack of other opportunities in the surrounding area. By contrast, the losses in Whakatū were temporary, as new employment opportunities arose both in the broader urban area and within Whakatū as new firms replaced the former meatworks.

Perhaps the most important insight of the study was that such (dis)investments may also have an impact on the age structure of the population. This was especially seen in the case of Pātea, which saw a shift to a much older population structure following the closure, as young workers and families left, while older people moved in to the vacated houses. Thus, infrastructure (dis)investment may affect not only population size but also population structure. A corollary is that investment in productive infrastructure and amenities that appeal to the young may be used as a mechanism to attract a younger population to a local area.

The 'agglomeration' relationship between infrastructure impacts and urban status (implied by the primary processing study) is emphasised in two analyses of firm productivity and employment density (Maré, 2008; Maré and Graham, 2009). Large urban areas tend to have greater infrastructure requirements and greater employment density than smaller areas. The former study finds an agglomeration elasticity of around 0.05 (i.e. a 10% increase in employment density (employees/km^2) results in a 0.5% increase in firms' labour productivity);[2] the intensity of this relationship is similar to that obtained in North American and European studies. The importance of this result is that, if the effect is causal, facilitation of higher density (e.g. through improved transport networks) can result in higher productivity and hence higher incomes.

The second study (Maré and Graham, 2009) provides further detail on the nature of this agglomeration elasticity. By industry, agglomeration benefits are lowest for agriculture, forestry and fishing and highest for the finance and insurance industry, with wholesale trade, retail trade and health and community services also having high elasticities. The latter four industries are most commonly found in major centres, emphasising the importance of infrastructure investments that facilitate increased employment density in larger cities. However, the study finds that there may be decreasing returns to agglomeration, since the higher density cities (Auckland, Wellington, Christchurch) have lower agglomeration elasticities than less dense areas, albeit still in the vicinity of 0.05–0.06.

Empirical findings: commonalities

The analyses summarised above indicate the importance of infrastructure investments for raising productivity and amenity values at local and national levels. In some cases, the nature of the benefits

that flow from the projects are easy to identify (e.g. improved local passenger transport options). However, in other cases benefits may be diffuse and/or difficult to pinpoint *ex ante*. One factor which causes difficulties in evaluating benefits *ex ante*, especially of large-scale projects, is judging the nature of eventual benefits and the recipients to whom they may accrue.

For some infrastructure projects – e.g. a rural road straightening – the recipients of the project may be definable. But for others – e.g. investment in fibre-optic cable or a major new motorway linking two cities – the investment benefits are partly in the nature of the purchase of an option for future development, where the size and recipients of the potential options pay-off are unknown. Two of Vogel's major investments – in telegraph and rail – were of this nature; both had an immediate surge in usage with a further lift in usage 30 years later (see Grimes, 2009b). The nature and size of Vogel's investments effectively purchased an option that enabled these subsequent developments to occur. Investments in fibre and/or investments in major transport networks may today have similar properties. The companion article examines some considerations that must be taken into account when considering such matters. In keeping with that article, the studies cited here provide prima facie evidence to support a strategic, network-oriented approach to infrastructure investment that goes well beyond a project-by-project analysis of specific investment proposals.

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2 This is the central estimate of three estimates provided in Maré (2008).

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Arthur Grimes

PLANNING NEW INFRASTRUCTURE
Some Issues

Empirical themes

Infrastructure investments are mostly long-lived, service multiple (current and future) users, and interact with other public infrastructures and private investments. Empirical examples cited in the companion article in this issue, 'Infrastucture: new findings for New Zealand', include long-lived road, rail and port investments, telecommunications networks (fibre), water infrastructure and local social amenities. Much of this infrastructure is provided by central or local government, but some is also provided by public (state-owned enterprises) and private commercial enterprises.

The presence of positive agglomeration elasticities found in New Zealand and elsewhere (see Maré, 2008; Maré and Graham, 2009) indicates that increasing returns to scale may be present in relation to some infrastructure investments. The possibility of such increasing returns needs to be accounted for in *ex ante* assessments of the benefits flowing from new infrastructure investments. Increasing returns mean that many infrastructure investments do not stand alone: analysis requires a network approach rather than a specific project analysis.

The empirical work outlined in the companion article also points to the importance of considering the options role performed by certain infrastructure investments. The importance of network thinking and the consideration of options complicate the use of traditional cost-benefit analysis (CBA) tools. Other complications also arise in relation to CBA, especially in determining the weightings given to current versus future benefits and to different types of benefit (especially consumption versus production benefits). This article indicates some of the issues that have surfaced as a consequence of the findings of the empirical studies. A fuller examination of these conceptual issues is provided in Grimes (2010a).[1]

Cost-benefit analysis

CBA is the standard tool used in New Zealand and elsewhere as a basis for decisions regarding infrastructure investments. It makes explicit the nature, size and timing of a project's costs and benefits, covering both tangible and intangible items, and includes consideration of wider economic benefits (e.g. agglomeration externalities).

As with any such tool, the analyst using CBA must adopt a range of assumptions. CBA is most useful when these assumptions apply equally to a range of alternatives, so that the outcome of a decision is invariant to the particular

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assumptions made. For instance, it can be used with confidence when making comparisons between alternative projects designed to produce similar benefits (e.g. two roading choices designed to meet a similar need).

The scope of a cost-benefit analysis must be appropriate for the issue at hand. If a project has synergies with other prospective investments, a project-specific CBA will provide an inadequate estimate of benefits if the interactions with other synergistic projects (i.e. the full network) are not taken into account. In many circumstances – for instance, upgrading a roading network – a network CBA is therefore required instead of a project-specific CBA. (The latter may nevertheless still be useful where there are multiple ways of building a particular stretch of road within the network, provided the full network CBA is also undertaken.) The article by John Boshier in this issue and discussion in Grimes (2010a) deal with this issue in more depth.

Options and uncertainty

Investment is frequently undertaken under conditions of uncertainty with respect to many factors, including future demand, construction costs, future input costs, rival investments, complementary investments and the potential for new technologies. In some cases the uncertainty may relate to the investor's own future actions, but in most cases it will relate to the actions of others. For long-lived investments, the uncertainties relate to actions of agents who may not be alive or active at the time the initial investment is considered.

Investments in general-purpose technologies are especially beset with such uncertainties. At the time telegraph cables were first erected in New Zealand in the 19th century (under Julius Vogel's infrastructure investment programme), no one could foresee that movies would one day be downloaded to an individual's home from any point on the globe through such cables.

These uncertainties may have a considerable impact on infrastructure investment. A classic result from the literature on 'investment under uncertainty' is that investments may face a high hurdle rate if information about future conditions unfolds over time (Dixit and Pindyck, 1994). The reason for this is that a project that today has a benefit-cost ratio (BCR) exceeding one (based on current information) may have a BCR next period (or later) that is less than one (based on updated information). By waiting for further information to unfold, the risk of investing in a poorly performing project can be lessened. A conventional CBA that ignores uncertainty and learning therefore provides an insufficient basis for making investment decisions under conditions of uncertainty.

... investment in the initial project creates an option to reap high returns through prospective future investments, with no obligation to invest in those projects where circumstances indicate that returns will instead be low.

The logic of delaying investments (or raising the hurdle rate) under conditions of uncertainty may be reversed where a project forms part of a sequence of potential projects in which future ones can only be undertaken if the initial investment is itself undertaken. If information about returns to future projects is forthcoming only after the initial project is completed, the initial investment creates a valuable option for potential investment in subsequent projects. For instance, consider an investment in fibre for broadband. The fibre itself constitutes the initial investment; subsequent projects relate to a range of private sector investment choices by firms that may wish to utilise the new technology. At the time of the initial (fibre) decision, the future returns to the private sector's investments are uncertain; the expected net returns (given current information) of the fibre investment plus future private investments may even be negative (i.e. a BCR of less than one). However, as shown in Grimes (2010a), it may still be worthwhile investing in fibre because, unless the initial fibre investment is undertaken, there may be no possibility that the future firm-specific investments can be undertaken. Those future investments will be undertaken if they are privately optimal for those firms, but these decisions will only be revealed in the future and will be conditional on the fibre already being in place. The initial public investment therefore creates the option for subsequent investment opportunities and hence for increased national income, and may be worthwhile even though no private sector participant would embark on the initial investment programme.[2]

The key to this result is that investment in the initial project creates an option to reap high returns through prospective future investments, with no obligation to invest in those projects where circumstances indicate that returns will instead be low. The potential for such options means that analysis for a project may, on occasions, need to incorporate a list of prospective (but uncertain) opportunities that may arise due to the completion of the project. Furthermore, the analysis must be undertaken at a national scale, rather than relating solely to the returns to the initial investor.

A corollary of the options approach is that disinvestment decisions must account for future opportunities that may be lost if existing infrastructure were scrapped. This insight is particularly relevant where large sunk costs are involved (rail freight lines are one such example).

Options analysis means that a BCR greater than one (within a conventional CBA) is neither a necessary nor a sufficient condition to make investment decisions under conditions of uncertainty and learning. Some projects with a BCR greater than one optimally should be delayed, whereas other projects with a BCR of less than one optimally should proceed. Analyses that use certainty-equivalent methods in the presence of uncertainty and learning are therefore flawed.

Discount rate

One of the most important decisions that must be taken when conducting a CBA, or using any other method to determine the net benefit of an infrastructure project, is how to trade off future against current net benefits. In order to arrive at a BCR or a net present value (NPV) figure, the trade-off between present and future net benefits is normally made through choice of an explicit discount rate. As implied by the multiplicity of discount rates used for infrastructure projects internationally, there is no single 'correct' discount rate that covers all project types.

Nevertheless, some guidance can be given. Where returns from a project are monetary and can be reinvested in another project that in turn gives the same explicit rate of return (with the same risk profile) as the project under consideration, and where the project could be undertaken equally by another agent, a cost of capital (incorporating a market-derived risk premium) constitutes an appropriate discount rate for the project.

Even here, the choice of risk premium is far from trivial, and circumstances exist where a negative risk premium may be appropriate at a national level. Consider, for instance, an irrigation scheme, which has its highest pay-offs during times of drought. Empirical work demonstrates a causal link from drought to GDP decline in New Zealand (Buckle et al., 2007). If government is averse to negative shocks to national income, there is a case for government to support an irrigation scheme through provision of funds at a discount rate that reflects a negative price for risk. In other words, because the scheme can mitigate adverse national income fluctuations, it has a negative 'consumption beta' and this makes it worthy of access to funds at a less than risk-free rate. If government is not concerned with fluctuations in national income, this result no longer holds and a market rate of return reflecting purely private risk is appropriate.

The issue of appropriate discount rate becomes even more difficult to determine where the benefit stream of a project in part comprises intangible consumption benefits, such as social benefits that cannot be monetised. In this case, the discount rate reflects the decision maker's subjective trade-off between people across time (i.e. between generations). Consider, for instance, a government faced with the choice of investing in two projects. The first is a one-off purchase of 1,000 hip operations today for elderly people in need of the operation (and who otherwise could not afford one). Assume that this incurs a one-off cost of $10 million which is lost to the government once the operations have been completed. The second project invests $10 million in a toll-road that yields a 7.5% compound real rate of return over 25 years (and where the returns can be reinvested at 7.5% real). The New Zealand government's current discount rate used for roading projects is 8% real; thus, it would reject the toll-road proposal as having a BCR of less than one.

What does this rejection mean? Investment of $10 million for 25 years at 7.5% real would result in a capital sum of $61 million at that time. Assuming hip operations cost the same in real terms then as now, a government in 25 years time could conduct six times as many hip operations as now if it invested in the toll-road instead of purchasing hip operations today. Use of an 8% real discount rate says that we would prefer to conduct 1,000 hip operations today rather than invest that sum and have 6,000 hip operations in 25 years time. In other words, faced with consuming today or setting aside these funds to make the next generation six times as wealthy, the official choice in New Zealand is to consume today.

Rather than seeing a productivity-enhancing infrastructure investment in Auckland as potentially taking resources away from the rest of New Zealand, it should instead be interpreted as boosting the return to factors of production within New Zealand.

Furthermore, current roading projects are generally not undertaken unless their BCR is considerably greater than one (using an 8% real discount rate). The effective trade-off between current consumption and wealth of the next generation is therefore effectively much greater than the ratio of 6 implied by the discount rate choice. Seen in the light of these official policies, New Zealand's high rate of consumption out of income and low growth rate is understandable.

The nature of investments

New Zealand is an open economy with free migration internally and across the Tasman. In these circumstances, New Zealand needs to be considered as one region within a broader economy. A recent analysis for US states (Moretti, 2010) demonstrates that increased demand for a region's tradable goods raises employment in that industry and also raises demand for employees in non-tradable industries, thus inducing net inward migration. If labour is not perfectly mobile across regions, the result is a rise in incomes across the regional economy. A similar result holds for an increase in tradable sector productivity that arises from an improvement in infrastructure (Grimes, 2009a, 2010a). The productivity improvement to firms in the tradable sector translates into income increases across the economy as returns to local resources are bid up in order to increase output in the more productive tradable sector. The effect is to relocate resources both within and between countries.

These results are important for interpreting the agglomeration findings in the Motu infrastructure programme (Maré, 2008; Maré and Graham, 2009). Rather than seeing a productivity-enhancing infrastructure investment in Auckland as potentially taking resources away from the rest of New Zealand, it should instead be interpreted as boosting the return to factors of production in New Zealand. The resulting higher incomes attract additional resources (including labour) to this country and/or reduce the

Where projects are national in scale and have positive net pay-offs ... they can be financed through debt, since the stream of benefits is available to service that debt.

net outflow of labour and other resources to Australia.

Strategic and funding implications

The empirical work summarised in the companion article and the conceptual issues discussed in this one together suggest that a more strategic approach to infrastructure investment could be pursued in New Zealand than has been the case in recent decades. A national infrastructure strategy may concentrate on prioritising projects that: (i) service the internationally traded productive sector; (ii) exhibit network complementarities; and/or (iii) create opportunities for subsequent value-enhancing investments that take advantage of the initial investment project.

These considerations, which are largely absent from conventional CBA evaluation, may be combined with use of a lower discount rate in order to prioritise projects that boost the productive base of the New Zealand economy for future generations.

Where projects are national in scale and have positive net pay-offs (after inclusion of network and other externalities and option values), they can be financed through debt, since the stream of benefits is available to service that debt. Where the effects are predominantly localised (for instance, with a motorway extension or new social amenities) another funding avenue is possible. Theory, and the empirical work cited here, shows that beneficial infrastructure investments with localised benefits result in an uplift in land values. This value uplift accrues to property owners who have not necessarily risked their own capital to undertake the infrastructure investment. The value uplift affords a base on which to raise revenue through targeted local authority rates (land taxes). Historically, similar mechanisms have been used to fund railway development in the United States and in New Zealand, and are used today in the United States through TIF (tax increment financing) funded projects (Coleman and Grimes, 2010a, 2010b). Further consideration of this approach, possibly in place of development contributions and financial contributions (under the Local Government Act and Resource Management Act respectively), is warranted in New Zealand.

Whichever funding mechanisms are used, there is a need in New Zealand to extend current approaches to infrastructure planning so as to incorporate some of the analytical extensions to cost-benefit analysis introduced by modern economic approaches. Incorporation of network externalities and option values, plus reconsideration of discount rates (especially in respect of differing types of benefits), are specific extensions to consider. The land value-based funding mechanisms then provide a funding option to finance further productive infrastructure investments, especially at the local level.

1 The analysis in Grimes (2010a) was funded by CAENZ (the Centre for Advanced Engineering New Zealand) and by the Foundation for Research, Science and Technology (FRST grant MOTU0601). We thank FRST and CAENZ for their assistance.

2 Against this option must be weighed the option of delaying investment in a fibre network. This option may have value if cheaper fast broadband options (e.g. improved mobile technology) were potentially to become available in a relatively short timeframe, so enabling savings on the large costs of investing in a ubiquitous fibre network.

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THE COSTS OF CRIME
Toward Fiscal Responsibility

A one day forum on Monday 21 February 2011
Government Buildings lecture theatre one, Pipitea Campus, Victoria University of Wellington

The Costs of Crime: Toward Fiscal Responsibility forum will provide information on the fiscal and others costs of the impact of crime and policy measures to respond to it and generate discussion on cost-effective ways of responding to crime and repairing the harm caused by it. The primary focus will be on public expenditure but costs to non-governmental organizations will also be considered where relevant and possible.

Speakers include:

- Audrey Sonerson and Paul O'Connell, New Zealand Treasury
- Kim Workman, Rethinking Crime and Punishment
- Professor Tony Ward, School of Psychology, Victoria University
- Dr Gabrielle Maxwell, Institute of Policy Studies, Victoria University
- Heather Henare and Kiri Hannifin, Women's Refuge
- Tony Paine, Victim Support

Presented by Institute of Policy Studies and the Robson Hanan Trust

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Email your details to ips@vuw.ac.nz for further information as it becomes available or to register to attend. There is no fee to attend.

John Boshier

INFRASTRUCTURE INVESTMENT

Supporting Better Decisions

This article is about making decisions on infrastructure. It is about widening the menu of methods used to evaluate infrastructure investment proposals. The article summarises the findings and recommendations of the report *Infrastructure Investment: supporting better decisions*, produced by the New Zealand Centre for Advanced Engineering (CAENZ) hosted at the University of Canterbury (Boshier et al., 2010).[1] The objective of the infrastructure study is to examine whether existing frameworks fully capture the goals of increasing the productivity of the economy and improving the social and environmental outcomes of infrastructure projects.

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Investment in public infrastructure is a key driver of the economy. It delivers a wide range of services that underpin the material standard of living of all New Zealanders. Modern society relies on infrastructure for domestic markets to function efficiently, for export goods to be produced and for social interaction to occur. The OECD suggests that investment in infrastructure, particularly in network infrastructure such as transport and communications, boosts long-term economic output more than other kinds of physical investment.

Investing in productive infrastructure is one of six policy drivers in the government's Jobs and Growth Plan for New Zealand, intended to help the country recover from the effects of the global financial crisis. Such infrastructure investment is designed to help increase the growth in productivity, maintain high levels of employment, improve our resilience to adverse events, and close the gap with Australia by 2025.

The Resource Management Act (RMA) has, for some time, been the *bête noire* of the development community, while decision-making practice has been somewhat under the radar. Refinement of the approvals processes for projects of national significance and other enhancements were enacted with the 2009 amendment to the RMA. More changes are to come under phase two of the reforms.

The CAENZ study has developed a complementary agenda for reform. It is designed to enhance decision making on infrastructure investments to augment the current tools, which are considered to be too narrow. It is fair to say that New Zealand has been generally slow to adopt extensions to cost-benefit analysis. Leaders in decision making have commented that evaluation does not at times match their intuition.

The emphasis now being placed on the role of infrastructure investment comes at a time when there has been a growing realisation that New Zealand is suffering the consequences of under-investment in network infrastructure as a proportion of GDP in the 1980s and 1990s (Figure 1).

It is now timely for this review. The publication of the National Infrastructure Plan (The Treasury, 2010) provides a platform that was previously absent. There are now improved analytical tools which can support decision makers seeking to understand wider economic benefits, network effects and opportunities, resulting in real options. There are also effective methods for incorporating a range of social, cultural and environmental factors into the assessment. Together with extended economic analysis, they can achieve the intent in the National Infrastructure Plan of improving the advice provided to decision makers. These tools will provide a richer evaluation of infrastructure proposals being considered by government and the private sector.

Some aspects of our recommendations can be implemented simply through information and training. Others require some investigation and demonstration. All require the adoption of a rigorous and more standardised process by decision makers and analysts alike.

Strategy in operation

The first main theme of the report is the need to 'operationalise' the government's strategy for infrastructure. When the study team interviewed a number of leaders of decision-making organisations, many commented on the need for a strategy for infrastructure development. The National Infrastructure Plan does provide a backdrop to enable government agencies and the private sector to better co-ordinate the provision of infrastructure. That said, an overall strategic framework for infrastructure investment is missing. Sector-specific legislation and policy statements are relied on to provide guidance for project appraisal.

Some of the concerns about the lack of a strategy may be addressed by greater transparency in the reporting of analyses and decisions, and by 'closing the loop' through benefits management plans and benefits realisation testing. An important element would be the development of indicators to provide the (sometimes missing) link between vision and analysis, and which are then used to assess outcomes.

Accordingly the study makes recommendations to:

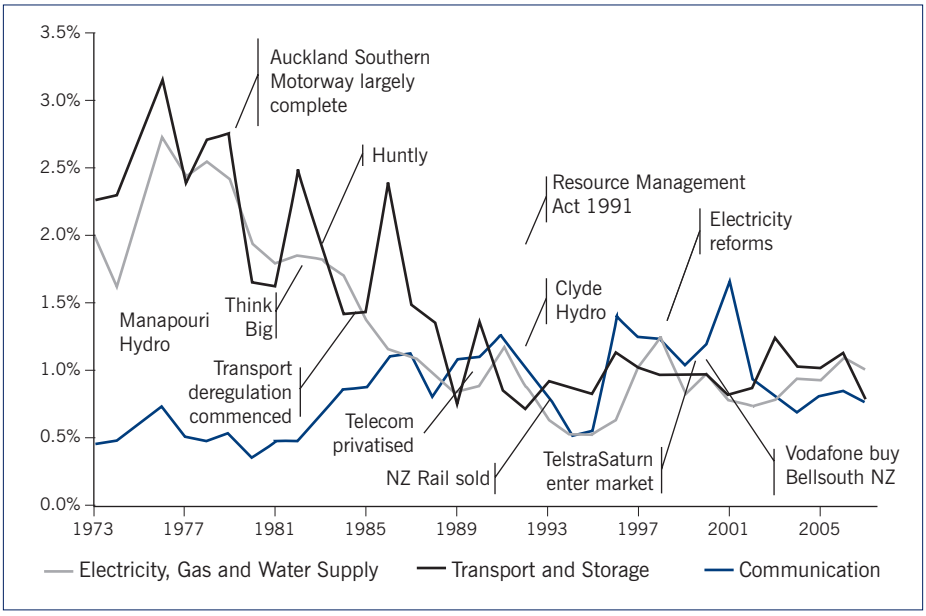
- augment the government's long-term vision and strategy for infrastructure investment with quantified performance indicators and national criteria for project selection, and include these in the National Infrastructure Plan;
- operationalise the relationship between strategy, project planning and evaluation through the use of logical framework analysis which clearly defines the links between ends, means, measures, assumptions and resourcing; and
- establish an ongoing programme of publication of analyses of investment proposals to provide increased transparency on infrastructure investment advice and decision making.

The scope of projects

The second important theme is the need to properly define the scope of infrastructure projects. The way a project is scoped and the bounds of the effects that are evaluated are central to maximising the productivity of investments. Silo-thinking can inappropriately limit the scope of a project or curtail the assessment of benefits that might occur. Investment logic mapping is increasingly being used to provide rigour to the process of deciding the scope of a project, whether government intervention is required, and the outcomes that are expected.

Network effects are a core issue in project definition, in terms of making sure that the scope of the project that is assessed captures the full range of potential effects within a network. The effects of an enhancement to one part of a network depend on the consequences or enhancements to other parts. This can mean that all enhancements appear individually uneconomic even when

Figure 1: Infrastructure investment as a proportion of GDP



Source: New Zealand Council for Infrastructure Development

The 'bottom-up' approach builds on the benefits of a more standardised approach to analysis recommended by the study by enabling a portfolio of high-performing projects to be built up which have been evaluated on a comparable basis.

the enhancements would all appear worthwhile when viewed collectively.

What constitutes the 'network' that should be analysed is not a simple question. It is not always the collection of links in a single mode system like a motorway network. The New Lynn Transit Centre is a good example, where the network comprised elements of rail, road, bus services, car and passenger access and commercial building development. Analysing any one of these would have served little purpose. The whole integrated combination of interacting components needed to be analysed and compared with its alternatives.

The interest in real options for the analysis of infrastructure investments arises because providing improved infrastructure can create opportunities for further investments. One classification defines five types of real options:

- waiting-to-invest option: holding the necessary resources available to make an investment, but waiting until the time to do so is propitious;
- growth option: building an asset that can have its capacity expanded at a later date;
- flexibility option: the ability to alter the course of the investment after it is built;
- exit option: the ability to get out of or run down an investment if it proves to be redundant, or to have its life extended if it has ongoing value beyond its design life; and
- learning option: making an investment enables the holder to learn about an uncertain quantity, technology or opportunity.

Cost-benefit analysis has not conventionally included the potential benefits that might come from subsequent projects or developments, except in the petroleum industry. Where projects have clearly identifiable consequences in enabling other projects to go ahead, then it is valid to include this value in the project assessment.

The importance of options created by certain infrastructure investments means that a standard needs analysis may need to be supplemented by an 'opportunities analysis'. Some caution is needed when the possibility is purely speculative. Rather than attempt a doubtful valuation, it may be better to assess the extent to which the project falls short of breaking even without including any option value. The question for decision makers is then whether they are prepared to believe that the option is worth at least that much. It is for these reasons that the report makes recommendations to:

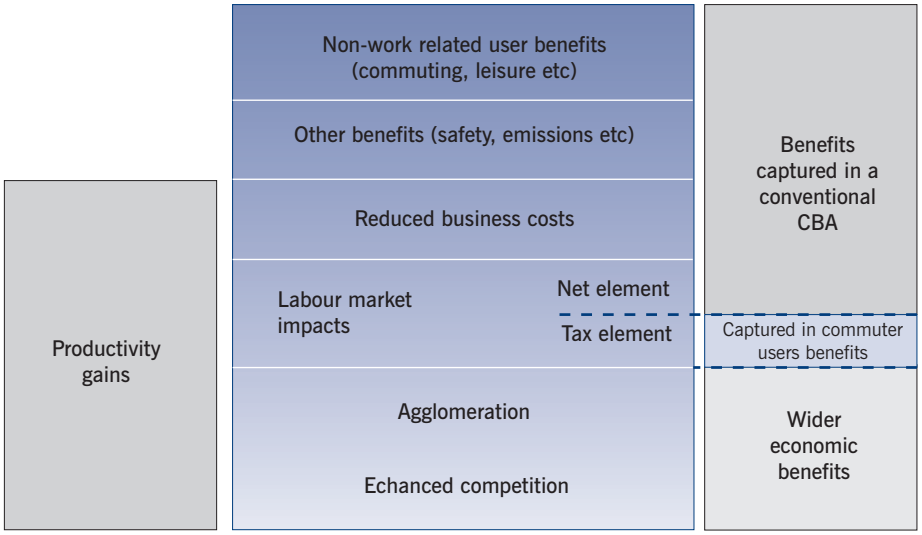
- promote the use of investment logic mapping and the inclusion of the governance viewpoint at project inception to add rigour to problem identification, to ensure wide coverage in options definition, and to capture opportunities;
- undertake investigations to show how the value of 'real options' might be incorporated into analyses of infrastructure investments; and
- extend the use of the State Services Commission's Gateway review process across the public sector, including agencies and local government.

Wider economic effects

Wider economic effects derive from improving the efficiency with which markets operate through agglomeration, through mitigating existing market failures, and through an increased output in imperfectly competitive markets.

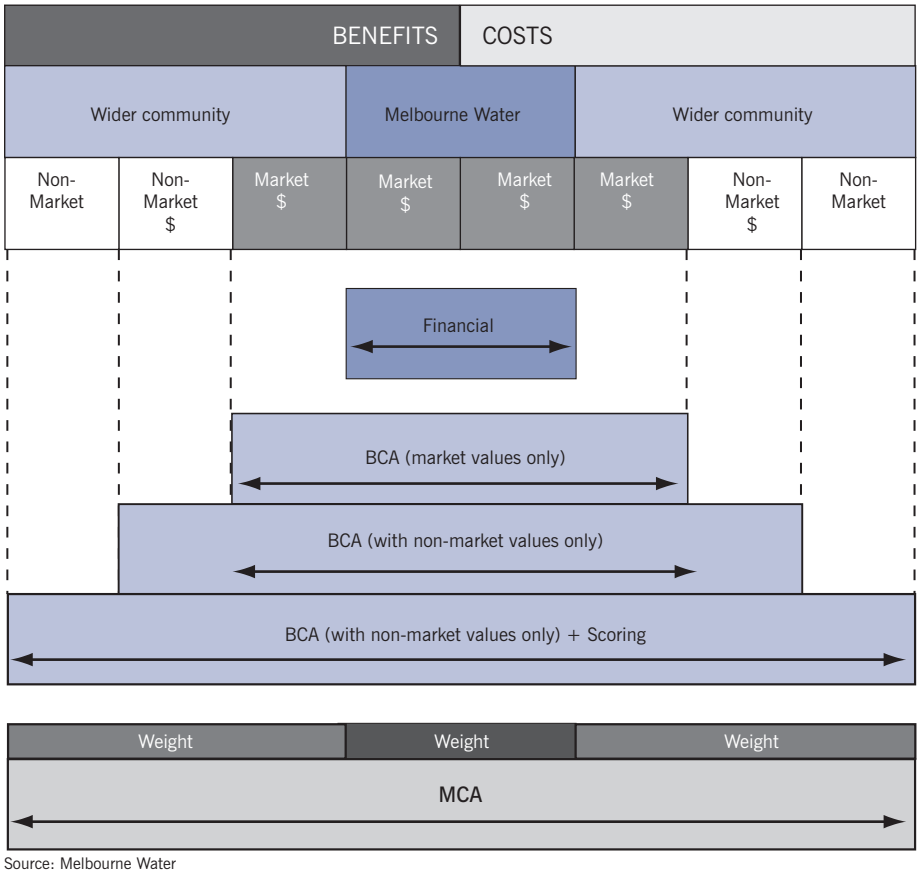
Improvement in transport links improves efficiency in a number of ways, including the facilitation of closer production linkages. In sectors where there are economies of scale, this results in productivity improvements, raising efficiency as well as the volume of production. Reduced barriers also enable businesses to relocate to more central locations to gain further economies of

Figure 2: Productivity gains identified by extended cost-benefit analysis



Source: Dialogue Consultants

Figure 3: Overview of triple bottom line assessment



Source: Melbourne Water

scale while still accessing the resources they need from the hinterland.

Such agglomeration benefits are typically the most important of the wider economic effects. They are additional to the benefits captured in a narrowly-defined cost-benefit analysis appraisal. Wider economic effects can also include other improvements to the efficiency of economic activity, through enhanced competition, labour market effects, taxation, trade gains, and technology and knowledge transfer.

A trial application of the method developed for the UK Department for Transport commissioned by the New Zealand Transport Agency (NZTA) examined the Waterview motorway extension project. NZTA established the workability of the method in New Zealand. The wider economic effects calculated in that study added another $250 million, or 23%, to the conventionally captured benefits. While the method in this case is specific to road transport, the same general principles apply in other sectors.

To give confidence to the assessors of projects that wider economic effects have been properly examined, the report makes recommendations to:

- require a benefit management plan for every major infrastructure project; and
- investigate benefit realisation on a range of past investments to determine lessons that can be learned and identify exemplars for the promotion of good practice to be used with the portfolio of methods.

Productivity gains

The CAENZ research has identified an approach to the vexed question of selecting the most productive infrastructure investments after exploring both 'top-down' and 'bottom-up' approaches. The preferred approach is 'bottom-up', by considering the productivity gains offered by individual projects and network-based programmes based on an extended cost benefit (Figure 2). The 'bottom-up' approach builds on the benefits of a more standardised approach to analysis recommended by the study by enabling a portfolio of high-performing projects to be built up which have been evaluated on a comparable basis.

Comparisons can be made between sectors by identifying projects which may have high benefit-cost but which were not funded due to budget constraints. There may be a case for switching funds into the sectors with more high-value projects, especially those which offer high productivity gains.

Standardised methods and presentation

One of the more interesting frameworks for systematic and sequential analysis is that used by Melbourne Water with its triple bottom line (TBL) assessment, illustrated in Figure 3. What differentiates a triple bottom line assessment from a purely financial assessment is the extent to which it takes into account the broader effects on the environment and the community. Within these TBL guidelines, at least one and usually two of four different evaluation techniques are used to define the 'optimal' solution, in the following sequence:

- financial analysis;
- benefit-cost analysis (BCA) with wider costs and benefits that are monetised; and
- multiple criteria analysis (MCA).

The financial analysis is used to differentiate between options on the basis of the cash flow implications to Melbourne Water, while benefit-cost analysis and multiple criteria analysis are used to account for wider effects on the environment and society.

An important feature of the Melbourne Water approach is that the weighting used in the multi-criteria analysis is based on widespread consultation, based on the understanding that 'the weight given to factors and the identification of relevant distinguishing factors is subjective and cannot be decided by "experts" in isolation'. Sensitivity analysis, changing the discount rate and modelling probability distributions for uncertain effects are then used to incorporate risk and uncertainty in the decision making.

The CAENZ report makes recommendations to:

- undertake a pilot benchmarking project across a range of central and local government agencies on the quality of analytical methods and tools used for infrastructure investment;
- prepare and foster the adoption of a standard portfolio of analytical tools and indicators to ensure comparability of investment proposals that would capture monetised user benefits, wider economic effects, network effects, life cycle costing, and effects that cannot be monetised (principally social and environmental); and
- develop a process using the standardised project assessments to present the economic benefits and productivity gains of projects and programmes in different sectors, to inform the discussion of budget allocation between sectors and develop a portfolio of high-performing investments.

Conclusions

This study by the Centre for Advanced Engineering is designed to support those leaders in Cabinet, councils and company boards who are responsible for making decisions to invest in infrastructure. The authors intend it to be complementary to the government's Jobs and Growth Plan for New Zealand. We have explored what it means to invest in productive infrastructure, and how the wider economic benefit may be captured, and made specific recommendations on techniques to give greater assurance on the evaluation and delivery of projects.

1 The report's authors wish to thank the funders of the project: the New Zealand Council for Infrastructure Development (the cornerstone funder), the Electricity Commission, Waitakere City Council, Transpower New Zealand, Westpac Institutional Bank, Auckland City Council, Fletcher Construction and Christchurch City Holdings. They also thank other funders who have contributed resources in kind: Auckland Regional Transport Authority, Ernst and Young, Watercare and Waitakere City Council; and acknowledge with appreciation the expert contributors who have worked on the project: BERL Economics, Motu Research, Dialogue Consultants and Opus International Consultants.

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Stephen Selwood

Strategic Decision Making Frameworks

The New Zealand Council for Infrastructure Development (NZCID) considers that there is a need for a much more strategic, more sophisticated and better balanced approach to prioritisation of infrastructure investment in New Zealand. This was one of the key reasons why NZCID was a cornerstone funder of the New Zealand Centre for Advanced Engineering (CAENZ) study into improving capital investment decision-making frameworks. In commenting on the need for reform of decision-making frameworks, this article traces the history of public sector project prioritisation methods, with a particular focus on transport. It critically assesses the approach used in conventional cost-benefit analysis (CBA), as applied during the 1990s and early 2000s. CBA is then compared with the much more politically driven approach adopted from 2003 onwards. The paper concludes by arguing that New Zealand must develop more strategic project prioritisation and decision-making methods which appropriately value economic, social/cultural and environmental benefits and costs.

Looking at investment in national infrastructure as a percentage of GDP since the early 1970s, some interesting trends emerge (see Figure 1 in John Boshier's paper in this *Policy Quarterly*). The first decade was characterised by a significant level of investment in transport and energy infrastructure. Gross fixed investment as a percentage of GDP ranged between 4% and 6%. Major projects completed included the Manapouri hydro scheme (1972), Auckland's Southern Motorway, largely completed by the late 1970s, and the 'think big' projects, including the Huntly coal generation plant, in the early 1980s. But the decade of the 1990s and early 2000s were characterised by a comparative low level of investment. There were three main drivers of this. First, having built some national infrastructure capacity, we were able to live on this for some time. Secondly, the less successful 'think big' projects created a reactionary trend against central planning in favour of the decentralised market approach. Most significantly, the nation faced significant capital constraints because of a high level of national debt, a legacy of some profligate spending during the 1970s.

Perhaps the most notable example of this capital constraint is the transport sector. Rail went through a decade of divestment during the late 1980s and early 1990s under its new corporatised and then privatised structures. In roads, only projects with a benefit-cost ratio (BCR) of 4:1 were even considered for funding. Benefits assessed in the traditional BCR analysis were heavily weighted to travel time savings and safety improvements. In addition, a high discount rate of 10% was

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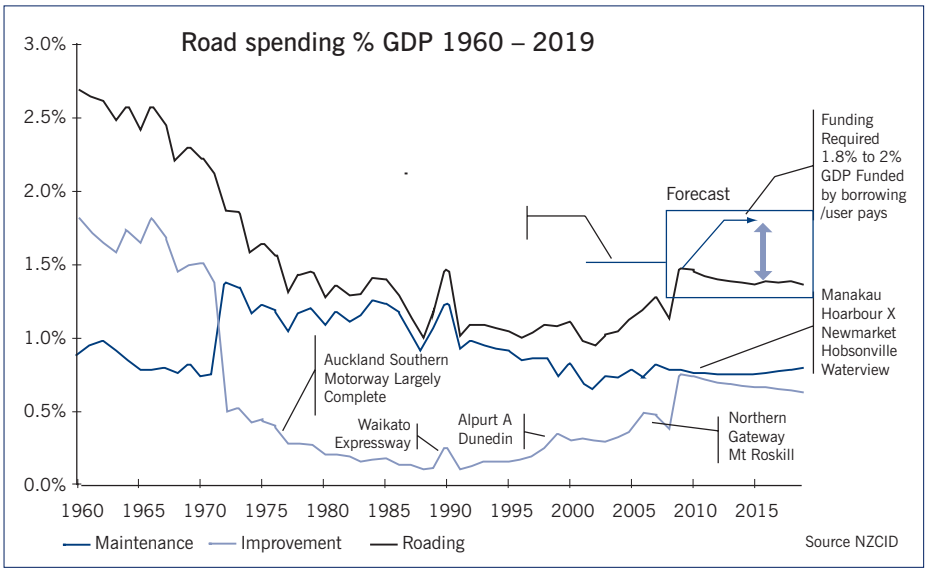
Figure 1: Road expenditure



applied. Consequently, most expenditure went on rural curve realignments, passing lanes, road widening and urban intersection improvements. Notwithstanding significant worsening congestion in Auckland, only a small number of capital projects were undertaken during this time, including modest extensions of the Northern Motorway, the upper harbour corridor, State Highway 20a airport extension, the South Eastern arterial and Grafton Gully (Figure 1). On the wider network the only significant state highway improvements were partial extensions of the Waikato Expressway, the ALPURT-A motorway extension north of Auckland and the Fairfield Motorway extension in Dunedin – all semi-rural extensions of the existing state highway corridor.

Ironically, although there was, and still is, wide acceptance of the need to complete the four-lane Waikato Expressway between Auckland and Hamilton, only a small number of discrete sections of this road were completed during this decade and only where improvements achieved a benefit-cost threshold of 4:1. Whereas other, more costly sections of the expressway resulted in a lower BCR these sections were left unfinished. Consequently, the Waikato Expressway now includes various stretches of four-lane, three-lane and two-lane sections.

CBA proved to be highly effective as a capital rationing tool during the 1990s. However, it was far less successful in achieving the highway agency's overarching objective to 'deliver a safe and efficient state highway network'. Instead of the economically strategic connections between Auckland and Hamilton being completed or the provision of an alternative north–south route through Auckland being realised, only small piecemeal sections of these nationally significant transport links were completed during this time.

By 2003, under considerable pressure from Auckland business and local government representatives, and with a desire to make some substantial progress in Auckland, the Labour government decided to take a more strategic approach to the allocation of transport funding. An improved financial situation allowed the government to have less reliance on CBA in the allocation of funds. With the injection of additional Crown funding, a number of projects were started, including the Mt Roskill extension and ALPURT-B2 north of Auckland, and substantial planning was done for the Manukau Harbour Crossing, Newmarket Viaduct upgrade and the Waterview project, among others.

A major shift in decision-making frameworks occurred during this period. In its desire to achieve a higher level of environmental and social outcomes, the government, through Transit New Zealand, substantially increased funding for social and environmental mitigation. This was clearly evidenced by projects like the Northern Gateway, which included expensive viaduct and tunnel solutions, and by the decision to construct the Victoria Park tunnel rather than an additional viaduct. Neither project would have had any possibility of proceeding under the former 4:1 BCR regime. The move to improved environmental mitigation avoided the need for lengthy legal battles through the courts to obtain the necessary approvals. However, the significant additional expenditure on these major projects inevitably meant that numerous other projects across the country had to be deferred.

The ministerial report on roading costs produced in 2006 (Ministerial Advisory Group on Roading Costs, 2006) clearly identified that the costs of a number of major roading projects undertaken during this period escalated significantly (sometimes more than doubling). By and large this was the result of attempts by Transit New Zealand to avoid litigious delays in order to resolve political and community concerns in regard to environmental and community impacts of the projects.

The advisory group found that scope change resulting from community and environmental impact mitigation

Table 1

Project	Time to approve	Cost change in $millions as identified in 2006
Northern Gateway (Alpurt B2 Toll Road)	9 years, 1997 to 2006	82 to 340
Victoria Park Tunnel	5 years, 2001 to 2006	165 to 320
Waterview Connection	14 years, 1996 to current (The project is to be called in under the RMA in 2010.)	72 to 1,380
Manukau Extension	6 years, 2000 to 2006	125 to 225

measures were a key driver of cost increases for a number of the roading projects they studied, as shown in table 1.

The group reported on two key projects in detail. In respect of the Northern Gateway project it found that:

> It appears that the environmental enhancements incorporated in ALPURT B2 at a cost of $65 million were in response to the risk that the Manu Waiata Restoration Protection Society (the Society) would challenge the project's compliance with the requirements of the LTMA. In response to a February 2004 letter from the Society, the Board looked for environmental enhancements to the project, which ultimately led to the inclusion of the Nukumea viaduct and Johnsons Hill tunnels. The inclusion of these features appeared to the Advisory Group to be in order to expedite the project, and ultimately resulted in a significant cost increase. (p.13)

In respect of the Victoria Park Tunnel (Option D) which is now under construction the group found that:

> An objective assessment of environmental effects prepared in September 2002 for Transit NZ showed that 'Option D [northbound tunnel option] retains the status quo within Victoria Park, and therefore has no significant reduction in effects compared to Option A [viaduct option]'. On this basis, there appears to be no objective reason to provide additional funds to construct Option D instead of Option A. In fact, analysis indicates that significant environmental improvement will only occur if all traffic is moved underground. However, there is currently no plan to replace the existing viaduct.

And that:

> Transit NZ appears to be making decisions to speed up projects that have high cost implications. There does not seem to have been a systematic process to establish the scope of this project based on the assessment of environmental effects. (p.15)

While not explicitly stated in the report, it seems reasonable to conclude that the behaviour of Transit New Zealand in selecting project design options was and arguably still is (as evidenced by the design of the Waterview tunnels) being significantly influenced by risks and time costs associated with protracted legal processes, involving both the Resource Management Act and other legislative requirements. In other words, while it might be possible to gain necessary approvals for projects by taking an adversarial approach through the courts, the costs of delay and the political risks associated with the contentiousness of the process make it easier and faster (if not necessarily cheaper) to make the necessary changes to the project scope.

Past experience underlines the need for a much more sophisticated, more balanced decision-making framework that is driven by overarching national strategy and which appropriately values economic, social/cultural and environmental benefits and costs.

The key question to be addressed is whether this approach is achieving an optimal balance between economic, social and environmental imperatives, and whether a more streamlined, integrated approach to project approvals might yield a better outcome.

The history shows a substantial change in policy direction, from very narrow assessments of national benefit, which almost totally excluded social and environmental imperatives and which had only limited assessment of economic returns, to a politically expedient assessment of economic, social and environmental needs. In both cases the strategic implications and opportunity costs of these decisions were not substantially considered. On the one hand the traditional CBA approach sought to maximise value but failed to address wider economic benefits or network effects. On the other hand, the politically expedient decisions to improve social and environmental mitigation on specific projects meant that there was insufficient funding for the construction of other strategically important network projects.

Forward projections of road spending, as illustrated in Figure 1, show a ramp-up of investment in 2010 which will see completion of the Western Ring Route in Auckland by 2015 and the roads of national significance towards the end of the decade. But investment declines and flatlines for the balance of the decade, despite significant need for new investment in local roads and public transport services in the major centres. NZCID forecasts a substantial deficit over the next decade, requiring an increase in funding from 1.5% of GDP to 2% in order for this new capital investment to be delivered. Not only will more capital be required; optimal application and prioritisation of that additional investment will be a critical success factor.

Past experience underlines the need for a much more sophisticated, more balanced decision-making framework that is driven by overarching national strategy and which appropriately values economic, social/cultural and environmental benefits and costs. This is the primary purpose of the CAENZ research project: to find much more robust decision-making tools that provide an optimum balance between economic, sociocultural and environmental imperatives.

It is interesting to note that comparable nations, including Denmark and Sweden, and the Canadian province of British Columbia have adopted a more strategic approach to project prioritisation and investment. While CBA methods are used to inform the decision-making

process, strategy is the primary driver of project prioritisation. CBA is used to test and inform the financial viability of a project business case and the delivery alternatives that have been considered. The discount rates used reflect the life cycle of the investment being made, with lower discount rates for long-term investments of strategic importance. Unlike New Zealand, which now applies an 8% discount rate, with sensitivity testing at lower and higher thresholds the discount rates used in Europe are much lower – typically in the 3%–6% range.

A principal conclusion of the CAENZ report is the need to augment the government's long-term vision and strategy for infrastructure investment with quantified performance indicators and national criteria for project selection, and include these in the National Infrastructure Plan. NZCID strongly supports this policy recommendation. In our view, the establishment of a strategic vision for New Zealand's infrastructure must be the overarching guiding imperative for project selection and prioritisation. Since we are seeking a balance between economic, sociocultural and environmental outcomes, the decision-making frameworks and the tools and methods that we deploy to evaluate capital investment choices must adequately address all three criteria. Sector plans should identify the set of investments in existing and new infrastructure that are required to deliver the strategic goals of the nation. In supporting policy processes, full social cost-benefit analysis should inform key decisions by identifying the most suitable project delivery methods from a range of alternatives. Where CBA is unable to monetise benefits and costs adequately, more robust multi-criteria attribute and non-market valuation methods will have to be deployed.

Not only will this enable better, more rational investment choices, determination of a more balanced long-term strategy provides the opportunity to engender broader multi-party political support for the investment programme and enable a shift away from the politically-driven project-by-project piecemeal implementation of infrastructure delivery that has characterised the investment over the last three decades.

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Andrew Coleman

Transport Infrastructure, Lock-Out and Urban Form

Highway Development in Auckland and the United States

When travelling the world, it is impossible not to be struck by the different urban forms of the world's great cities. Cities differ in size, age, shape and height. They have different housing styles and population densities. Some are concentrated around a mess of crooked streets, some are laid out around a planned grid, and some sprawl over wide areas. Many have a central waterfront, while others have ports several miles away. Cities also differ substantially in terms of their transport systems. There are walking cities, light rail-based cities and subway cities. And there are also cities where public transport is little used, as most travelling occurs in private cars.

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Historians, urban planners and economists are trying to understand why cities have evolved in such different ways. Two key questions have concerned the reasons why some cities use much more public transport than others, and why some cities have much higher population densities than others. These questions are related. Careful research across a large number of cities in Europe, Asia, North America and Australasia has shown that cities where most trips are by private car tend to have much lower population densities than cities where public transport plays a more important role (Newman and Kenworthy, 1989). This is not surprising, for people living in cities where car ownership is high can more easily live far from public transport facilities, enabling sprawl. But the evidence also suggests that investments in highway networks create sprawling low-density cities that are then unsuited for public transport.

This evidence is particularly pertinent to New Zealand. By world standards, cities like Auckland and Christchurch are characterised by low population densities and low public transport usage (Bachels, Newman and Kenworthy, 1999). In recent years the adequacy of public and private transport infrastructure in these cities has been reviewed, in part because of concern about traffic congestion. In evaluating the appropriate mix of transport infrastructure, cost-benefit analysis needs to evaluate how investment in one form of infrastructure – say, roads – affects the demand for other forms.

When historic choices about public and private transport infrastructure networks have long-lasting effects on transport demand because they change the urban structure of a city, there is path dependency of a type described by Arthur (Arthur, 1987; Barter, 2004). This path dependency needs to be taken into account, for it affects the way future transport investments will operate, and thus the likelihood of different transport investments occurring in the future. In a network system the value of current transport investments depends on the way the network is extended by future investments. Accordingly, a proper evaluation of current transport projects can only be done while cognisant of the way these investments are likely to affect the structure of a city.

... a new road, built for reasons independent of a city's economic performance, tended to increase the population of the city, because it lowered transport costs in the city and for that reason made it a more attractive place to live.

Transport modes, income and city form

In recent decades there have been several cross-city studies of the relationship between a city's transport systems, its size and population density and its urban structure. Much of this work was pioneered by Kenworthy, Newman and various co-authors (Newman and Kenworthy, 1989; Kenworthy and Laube, 1999; Bachels, Newman and Kenworthy, 1999). Using a consistently assembled data set, they examined the extent to which residents of cities in Europe, Asia, North America and Australia differed in their use of public and private transport (including non-motorised transport) and how these differences were related to various aspects of cities such as population density, average income and the concentration of employment in central business districts. In general, they showed that low-density cities have high private car use and low public transport use and high-density cities have high public transport use and low private car use. More particularly, across cities they showed that (a) there was a strong negative correlation between car ownership and population density; (b) there was a strong positive correlation between the use of public transport and population density; (c) in low-density cities, not only was car ownership greater and public transport use less, but more miles were travelled by car per car and a greater fraction of income was spent on transport; (d) there was little relationship between average income and public transport use; and (e) public transport use was much higher in cities that had intensive rail service. Some of these differences reflect major differences in the style of cities found in different regions of the world, for cities in Asia and Europe tend to have much higher population density and much greater use of public transport than cities in North America or Australasia. Nonetheless, even within broad continental regions the relationship between population density and transport structure appears to hold.

The negative correlation between private transport use and population density raises two related questions. The first is whether there is a causal relationship between private transport use and density. The answer appears to be yes. If private transport infrastructure – a highway – is built, people move out from high-density central city locations to low-density suburban locations, and population density declines; or, to be more succinct, highways induce sprawl.

The best evidence on this point comes from a series of papers by Baum-Snow (2007, 2010) analysing the effect of the United States highway network that was constructed after 1950. This network, which was constructed partly for defence reasons, connected cities across the nation. The way in which it was designed meant that the number of new highways entering any particular city was largely exogenous to the city's initial characteristics, such as size. For example, in most of the country highways were built so that they connected contiguous cities; thus, cities that were close to many other cities gained more new highways than cities located far from anywhere. Given this design feature, Snow-Baum used the original network design as an instrument to examine how the construction of a highway affected the employment and residential location patterns in a city over the subsequent 40-year period.

The data indicate that cities decentralised after highways were constructed. Baum-Snow (2007) estimated that an additional highway ending in the centre of a city reduced the central city population by 9% between 1950 and 1990. Overall, the population of metropolitan areas increased from 93 million to 160 million during this time; since the population of central cities only increased from 45 to 51 million, and cities on average gained 2.6 new highways, a third of the relative decline in central city populations was caused by the highway building programme. He further analysed the effect of highways on the location of jobs, noting that in 1950, 20 million out of 40 million urban centre jobs were in central cities, whereas in 1990 only 27 million out of 87 million jobs were located there. Cities with more highways had greater job decentralisation: an extra highway led to an 18% reduction in the number of people living and working in central cities, and a 25% increase in the number of people living and working outside central cities. In a strongly worded conclusion, he observed:

> The evidence is clear that the primary way highways serving central cities caused declines in central city populations was by inducing those who had lived and worked in central cities to live and work in suburban

> areas instead. … Estimates indicate that had the urban highway systems not been built, the total number of within-city commutes would be about double its 2000 number, and the total number of within-suburb commutes would be cut by about one half. (Baum-Snow, 2010, p.382)

Related evidence from Duranton and Turner (2008) shows that road building increases the population of cities as well as reduces their density. They demonstrated that a new road, built for reasons independent of a city's economic performance, tended to increase the population of the city, because it lowered transport costs in the city and for that reason made it a more attractive place to live. They estimated a 10% increase in a city's stock of major roads led to a 20% increase in population over a 20-year period. But they questioned the cost-effectiveness of road building as a strategy for reducing transport costs, noting that the provision of bus services increased the population at far lower cost.

While Baum-Snow's evidence is clear that highways induce sprawl, it should not be concluded that the highways were bad. Many people and firms are obviously happy to move to low-density housing far from the city centre if transport systems are sufficiently efficient that it is not too inconvenient to locate there. Indeed, from the data assembled by Kenworthy and Laube (1999), it is clear that people are prepared to pay high private transport costs in order to live in these low-rent, low-density areas. From the evidence compiled by Duranton and Turner (2008), it appears many people are prepared to migrate to these cities from elsewhere because of the transport network. This is not to say that people would not use inexpensive public transport if it were convenient. But revealed preference indicates that, when faced with the relative costs and benefits of high-density city or low-density suburban living, in many cities a large majority of people has chosen the latter.

The second question is whether the construction of private transport infrastructure makes public transport less efficient. Here the evidence is indirect. Nonetheless, combining the analysis of Baum-Snow and Newman, Kenworthy and others, it appears that (a) constructing a highway reduces the population density of a city and (b) cities with lower densities have less efficient public transport. The inefficiency can occur for two reasons. First, the population close to each bus or rail route is smaller in less dense cities, meaning that a given route is likely to have lower utilisation because it is conveniently located to fewer residences. Secondly, since people, their jobs and the amenities they wish to use are widely dispersed across space, any route is less likely to go directly to a desired destination than when a city is densely populated. While it may be possible to go between any two points in a city indirectly, by transferring between public transport lines, this can be excessively time consuming and unattractive compared to private transport.

While there is clear evidence from Newman and Kenworthy and others that cities with low population density have little public transport, the argument that low density reduces the utilisation and efficiency of public transport is difficult to prove. First, the cross-city evidence analysed by Kenworthy and Newman can be criticised because, rather than analyse the history of a city or cities through time, they analyse a cross-section of cities at a single point in time. This type of analysis can be misleading if city transport patterns evolve through time and cities differ in terms of their development stage, or if the transport arrangements in each city are dominated by idiosyncratic factors that are correlated with density, but that are not caused by density (Hensher, 2000). Secondly, within-city evidence that public transport is more efficient in densely populated areas than in low-density areas suffers from selection issues: often people who frequently use public transport have characteristics that attract them to high-density areas. Nonetheless, the weight of evidence strongly suggests that density and city form have a large effect on the use of public transport, and there is no evidence that reductions in population density increase public transport use. For instance, a study of commuting patterns across 114 urban areas in the United States shows that cities with less dispersed populations have lower car ownership rates, and that the combination of population density, public transport supply and road density explains a large fraction of the difference in commuting patterns across cities (Bento et al., 2005).

Once people and firms take advantage of highways and other roading investments to locate in dispersed regions far from the city centre, public transport becomes increasing irrelevant to city operation.

If, as theory suggests and evidence corroborates, low-density cities are less suited for public transport than high-density cities, transport infrastructure choices can have long-term and potentially irreversible effects on city form. A city that chooses to invest in roads rather than public transport infrastructure to improve its transport system is likely to reduce the efficiency of any subsequent public transport investments, by causing population and employment in the city to disperse widely over space. When making decisions to build roads, therefore, the city planners need to take into account the way roads affect the operation of subsequent transport infrastructure investment choices. Once people and firms take advantage of highways and other roading investments to locate in dispersed regions far from the city centre, public transport becomes increasing irrelevant to city operation.

It is important to emphasise that the overall operation, income and welfare of a city is not necessarily affected by its population density or public transport use. Both low-density and high-density cities can have and do have high productivity

and high incomes. Moreover, it appears that city highways enable many firms to leave the central city area to obtain cheap land without losing the agglomeration benefits usually associated with central cities (Moses and Williamson, 1967; Glaeser and Gottlieb, 2009). Traditionally, firms have clustered together to reduce the cost of doing business with each other, or to share a common input or customer; this cost can be minimised by lowering transport costs, or, for a given level of transport costs, by lowering the distance between businesses – that is, by increasing density. The fact that many firms leave central business areas when road transport costs decline suggests that firms can obtain agglomeration benefits over a large area if transport costs are sufficiently low, as well as obtain benefits from not being in the central city.

Transport infrastructure in New Zealand: an historical perspective

By world standards, New Zealand's cities, particularly Auckland and Christchurch, are characterised by low density and extremely low public transport use (Bachels, Newman and Kenworthy, 1999). Like many other Australian and American cities, these cities have always had low population densities, for reasons that can be traced back to a coincidence in their initial histories: not only did they develop at a time when streetcars made it possible for people to live in suburbs and commute to the central city, but their incomes during this phase were sufficiently high that a large fraction of their populations could afford to make this commute (LeRoy and Sonstelie, 1983; Frost, 1991; Frost and Dingle, 1995). It helped that New Zealand, like Australia, was largely populated by English settlers who had a preference for living in leafy suburbs rather than compressed cities (Frost, 1991). Note, however, that this history means that while New Zealand's cities have always had low density, they have not always been dependent on the car for transport. Rather, until the 1950s, urban dwellers in New Zealand cities intensively used public transport for commuting purposes.

The transport history of Auckland is particularly interesting. In the early 1950s, 58% of motorised trips were by public transport, or 290 trips per resident per year. This is similar to the number of trips in contemporary European cities (Kenworthy and Laube, 1999.) In the mid-1950s, however, it was decided that Auckland's transport future would be based on private transport, and several highways were constructed, using the US interstate highway model as inspiration (Mees and Dobson, 2001; Harris, 2005; Mees and Dobson, 2007.) Auckland had a highway system one or two decades before comparable Australian cities, and switched away from public transport to private transport much faster than these cities, despite having similar levels of car ownership. By 2000, only 2% of motorised trips, or 33 trips per resident per year, were by public transport, the largest decline in any major city during this period around the world. The decline of public transport was much faster in Auckland than in Wellington, where a significant public transport infrastructure system had been constructed between 1937 and 1955 (Harris, 2005). Consistent with the history of US cities, the population of Auckland grew rapidly, far faster than Christchurch or Wellington, with the growth concentrated in new suburban regions south and north of the central city. In short, after the construction of the highway system, Auckland grew, decentralised and gave up public transport.

If Aucklanders wish to reduce the amount of private transport use, not only will they need to increase the provision of public transport ... but they will need an urban plan that reverses population and employment dispersal.

Since the middle of the 1990s, Auckland has made several new investments in public and private transport infrastructure, in part because of growing traffic congestion. For example, a dedicated bus-way has been constructed to the north of the city, and the train system to the south and the west of the city has been upgraded and partially double tracked. It is also upgrading its road network, and considering several large-scale developments such as a new harbour bridge. While public transport use has nearly doubled in response, it remains at very low levels (Wang, 2009). It appears that Auckland citizens, spread over a wide urban area, still find it more convenient to travel by car than to use public transport. It seems likely that the reluctance to use public transport is because many of their trips could not be easily made by public transport. If this is the case, it suggests that, for the time being at least, Auckland's public transport has been locked out by historic decisions to build a highway system, and the subsequent geographical dispersal of the city.

US evidence suggests it is very difficult to increase public transport use, and that to increase its use requires careful planning. It also requires a clearly stated objective. If Aucklanders wish to reduce the amount of private transport use, not only will they need to increase the provision of public transport (which, as Duranton and Turner (2008) suggest, can be considerably more cost effective than constructing new roads), but they will need an urban plan that reverses population and employment dispersal. This is not easy to do, given the lifespan of residential and commercial building. But it is not impossible either, as several overseas examples demonstrate, and such plans are being considered and adopted by major Australian cities (Mees and Dobson, 2007). However, this is not the only possible goal. If Aucklanders merely want to improve transportation speeds, and don't mind private transportation remaining the dominant transport form, new road and bridge construction is a means to achieve this goal. But Aucklanders should not expect this to be inexpensive, or to revitalise the central

city. The US evidence, and Auckland's own history, suggest that new roads cause population dispersal and employment decentralisation, as firms and citizens flee the central city in search of desirable locations with easy city access located slightly further out of town.

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Lewis Evans

Infrastructure Investment Under Uncertainty[1]

Introduction

Many volatile factors influence the performance of infrastructure and these yield a range of uncertainties when forward-looking investment decisions are being considered. This article is restricted to consideration of physical infrastructure, which has a wide spectrum of such factors. It includes physical events such as earthquakes that are beyond the influence of humankind, other events for each of which there is a very small probability of occurrence, and events that will almost certainly occur at some point within any reasonable period of time. It also includes economic events relating to uncommon financial episodes and common, but uncertain, volatility in demand and cost. Rare physical events have implications for investment in infrastructure that provides some mitigation of the effects of these events. In so doing, there is a trade-off between providing in advance for remotely likely but substantial events in specific, and usually costly, redundancy infrastructure, and having an economy with the resources to deal ex post with natural disasters. Obviously, some intermediate position will be socially desirable.

This article considers investment in infrastructure taking into account more immediate risks. It argues that demand should be responsive to infrastructure's direct and indirect costs and risks; and that, where economically feasible, pricing[2] will facilitate management of these risks and so enable a desirable level of investment in infrastructure. Much infrastructure – e.g. roads, electricity and gas transmission, broadband and telecommunications networks – provides platforms on which consumers interact in various ways that affect the utilisation of the platform. Without consumers revealing their willingness to pay for these platforms, investment is unlikely to meet the test of being socially desirable. This issue is placed in perspective below by consideration of the effect of incentive regulation on investment.

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Infrastructure investment once made is sunk – i.e. not recoverable in nearly its entirety – and typically entails economies of scale in investment, even in infrastructure maintenance expenditure.[3] These features and uncertainty in demand mean that provision of infrastructure is investment in capacity that services demand rather than in demand *per se*. When combined with volatility, these features complicate the evaluation of infrastructure investment.

Volatility and economies of scale

There is volatility in both demand and cost, with the extent of volatility depending on the nature of the industry. Technological change affects cost and demand, and where it is rapid – as in telecommunications – its effects on investment decisions can be significant.

Demand volatility, and hence risk, arises where there is competition in modes of delivery – for example, as between road and rail, and for gas pipelines as between alternative fuels and locations of customers. Even the utilisation of gas pipelines can exhibit very high volatility in demand at different locations in the network of pipes. To illustrate: between 1995 and 2003 the flow through one of the Natural Gas Corporation's piplines fell from the capacity of 500 terajoules (TJ) per period to 50 and rose back to 400 TJ; during this period other pipes were stranded as their gas flows fell to zero. This substantial variation evidences very considerable demand risk that must be assessed in advance when evaluating investment in capacity that will be irreversibly sunk once in place.

Cost uncertainty also arises due to variation in technological change, and a range of other factors. PBA (2004) report that cost variation can be attributed to: the price of inputs such as labour and materials; the level of competition; the level of supply and demand; project size and location; legal and regulatory requirements; constraints imposed by local authorities; choices between new construction and use of established locations; design and construction standards; and the efficiency of the project and contract management. While cost uncertainty is reduced as a project becomes more specific – e.g. in location and design – much uncertainty may remain. An analysis of tenders for 30 roading projects in Auckland, Christchurch and Wellington as reported by Transit New Zealand (2006) suggests that on average the range of tenders for the same project was 26% of the maximum tender.

PricewaterhouseCoopers (2005) reported on project quotes for four categories of investments across six electricity lines companies. The results reported in Table 1 indicate a very substantial variation in potential construction costs.[4] By way of illustration, if the quotes were normally distributed, a lines company contemplating an urban 11kV project would be of the order of 95% certain that the spread of quotes would be 55%–155% of the average quote received. Variation, and thus prospective risk, is reduced by negotiation as the project is finalised, but risk remains.[5]

Table 1: Variability of infrastructure construction costs

	Under-ground	Transformer	11kV urban
Coefficient of variation	17.8%	40.1%	27.8%

Economies of scale in investment arise where the larger the capacity provided by the investment, the lower the per-unit cost of the extra capacity. This is illustrated in Figure 1, where economies of scale are 10%: i.e. 0.9 units of investment are required to produce 1 unit of capacity. Constant economies of scale in investment would be where investment was 1 for 1 with capacity. In Figure 1, investment in two steps obviously has a much higher investment cost than investment in a single step.

The conjunction of volatility and investment economies of scale complicates infrastructure investment decisions. On the one hand, a large increment in capacity will yield lower construction costs per unit of capacity than will a multi-stage investment. On the other hand, with uncertain demand growth there may be inadequate demand for the larger capacity. Typically, capacity is expanded iteratively, trading off these two factors: where demand is more uncertain, the higher is the likelihood of the smaller increment in capacity being socially desirable, despite its higher cost.

Figure 2 indicates the decision rule in the case of volatile demand, and 10% economies of scale in infrastructure investment. Demand and capacity are on the vertical axis and time on the horizontal. Demand (x) is volatile and must be served, and capacity (s) is irreversible (sunk) but declines without investment at a fixed rate of depreciation. The socially optimal decision rule is to invest whenever demand equals capacity and at that time increase capacity beyond the amount required to meet immediate demand. This decision rule is a consequence of the presence of investment economies of scale (see Evans

Figure 1: Economies of scale in investment

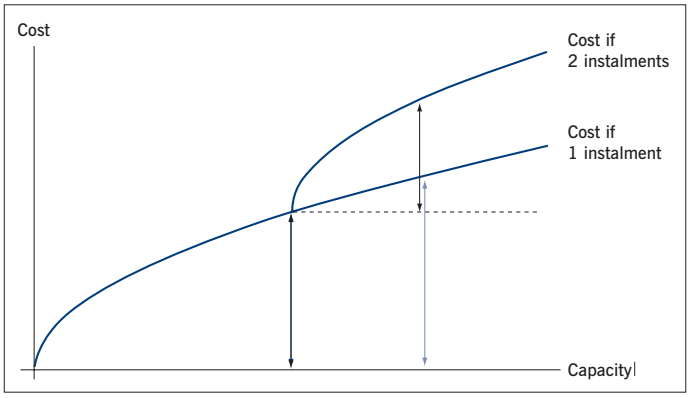
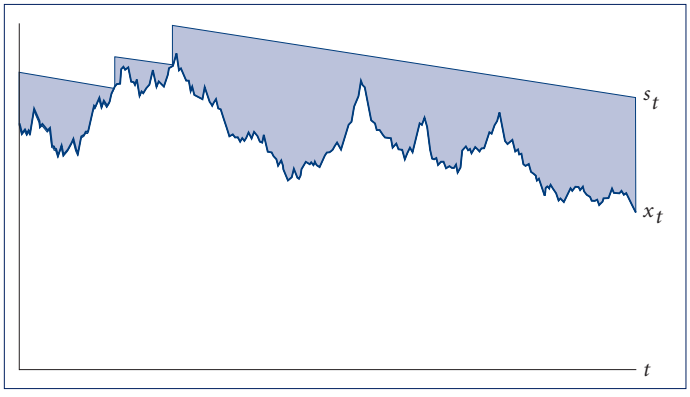


Figure 2: Demand, capacity and scale economies



The Case I firm would never start up, for its value lies below its replacement cost: this situation arises where existing assets are not allowed to, or cannot, earn a competitive rate of return.

and Guthrie, 2006), and it is affected by the variability in demand.[6] Building an extra unit of excess capacity allows the firm to connect new customers in the future without investing (at higher cost), but it destroys the option to wait and assess if such customers will arrive.

Project evaluation and regulation

The concurrence of risk and irreversible investment materially affect investment decision making (see Dixit and Pindyck, 1994; Guthrie, 2009). The key effect is to render it socially desirable that the variation in demand and cost be a critical element in the investment decision.[7] In particular, investments that seek to maximise the expected present value of the sum of producers' and consumers' surpluses into the foreseeable future should consider the timing of the investment, not just whether, if carried out, it will be socially beneficial at the date of evaluation. In situations of risk and irreversible investment it is generally desirable that there is some delay beyond this date. The delay enables some resolution of uncertainty. If the investment climate improves, much less is lost by delay than would be lost by immediately (irreversibly) investing and the investment turning out to be bad because demand (cost) turns out to be low (high). The larger the risk – or variation of demand and cost – the larger the private and social benefit of the option to delay. Economies of scale may induce a longer waiting period to invest because increased surety of demand increases comprehension of the effect of building a larger expansion in capacity, and thereby gain the cost advantages of economies of scale in investment.

The interactions among risk, irreversible investment and economies of scale have been the Achilles heel of incentive regulation of infrastructure assets. It is useful to consider why this is so because it foretells the sorts of institutional arrangements that facilitate socially desirable investment in infrastructure. In New Zealand and in some other countries it was proposed that such infrastructures as transmission, pipelines and telecommunications be subject to incentive regulation in which the regulated price be set at a level that financially just supported the most efficient firm in its delivery of services, independently of the actions of the firm being regulated.[8] The efficient price to be calculated was set as a price that would just enable a hypothetical, efficient firm to exist and provide existing services. The effect of this on firms' decision making is illustrated by examining its effect on the valuation of the infrastructure firm.

A firm looking forward from some date t has a valuation given by:

value(t) = expected present value of revenue less expected present value of costs

The expected present value of costs contains the sunk cost of the capacity in existence at date t, as well as expected future investment in the network. Consider the effect of this incentive regulation price setting where demand has to be served, there is 10% investment economies of scale and uncertainty about future costs and demand: both sources of uncertainty are reflected in the valuation of the firm that owns the infrastructure. The valuation makes some allowance for economic uncertainty (systemic risk) in the level of its discount rate but it does not include uncertainty about the very many other risks to the project's social and private viability. In this setting, Evans and Guthrie (2006) depict a firm that holds an *existing* capacity of 100 units and an associated rate base of K(t), and a regulator setting allowed revenue for the infrastructure provider as follows:

- Case I: just sufficient revenue for the firm to keep operating but not enough to start up by building the (existing) network from scratch: this requires setting revenue to cover the expected cost of additional investment but it disallows accumulated past investment.
- Case II: just sufficient revenue for the firm to start up and keep operating.
- Case III: just sufficient revenue for the firm to start up, keep operating and not lose value when it expands capacity.

The Case I firm is just willing to operate using its existing assets: that is, those put in place in the past and depreciated. Because it is earning no return on its existing assets the revenue it receives just covers its expected capacity expansion cost. At low demand it makes little profit and hence has a low valuation at that level of demand. But its profit increases as demand increases – and its network is more fully utilised – until the point where the firm's anticipation of the cost of investing in expanded capacity outweighs the revenues per unit of demand. As demand approaches capacity, the probability of having to invest in expanded capacity increases to the point that the expected cost outweighs the revenue allowed per unit of demand. Thus the value of the firm declines: by enabling the firm to just cover expected investment cost, the value of the firm where demand equals capacity is zero. The Case I firm would never start up, for its value lies below its replacement cost: this situation arises where existing assets are not allowed to, or cannot, earn a competitive rate of return. The decline in value at higher levels of demand means that the firm is contemplating investment in capacity that will have a negative payoff to it.

In Case II, the firm is allowed just enough revenue for it to start up and continue operating. Its situation is as for Case I, but with a minimal revenue stream covering both existing assets and additional, but prospective, investment. This firm will have a valuation greater than its replacement cost at moderate levels of demand, but it will try to avoid investment in additional capacity, because as demand approaches capacity the firm's valuation falls, even below its optimised

replacement cost (ORC). The revenue assigned this firm is insufficient for it to invest and maintain its value when it faces network expansion. The reason for this result is that revenue will be reset as the revenue required to just support a hypothetically efficient firm that produces the same level of services as the firm in Case II. This revenue will be based upon the cost of building a *single* network and hence must be lower than that required to just support a firm that makes *incremental* decisions over time because of the presence of economies of scale. Put another way, while the firm makes incremental capacity decisions anticipating uncertain demand, the regulator sets the price after the firm's decisions, applying the economies of scale to the whole firm and with no uncertainty about demand. The *ex post* actions of the regulator take place with more information than the firm had when it made decisions, and they utilise economies of scale more extensively.

If there were no economies of scale, but rather constant returns to scale, the firm does not lose value by expanding network capacity and thus has the incentive to invest in new capacity as required under incentive regulation. Comparison of constant returns to scale and Case II illustrates why incentive regulation fails in the case of economies of scale in investment. Scale economies must produce a conflict between the regulator and the firm in which the firm seeks to reduce its investment relative to that desired by the regulator.

In Case III, the firm has sufficient revenue that its valuation does not decline as demand approaches capacity. Evans and Guthrie explain that, in the presence of investment economies of scale, this desirable state can only be achieved if the firm is allowed an inordinately large return on its assets: a return that would not be contemplated by a regulator. It is for this reason that pure incentive regulation fails where there are economies of scale in investment. These economies exist for most infrastructure and hence pure incentive regulation is unsuitable for it. In many cases, pure incentive regulation has been replaced by historical cost regulation, where there is intense regulatory oversight and approved infrastructure investment projects are included as capital in the rate base.

Demand and investment

Cases II and III illustrate that where demand must be satisfied at prices that approach the cost of infrastructure services, it will be a challenge to achieve the socially desirable level of investment where there are investment economies of scale. If price is set at a level that just covers the cost of a replacement firm, society will have to subsidise the infrastructure provider to achieve the desirable level of investment.[9] If a price is set that just covers the incremental costs the firm incurs with its sequence of investments so that the firm is agreeable to investing, it will no longer be incentive regulation: it will be approved investment management. In this situation, demand management becomes as important as investment management. In Case II, the firm's conflict with the regulator might be resolved by allowing excess demand to reach some level before investment takes place, even in the presence of investment scale economies. Indeed, this has been an approach long advocated by some.[10] The income generated by the jump in number of customers using the infrastructure at the time of investment enables the firm to not lose value at the time it invests. Whether this means that the firm invests at the socially desirable time will be affected by whether it has competition or is subjected to regulation that precludes it making excessive rents from congestion.

Excess demand requires prioritisation of use of the capacity, and this may be achieved by pricing where it is economic, or by congestion broadly conceived.[11] Congestion pricing for infrastructure importantly allocates the capacity to those who most value its use, and it provides information about the willingness to pay for an expansion in infrastructure. Both features are highly desirable if not essential if investment in infrastructure is to be at a socially desirable level.

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1 This paper draws heavily on work with Graeme Guthrie.
2 Indirect costs include costs imposed by individuals that affect others. These suggest prices such as congestion prices that enable consumers of infrastructure to express their demand for it while paying the cost of externalities induced by their use of the infrastructure.
3 Economies of scale in investment mean that the larger the quantum of investment, the lower the cost per unit of service or output of the additional capacity.
4 The coefficient of variation is the standard deviation of the quotes for the same project divided by the average quote for that project.
5 The risk may well be shared between the investor and the construction company.
6 And variability in cost, where this exists.
7 Although some firms' decisions may differ from those preferred by society.
8 In a number of countries this approach has been applied to calculating access prices for telecommunications services: see, for example, the widely used forward-looking cost concept of total service long-run incremental cost (TSLRIC). In New Zealand, this regulation was proposed for lines companies by the Commerce Commission but was never actually implemented.
9 This is the dynamic analogue to the classic static depiction of natural monopoly. The need for a subsidy changes the concept of the desirable level of investment.
10 The argument was advanced as long ago as 1970 by Baumol and Bradford in a setting without risk but with growing demand. A second approach not considered here is to charge bundled, or two-part, tariffs: these may reduce consumer surplus at any point in time but bring forward investment in capacity to the benefit of future consumer and producer welfare.
11 Congestion can take various forms that represent reduced service quality – e.g. delays and poorer service – and be managed by prices, administrative rules or laissez faire which is unlikely to be socially desirable for infrastructure.

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Colin Crampton

> Our wealth did not create our transport infrastructure; it is our transport infrastructure which created our wealth.
>
> John F Kennedy

A Culture of Lead INFRASTRUCTURE

Introduction

In a time of global economic downturn, such as the one we are living through, it is important to ensure that we do everything we can to make ourselves as competitive as we can in the global market. The government's priority for transport is to invest in land transport to increase economic productivity and growth in New Zealand. Quality land transport infrastructure and services are recognised as being an essential part of a successful and resilient economy. Good quality land transport enables people to access employment and businesses to get their goods to markets across the country, and is the first link in the 'logistics chain' to international markets, through our ports and airports. Therefore, investing in quality infrastructure, as John F. Kennedy so eloquently put it, contributes to our economic growth and productivity.

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Ensuring we get quality infrastructure through investing in land transport is the responsibility of the New Zealand Transport Agency (NZTA). The NZTA takes a lead in planning the land transport network; investing in land transport; managing the state highway network; and providing access to, and use of, the land transport system through the licensing of vehicles and people. The aim of this article is to outline:

- how the NZTA contributes to economic growth and productivity gains;
- how the NZTA invests in infrastructure; and
- what cultural changes the NZTA has needed to initiate to address these issues.

It is not the purpose of the article to make the economic case to invest in public infrastructure and establish that long-term benefits accrue. There were sufficient papers presented to the Motu–IPS conference that already demonstrate this relationship. However, this article shows how in practice the NZTA approaches the task of ensuring that

New Zealand has a land transport system that is fit for the purpose and supports a resilient economy that competes in global markets.

The NZTA enables productivity improvements and economic growth by being involved in integrated planning to ensure that land use and transport links are planned together. In doing so the synergies that exist between having a quality planning framework and a well-managed land transport system can be captured. The NZTA also enables productivity improvements and economic growth by being responsible for improving the efficient and safe movement of people and goods around the state highway network and ensuring improvements in effectiveness of the transport system using the concept of 'levels of service' in terms of a performance measure.

The NZTA places particular focus on the Auckland network; critical routes between population centres; and routes carrying significant volumes of freight and large numbers of tourists. It recognises the importance of these routes to the overall economic well-being of the country. The NZTA sees itself as a service provider of quality links for our export market. All the high-performing industries, such as forestry, dairying and tourism, need a quality transport system to achieve, and maintain, their potential.

In fulfilling its role in planning and investing in the land transport sector the NZTA gives effect to a number of key documents:

- long-term transport sector outcomes, both national and regional;
- the National Infrastructure Plan;
- *Safer Journeys: New Zealand's road safety strategy 2010–2020; and*
- *Government Policy Statement on Land Transport Funding (GPS).*

The government policy statement on land transport funding sets the government's priority for land transport investment to support national economic growth and productivity. The GPS covers the impacts the government wishes to achieve from its investment in land transport, how it will achieve these impacts through funding certain activity classes, how much funding will be provided, and how this funding will be raised. The government directs investment through the activity classes (such as the activity class for new and improved state highways) into high-quality infrastructure projects and transport services that encourage the efficient movement of freight and people. Of particular importance are:

- investing in the state highway network as a key to the efficient movement of freight and people; and
- generating better value for money from government's investment across all land transport activity classes and enhancing economic efficiency of individual projects.

In the short-to-medium term the impacts the government wants to see are improvements in the provision of infrastructure and services that enhance transport efficiency and lower the cost of transport. To achieve this, the government wants improvements in journey-time reliability; easing of severe congestion; more efficient freight supply chains; and better use of existing transport capacity. This will provide better access to markets, employment and areas that contribute to economic growth, thus ensuring a secure, resilient transport network. Other impacts sought are reductions in the number of deaths and serious injuries on our road network; provision of more transport choices, particularly for those with limited access to a car; and reductions in the adverse impact on the environment and contribution to positive health outcomes.

As an example of how this works, the rest of this article uses the state highway network as a case study to show how these government priorities and impacts are given effect to when managing and investing in the state highway network. The NZTA tackles this in three parts:

1 What is the function of the highway network?
2 What level of service do we aspire to?
3 How best to allocate resources?

1. The function of the state highway network

In November 2010 the NZTA proposes to engage with stakeholders on a state highway classification system. The proposed classification system is built up around the function of the road. The classification system would balance the functional requirements of different state highways and would recognise:

- routes connecting major centres and thus having significant traffic volumes;
- port and airport connections;
- routes carrying a high proportion of freight;
- routes with high tourism volumes; and
- essential lifelines.

To put this into context, set out below is a range of examples.

State Highway 1 (SH1) is the spine of our state highway network. It connects Cape Reinga to Bluff, so its function changes.

SH1: Auckland to Hamilton

State Highway 1 (SH1) is the spine of our state highway network. It connects Cape Reinga to Bluff, so its function changes. The section south of the isthmus of Auckland down to Hamilton is a strategic section of SH1. It links New Zealand's largest city with the rest of the North Island and on to the South Island. It also forms one side of what has become known as the 'Golden Triangle', between Auckland, Hamilton and Tauranga. It is a section of SH1 that contributes very much to New Zealand's economy. This section of SH1 carries around 20,000 vehicles a day, of which 3,000 vehicles are trucks. Its function is very much one of moving people and freight, so it is a key link for business.

High tourism volumes: Queenstown to Milford

In contrast, the route between Queenstown and Milford may carry only a few thousand vehicles a day, yet it provides access to one of New Zealand's most iconic locations for over 100,000 tourists each year. As such, it makes a major contribution to tourism in New Zealand. Thus, this function of access for tourists to New Zealand's iconic locations needs to be recognised when managing the route.

Essential lifeline

At the other end of the functional scale, State Highway 73 provides a key link between Christchurch and the West Coast. The alternative is very long, and as such SH73 forms a lifeline between the west and east coasts of the South Island. The link provides connectivity between the two communities and allows the economic interaction that is so essential to the smaller communities on the West Coast.

In operating, maintaining and improving the state highway network it is necessary to have suitable systems that can respond to the differences between state highways. One way of managing this is to use a classification system as a way to predetermine the effectiveness of the transport network through specifying levels of service targets.

2. Levels of service

To measure and monitor the effectiveness of the state highway the NZTA uses three factors to determine the outcomes. These are reliability, safety and environmental responsibility. These factors relate back to the government's 'impacts' of improving journey-time reliability, reducing deaths and serious injury and reducing adverse impacts on the environment. To assist us with setting the appropriate level of service we are engaging with our customers and stakeholders to hear what their views are on these three areas.

Reliability

A reliable network is one where drivers can travel at their desired travel speed within the posted speed limit. This would be translated into a reliable Auckland network through not only completing the Western Ring Route, but also ensuring that there is the right balance between transport modes given the demand to travel. However, the future focus will be on getting the best out of the existing network through informing travellers before they travel, ensuring timely information is available during the journey, and ensuring that intelligent transport systems (such as ramp metering and variable message signing) are introduced effectively to ensure that the optimum use is made of the network and that travel times are reliable no matter what time of day you travel.

The challenge is how to allocate priority to all projects between today and our aspirational priorities for tomorrow.

Safety

Secondly, safe travel will be promoted through targeting maintenance and improvements to the network that contribute to a '4-star KiwiRap rating' on the heavily trafficked parts of the network. Star rating a road is a proactive approach to road safety. It enables sections of road with a relatively high level of risk to be identified before a crash occurs. The star ratings will make drivers aware of the relative safety of the roads they use, as well as help identify roads that will benefit from safety improvements.

Environmental responsibility

Thirdly, adopting environmental and social norms through appropriate standards in air, noise, water, community separation and good urban design will ensure that we meet the government's aim of a reduction in adverse environmental effects of land transport.

By combining function and levels of service we can compare what we have today with what our aspirations are for the network as a whole in the future. This generates the gap for improvements we need to close over the longer term.

3. Allocating resources

Investing in land transport is a closed system in the sense that all revenue collected from fuel, road user charges and licences is directed back into transport. Other funding sources for transport are the local government rates contributions for local government transport operations and improvements (including public transport). The ring-fencing of transport-related taxation is a policy a lot of countries would love to see implemented in their own jurisdiction. It means that in New Zealand all the tax revenue collected from road user charges, vehicle licensing fees and tolls is returned to the national land transport fund to support future investment in transport.

It is the role of the government policy statement on land transport funding to set the level of revenue against the outcomes for transport. Our job is to contribute to this debate with information: for example, on the roads of national significance. There is an economic argument for completing them sooner, so do we want to put more revenue into these routes? This has meant there has been a need for a culture change around how transport improvements are considered within the wider picture of economic growth and productivity.

The challenge is how to allocate priority to all projects between today and our aspirational priorities for tomorrow. One tool the NZTA uses to assist with this is to profile projects for the purposes of assessment using the three factors of strategic fit, effectiveness and efficiency. Each of these three factors is given a rating of H: high, M: medium or L: low. Therefore, an assessment profile of HMM means the activity was rated high for strategic fit, medium for effectiveness and medium for economic efficiency. This provides for a multidimensional assessment and ensures that the strategy for a route improvement or for an urban

area is given weight when investing in transport infrastructure.

The assessment factors are defined as follows:

Strategic fit

- links to key government aims;
- key freight and tourist routes;
- key functions such as access to jobs and business;
- congestion relief.

For example, the Wellington Northern Corridor (Levin to Wellington Airport) is classified as high strategic fit because it aims to improve access to the Wellington CBD, key industrial and employment centres, the port and airport. It provides relief from severe congestion both within the Wellington CBD and at Otaki, as well as improving the journey-time reliability and safety between Levin and Wellington Airport.

- Effectiveness
- supports national network;
- multi-modal;
- integrated with land use.

For example, Tauranga Eastern Link will reduce the cost of travel to Tauranga Port on a very busy route at the same time as providing improved environmental outcomes for Te Puke. It also supports the growth along the Papamoa peninsula in line with the SmartGrowth strategy for the Eastern Corridor by providing a good quality road network and opportunities for public transport and active modes, thus supporting the 'live work play' strategy adopted within the SmartGrowth area. This strategy encourages diverse land use patterns for an area, such as business parks being located within easy reach of residential areas and community facilities.

Efficiency

Efficiency is measured by the ratio between the cost of a project and the benefits generated (benefit-cost ratio or BCR). We place a particular focus on analysing the benefits on the basis of a route not just a project. By doing this we ensure that the whole strategy and package of improvements for a route are evaluated and optimised. The NZTA also recognises that there are wider benefits generated by a project. These wider benefits include agglomeration benefits, such as competitive advantage generated by improved access to markets, as well as employment advantages of improved access resulting in more and higher-value jobs.

For example, the completed Waikato Expressway will provide a four-lane divided carriageway between the Bombay Hills south of Auckland and Cambridge. It is expected to deliver several significant benefits which include reducing the journey time between Waikato and Auckland at the same time as providing better journey-time reliability and a safer route. The Expressway will bring, through the enhanced connectivity between Waikato and Auckland, the encouragement of economic development opportunities. It will improve supply-chain routes and industrial growth, as well as improve access to Hamilton International Airport and the major ports in Tauranga and Auckland.

Another example is the package of improvements to complete the Auckland Western Ring Route, which generates journey-time savings for travellers. It provides improved access to employment for a wider area: this converts to roughly $80–$100 million per annum of wider economic benefits from the package of improvements.

The standard BCR as currently calculated is based on an 8% discount rate. Some would argue that this discount rate leads to investment that is too focused on short-term projects at the expense of large, long-term infrastructure. The NZTA's process allows for sensitivity analysis of the BCR using discount rates of 6% and 4%. The effect of lowering the discount rate is to increase the numeric value of the BCR, reflecting the long-term nature of the investment.

Prioritised and then programmed

Prioritisation is placing projects in order in terms of their merits, based on the three-factor assessment profile. So, the project, package or combination of projects that is assessed as having a profile of high strategic fit, high effectiveness and high economic efficiency (BCR above 4) would be placed at the top of the priority list and those projects with a low strategic fit, low effectiveness and low economic efficiency (BCR below 2) would be at the bottom of the list.

The programming of the delivery of the investment is not a simple task. In an ideal world, investment would be undertaken in priority order from the top of the prioritised list down. In reality a more pragmatic approach has to be taken, to balance the competing demands of cashflow management, resource levelling, stimulus aspirations, and the ever-present project development and delivery risks that impact on both cost and timelines of delivering the overall portfolio of projects. This is particularly true when the portfolio of projects contains a mix of small, medium, large and extremely large projects at different stages in their project life cycle. Therefore, the programming over a ten-year period has to be determined by best value for money, and the optimal use of resources.

State highway improvements, maintenance and operations are considered in the context of the whole national land transport programme and so they are seen in the context of the whole land transport network. In conclusion, this has meant a culture change for the NZTA. This change can be summarised by five points:

1) Contributing to the government policy statement discussions by outlining the outcomes that are possible from current and projected revenue streams, and demonstrating to New Zealand the best use of the land transport dollar for state highways and other transport improvements.
2) Using more than the standard benefit-cost-ratio to prioritise projects. That means looking at the corridor as a whole and looking at wider economic benefits.
3) Understanding the need to provide an appropriate level of service on the different types of state highway, and the need to provide economic stimulus.
4) Protecting the network to maintain the levels of service.
5) Operating the network to take greater account of the function of each state highway.

Michael Deegan

Investing in Infrastructure

Investing in infrastructure is not a question. It is, for any nation, not only inevitable and vital, but also essential. Without infrastructure, nations, economies, individuals and communities have no future. It is as simple as that. Energy, water, transport, telecommunications: without any or all a nation cannot operate, much less prosper and grow. People's lives could not be lived. Business could not operate. City planning, growth and just getting around would become chaotic.

Since humanity began its path to civilisation, infrastructure has been inextricably linked with the development and futures of societies and cultures – and individuals. Throughout history civilisations developed and grew as their infrastructure developed and grew. Human endeavour was often portrayed and manifested in infrastructure.

The clear message we have in Australia is that, without meeting current and future infrastructure needs, we won't survive, we won't prosper and we won't grow. But to achieve the required delivery of infrastructure, and to ensure that the infrastructure delivered meets the needs as well as the aims and aspirations of both the government and communities, there has to be a plan, a strategy.

The strategy adopted by Infrastructure Australia is built on seven themes, namely:

- a national broadband network;
- creation of a true national energy market;
- competitive international gateways;
- a national freight network;
- adaptable and secure water supplies;
- transformation of the cities; and
- provision of essential indigenous services.

While delivering on infrastructure is integral to our role, Infrastructure Australia works with the Australian government and the Council of Australian Governments (COAG) in developing policy for cities, for ports and for freight in line with our defined strategy. Through this strategic approach we can create a multiplier effect of action, with positive impacts not only for business but for everyone in the community. The approach creates confidence across the board and underpins a positive business environment. We are looking not just at one area of policy or infrastructure, but right across the nation and the economy.

Involving and engaging the private sector, via public–private partnerships, in the delivery of infrastructure is vital. The feedback we have had so far is promising as the two sides learn more about each other. In my years in the bureaucracy I have been fortunate to have been able to spend time in the private sector and I have been able to gain an understanding of that sector. The same is not always the case with my fellow bureaucrats, and this is equally evident in the private sector. In engaging with the private sector, one of the most immediate and lasting outcomes has been an increased level of understanding about one another.

Putting aside what might be thought of as an almost ethereal outcome (which would be incorrect in the long term), what has been made clear is the need for:

- observable government procurement processes;
- national consistency;
- understanding of bid costs;
- understanding of bid times;

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- real risk transfer;
- governance structures and expertise;
- creating a true partnership rather than a cosmetic one; and
- the necessity of public evaluation audits.

The last is of integral importance, as the private sector needs to understand that any injection of public funds – taxpayers' funds – must be associated with full transparency.

The private sector also realises that the policies the government is following are approached on a national basis rather than state by state or intra-state across regions. For example, linking a national freight policy with a national ports policy or a cities policy with a national water policy can drive down costs and lead to better and more cost-effective services for the community.

Concomitant with the development of these national policies are initiatives on governance, although for the most effective delivery of the policies the issue of governance must be addressed. It is almost a chicken-and-egg situation of which one comes first.

Unlike the United Kingdom and New Zealand, Australia has three tiers of government: national, state and territory, and local. From before Australia became a nation through the federation of the states, conflict between the colonial governments and what was seen by them as the lesser tier – local government – was endemic. Post-federation, another layer was added to the mix.

Infrastructure Australia approaches the need for initiative in governance via the contention that the three tiers of Australian government have to engage and work together for the nation. National interests, a focus on outcomes for the Australian people, must supersede parochial issues, rivalries and one-upmanship. There is also the need, and the recognition, that government at every level must ensure that the views of the people they seek to represent are taken into account in all decisions and strategies. Without listening to the people and incorporating their views in the decision-making processes, infrastructure will not meet the aims and aspirations of the people. A government out of step with the people it represents will neither deliver for the people nor maintain the will of the people. This is the approach Infrastructure Australia takes in providing advice to all governments and in developing major policy initiatives.

We seek to identify regulatory reforms necessary to enable efficient and co-ordinated delivery of national infrastructure investment. Streamlining governance means addressing issues like planning, especially in the cities.

Nowhere is there more need to address governance than in the planning and delivery of infrastructure in Australian cities. Australia is a highly urbanised society; indeed, one of the most urbanised nations in the world. But while this may be the situation it also must be recognised that if there is an economic core in Australia, then it is found in the nation's major cities, cities with more than 100,000 people. These Australian cities contribute nearly 80% of national gross domestic product and employ around 75% of the nation's workforce. They are dominant in economic terms and equally dominant in employment. Governance of these major cities sees the hands of one national government, eight state or territory governments and 155 local governments.

On top of that, add the complexity of the bureaucracy, the departments, authorities, instrumentalities and the like. Within that myriad of governance, state and territory administrations lay down strategic planning frameworks and local government implements planning policies – although at times states take over planning decisions.

When it comes to major infrastructure within those cities – and beyond those cities – local, state and territory governments increasingly look to the Australian government for the capital to build the infrastructure. In meeting those demands, the Australian government must ensure that taxpayers' funds – and that is what builds infrastructure –are allocated to deliver improved living standards and a better quality of life for all Australians, rather than merely satisfying particular local demands. The three tiers of Australian government, national, state and territory and local, have to engage and work together for the nation. This is the beginning of a new regime in governance in Australia. If projects are to be delivered then the national good and improved outcomes for all people must be the drivers.

The new Auckland, the amalgamation of smaller local-government entities, has a larger infrastructure palate with which to work, along with increased demands, tight revenue streams and the myriad of problems replicated in Australia.

The cities are growing, inexorably and inevitably, something that is not unique to Australia. You can take, for example, the city of Auckland, the new bigger Auckland that now exceeds Australia's largest local government area, Brisbane. The new Auckland, the amalgamation of smaller local-government entities, has a larger infrastructure palate with which to work, along with increased demands, tight revenue streams and the myriad of problems replicated in Australia. This shows that infrastructure deficiencies, competition between communities or states, delivery timetables and national direction over localised and individual demands and perceived needs are features not unique to Australia. They are symptomatic of the industrialised world.

But while the national outcomes are obviously the focus of the Australian government, the reach of the national government is being expanded by it engaging directly with local government in the delivery of projects, bypassing the states and territories. Such steps are vital for the development of Australia, but they are not being taken without some resistance. Again, in the industrialised and political world that is to be expected.

Steps are being taken, and will continue to be taken, as we examine and make recommendations on reforming and streamlining governance. Reform can be across many different and divergent activities of government. In our work, for example, on developing a national transport policy and a national ports policy you can see how things can be governed better. In the transport policy, the necessary networks, of rail, road and ports, have to be financed. They also have to be priced right. They have to have access regimes and regulation conducive to business and consumers. They have to be interstate and intra-state and plugged into international markets. Nothing is in isolation. Everything is connected.

Take rail as an example. The tracks spread across Australia, across state and territory borders. Everyone – government, those responsible for the tracks and those responsible for the trains that run on the tracks – have a basic and unrelenting commitment to safety. But from state to state we have different safety regulators and sometimes different regulations. We don't have it in aviation, where the approach is national, but it is the case in rail. The need for a national rail safety regulatory regime is obvious and in the development of policy that is something we are working to put into place.

Planning is another area where the national approach is needed. Those who create and deliver major projects and those who service those projects are national in outlook, but state by state in application. In different jurisdictions there are different rules, regulations and requirements. This is another of the inconsistencies that Infrastructure Australia is examining for the Council of Australian Governments.

[When considering the delivery of infrastructure in Australia] No one could seriously consider, ... that the New South Wales economy stops at the New South Wales border. Nor does the economy of Victoria stop at the border with New South Wales or South Australia.

The outcomes Infrastructure Australia and COAG seek reflect the views of the most important group of stakeholders, the Australian people. In developing our cities policy we listened to the people who live in the cities. Those we listened to came from every city in every state and territory. They were the people who sat in trains, on buses and on ferries; the people who sat in motor vehicles, idling in congestion, waiting, frustrated, for traffic to move; the people who walk or ride bicycles. The people consulted may not be intimately involved in the development and design of new infrastructure, but they are the ones who eventually pay for government projects. They are also the people who will use the projects on a daily basis. As both end-users and project financers, they have expectations, aspirations and demands. They deserved to be listened to and that is what Infrastructure Australia did.

It did not come as any surprise to be told that problems with urban public transport and road infrastructure were the most common areas of dissatisfaction among people who live in Australia's major cities. Public transport was seen as overcrowded, unreliable, too infrequent, too slow and unsafe at night. Roads were seen as choked and congested and residential streets were seen as clogged with parked cars. There were also comments about limited or incomplete cycle paths. Walkers suffered from distances, dangerous intersections, too many vehicles, too much noise and the sense of being crowded out.

People, again not surprisingly, were also perceptive. They knew where the problems lay and, while they may not have the solutions, they look to government to find the solutions.

But government itself is not omnipresent; it needs information, analysis, debate and review in finding the path to the right solution. Our engagement with the private sector in public–private partnerships gives us one stream of outside advice. Other sources include industry organisations, along with the wide breadth of knowledge and experience held by the members of the board of Infrastructure Australia.

Across the nation we are told of the problems and shortfalls in one particular area or city or region. But what can be found in each of those areas, cities or regions can be replicated in almost any part of Australia. A new road, a new rail connection, upgraded and expanded ports, water and energy projects are not unique to particular locations and it seems that everyone has their own wish list. What communities are coming to understand is that every item on wish lists cannot be delivered. The ports, the roads, the rail lines, the water and energy grids and pipes, the broadband telecommunications, all are vital to meet Australia's infrastructure needs. But just as vital as the concrete and steel of infrastructure, things that people can see and touch, is the need to continue to promote reform in how we do things, how we price things, and, as discussed

earlier, what forms of governance are in place to work to and with.

We also need to accept that, when it comes to delivering infrastructure, Australia is not, and cannot be, confined by borders. No one could seriously consider, for example, that the New South Wales economy stops at the New South Wales border. Nor does the economy of Victoria stop at the border with New South Wales or South Australia. Ports, transport (road and rail) energy, water and telecommunications are, in economic terms, national. A national approach to infrastructure delivery is not only vital to the national economy, and to the lives of all Australians, but it is common sense. The borders drawn on maps in the 19th century exist, and will continue to exist, but those colonial lines on a map no longer inhibit the Australian economy. If some states want to resist the national approach, then they are flying in the face of reality.

This is even more of a denial of reality when you realise that it is to the Australian government that the states look for the majority of funding for major infrastructure projects.

Across the national government there are clear indications and evidence that things are being done. In financial and economic parlance, Australia is a 'player' in the most dynamic and growing region in the world: the Asia–Pacific region. And infrastructure will not only keep Australia in the game, it will enhance its place.

If rail and road connect the ports that link Australia to the world, then the national broadband network (NBN) is the link to every corner of the nation. The NBN is infrastructure vital for the future economy, and perhaps epitomises a change of approach for Australia. Like transport, communications are a vital part of everyday life, commercial and personal. The NBN will keep all Australians in instantaneous contact with economies and people around the region and the world, as well as in the next Australian street.

Underlying all aspects of what Infrastructure Australia does is the theme of building and rebuilding Australia's infrastructure. It is being done so there is growth and prosperity for the Australian nation and the Australian people. Infrastructure underlies productivity gains by helping Australia do what it does best even better, and more competitively. In many respects, the task has only just begun. The infrastructure deficiencies have been identified and Infrastructure Australia has appraised and recommended projects across the nation that are now being rolled out or are ready to begin. Strategies and policies are being developed for the future of Australia's ports, freight networks and cities.

Simultaneously, Infrastructure Australia is working across government on redefining governance through co-operation and reform, both statutory and economic. Through this there is a combination of:

- forces and factors;
- people and experiences;
- a desire to grow and share prosperity;
- acknowledging problems and resolving them; and
- building for the future with governance that works for the future.

This combination is now showing the potential of Australia and that potential is unlimited.

Todd Bridgman

Empty Talk?
University Voices on the Global Financial Crisis

The global financial crisis (GFC) which began in 2007 with a liquidity squeeze in the US banking system and which continues to play out today has affected us all, whether through the collapse of the finance company sector, rising unemployment, falling housing prices or the recession which followed the initial market crash. The speed and scope of the crisis surprised most experts – policy makers included. Specialists from a myriad of disciplines, from economics and finance to risk management, corporate governance and property, are trying to make sense of what happened, why it happened and what it means for us now and into the future. Members of the public rely on the news media to keep them informed of the crisis as it unfolds and they rely on experts to translate these complex events into a language which they can understand. The GFC is educating us all, and it is important that we all learn from it to avoid making the same mistakes again.

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In this article I report on my empirical study of public discussion of the GFC in New Zealand. I consider the contribution of New Zealand university academics alongside the contribution of others with expertise, and assess the performance of the mainstream news media in covering this global event of massive significance to our local communities. For me, the study raises questions for policy makers about how we view the role of universities in society and what the public can and should expect from their investment in them. Clearly, a number of academics have made valuable contributions to a public understanding of the impact of the GFC on New Zealand. The Institute of Policy Studies, for instance, hosted roundtable discussions on the GFC and the recession and in 2009 published contributions from five New Zealand economists in *Policy Quarterly*. Overall, however, I have concluded that, despite being a significant reservoir of knowledge in relation to many matters at the heart of the GFC, the public voice of our universities has been faint. Universities claim to be active public contributors and relevant to the communities which support them, but, at least in the case of the GFC and its effects on New Zealand, these claims sound like empty talk. I want to stress that this is not all of their own making, however, since in many ways their actions can be seen as rational responses to the policy environment they inhabit, which

places little value on communication with a lay audience. Another contributing factor is an increasingly resource-starved and commercialised mainstream news media, which makes the inclusion of academic voices less likely.

Veteran broadcaster Paul Holmes recently lamented the quality of expert comment on the New Zealand economy, describing economists who appear in the media as 'fundamentally, intellectually dishonest' (Holmes, 2010). According to Holmes, those who work for banks cannot be trusted because their employers have a commercial incentive to maintain confidence in the economy. Those working for economic research firms are also suspect because they depend on corporate clients for their survival. If we can't listen to them, who can keep us informed about New Zealand's economy? Interestingly, Holmes makes no mention of academics. 'The only people who know what is really going on, fundamentally, are the shopkeepers and Fonterra.' I mention Paul Holmes because his comments highlight a central theme to emerge from my research: that academics are largely forgotten when we consider sources of expert comment on major events such as the GFC. When we hear an economist talking in public about the economy, chances are it will not be a university economist, but rather an economist employed by a large bank or a research consultancy. This applies not just to economics, but to other disciplines relevant to the GFC, such as finance, property, law and management. My study explored why this is the case, what the implications are for the quality of public discussion and what could be done if we wanted academics to play a more active public role. In the following section, I provide an overview of the study, followed by some key findings. I then consider what is distinctive about the voice of academics, and conclude by suggesting how we might strengthen that voice to take more seriously our responsibility as public educators.

Universities as the 'critic and conscience' of society

The impetus for the research was a suggestion that globally, the university-based 'public intellectual', defined as an academic who has a commitment to speaking in the public domain, is in a state of decline and that this adversely effects the quality of public debate (Jacoby, 1987; Posner, 2001). 'Public intellectual' is not a term that rests easy with New Zealanders. Turner (2007, p.85) concludes that 'just talking about public intellectuals makes you … a wanker rather than a well-rounded bloke'. New Zealand's small population, geographical isolation, a prevalence of colonial attitudes and a pioneer culture which privileges Kiwi ingenuity over academic achievement is said to create an environment which is hostile to intellectualism, especially in the public arena (Horrocks, 2007).

The public role of academics is an issue particularly relevant for New Zealand because our universities are distinctive for having a statutory obligation to act as the 'critic and conscience' of society (Education Act, 1989). The philosophical origins of this obligation can be traced to Cardinal John Henry Newman's 1852 lectures on *The Idea of a University*. For Newman, the purpose of a university education was to cultivate the intellect, both within the boundaries of the university and beyond, in order to better enable people to make sense of their world (Newman, 1976). The term 'critic and conscience' emerged out of the 1988 Hawke report on tertiary education (Hawke, 1988) and subsequently found its way into the Education Act. The act identifies five characteristics that distinguish universities from other tertiary institutions: universities are primarily concerned with advanced learning; research and teaching are closely connected; universities are international in their standing; they are a repository of knowledge; and they accept a role as critic and conscience of society (Education Act, 1989).

What does it mean for universities to act as the critic and conscience of society? Wilf Malcolm, a former chair of the New Zealand Vice-Chancellors' Committee who pushed for its adoption, describes it as an enabling function which provides people with the knowledge and understanding to be able to exercise judgement. Performance of the critic and conscience role takes place in the classroom, through research and also through engagement with the wider life of a community (Malcolm and Tarling, 2007). It is made possible through the protection of academics' freedom to 'question and test received wisdom, to put forward new ideas and to state controversial or unpopular opinions' (Education Act, 1989).

The contribution of New Zealand academics to our public conversation on the GFC has been muted, in comparison with other experts, apart from a small number who have made frequent comments.

My own institution, Victoria University, has recognised these obligations as 'public contribution', one of eight strategic goals in its 2009–2014 plan (Victoria University, 2008a). According to the former chancellor, Emeritus Professor Tim Beaglehole:

> We want to ensure our research and knowledge are shared with the public in a way that enriches New Zealand's culture, society and economy. Victoria University's staff and students are well placed to contribute to the opportunities and challenges in the world today and we will continue to encourage and support staff in their role as the critic and conscience of society. (Victoria University, 2008b)

For the purposes of the study, 'public contribution' was defined broadly and included public presentations, appearances in the media, material written for a general audience, blogs, submissions to public bodies and

various engagements with community organisations. My assessment of the contribution of academics was based on an extensive archival search of online news databases, university websites and other online content such as blogs, as well as 43 interviews conducted with academics, other experts and members of the media. The study does not provide an objective measure of academics' public contribution vis-à-vis other experts. However, the qualitative data provides convincing evidence that New Zealand academic voices on the GFC have been muted.

Through my analysis of the archival data I identified academics who had regularly commented on various aspects of the GFC, including economics, finance, corporate governance, property, tourism, agriculture and politics, as well as academics in these fields who have not been active in public, to understand why. All of New Zealand's eight universities were represented in the sample. I also talked to experts who made public comments but are not academics, such as bank economists, private sector economists and spokespeople for various interest groups, such as unions and employer associations, to learn more about their motivations for undertaking such activity, as well as their perception of the contribution of academics. Finally, I spoke with people in the media, including journalists, journalism educators and media commentators to discuss their interactions with academics and other expert sources.

The faint voice of academics

The contribution of New Zealand academics to our public conversation on the GFC has been muted, in comparison with other experts, apart from a small number who have made frequent comments. This group of active academic contributors are typically driven by the desire to have an impact on policy, practice and the wider community, with many seeing their public work as a service to the public, in return for the public funding of universities. Most felt that, while such work benefited their university by providing it with good publicity, the university did little to recognise or reward their efforts. In contrast, the group of expert commentators who were not academics had stronger institutional support for their efforts. Economists and other private sector experts spoke of the commercial benefits of their public commentary in building their organisation's profile and credibility, while interest group spokespeople saw their public engagements as an effective way of ensuring their organisation's perspective was heard.

Respondents from the media typically found it difficult to find academics willing to comment publicly and felt academics needed to become better at speaking in a language accessible to those without specialist expertise.

Many of the academics interviewed, including both those active in providing public commentary and those who are not, regarded regular engagement with the wider public, particularly through the media, as detrimental to an academic career. This work is time-consuming, which leaves less time for 'outputs' which are accorded higher value, especially research articles in academic journals. Respondents spoke at length about the negative influence of the Performance-Based Research Fund (PBRF), which began with an initial round in 2003 and is nowadays an increasingly important funding stream for universities based on their research performance. Some felt the PBRF discouraged them from undertaking research on the New Zealand context, because it placed greatest value on research published in prestigious international journals, many of them in the US, which were not much interested in New Zealand. As a result, research that was relevant to local communities and which could have genuine impact on those communities was forgone in the pursuit of research more likely to appeal to an international audience. A combined effect was home-grown researchers losing touch with New Zealand issues and university departments increasingly seeking to recruit international faculty with excellent publication records but little interest in local concerns, such as New Zealand's experience of the GFC. Not everyone blames the PBRF for the retreat of academics from the public sphere. One respondent believed that it predates the PBRF, beginning in earnest with the election of the fourth Labour government in 1984, when academics became genuinely fearful of putting their heads above the parapet.

A lack of incentive is not the only reason for academics to shy away from public commentary. Those who speak in public can attract strong criticism and sometimes the threat of legal action. Many academics avoid media requests because of a fear of their views being misrepresented by journalists, although those academics active in the media accept this as an unfortunate but inevitable consequence of not being in control of the way stories are presented. Some academics avoid public interactions because they want to avoid trivialising academic knowledge, or, perhaps more importantly, want to avoid being seen by their academic colleagues as engaging in that process. Others questioned whether they were sufficiently in touch with current events to offer anything meaningful to the conversation.

Respondents from the media typically found it difficult to find academics willing to comment publicly and felt academics needed to become better at speaking in a language accessible to those without specialist expertise. Experts outside the university have dominated the public discussion of the effects of the GFC on New Zealand partly because they are adept at providing what the media

are looking for. Bank economists, for instance, understand well the news media's predisposition towards sources that are suitable, available and accessible. Bank economists can talk on a wide range of issues, from interest rates to immigration, business confidence to housing, exchange rates and commodity prices. They watch closely the daily flow of economic data and are therefore well positioned to offer expert comment at short notice and they are also highly skilled in speaking in a language the public can understand.

But does it matter if academics have contributed little to the public's understanding of the GFC and its effects on New Zealand? What, if anything, are we missing out on? There was a consensus amongst respondents that academics are perceived as more independent than other sources of expertise. They believed that when academics speak, they do so as individuals, whereas almost all others who contribute in public are spokespeople for organisations, which are perceived as having vested interests in promoting particular viewpoints. Paul Holmes' distrust of bank economists is a case in point. The bank economists I spoke to vigorously refute this suggestion, pointing out that their influence depends on their credibility, which would be nil if their expert comments bore little relation to economic reality. Rather than deliberately misleading the public and 'talking their book', as Holmes claims, several respondents felt that bank economists were likely to avoid discussing issues which placed the actions of the banking sector in a negative light. It was important, therefore, to have other experts in economics and finance, especially academics, to provide an independent view. For their part, bank economists were supportive of greater involvement by academics, acknowledging that academics were better equipped to provide the 'big picture' overview of the economy, as well as to put today's economic events in a broader historical context.

Having said that, it would be naïve to assume that the independence of universities is absolute. None of the journalists interviewed routinely ask academics if they have conflicts of interest, yet many academics have private research and consulting arrangements which could raise conflicts on various issues. In addition, New Zealand universities routinely seek funding from industry, such as the University of Canterbury's agreement in 2005 with Provincial Finance to fund a professorial chair in investment finance (University of Canterbury Foundation, 2005). The university hoped the deal would strengthen ties with the business community, fund world-class research and contribute to the economic development of the region, but Provincial Finance was put into receivership the following year. In light of the collapse of the finance company sector, we should be mindful about the potential influence which corporate funding has on the capacity of universities to act as the critic and conscience of society. If we want our academics to be a source of independent expert comment on the state of an industry, do we want them reliant on that industry for funding?

We also need to be mindful of the ability of our news media to transmit the voices of academics. New Zealand's population means we have a small media with little diversity amongst the mainstream print and broadcast offerings and limited funding for public broadcasting.

Strengthening the voice of academics

In defence of universities, they have simply mirrored policy makers' neglect of the critic and conscience role. It is clear from government's *Tertiary Education Strategy 2010–15* that the priorities for the tertiary sector lie elsewhere. The government's vision is for tertiary education to act as a driver of productivity and economic growth – 'tertiary institutions need to work more closely with business to ensure that research meets the needs of the economy' (Ministry of Education, p.7) – in essence what the University of Canterbury set out to achieve through its relationship with Provincial Finance. The government seems mindful of criticism that the PBRF discourages academics from engaging with audiences outside the university, recognising that 'research in universities needs to combine excellence with impact' (ibid., p.16). But impact is defined narrowly: 'We will ensure that the Performance-Based Research Fund recognises research of direct relevance to the needs of firms and its dissemination to them' (ibid.). When policy makers regard universities as the handmaiden of industry we should not be surprised when they pay lip service to their critic and conscience obligations.

We also need to be mindful of the ability of our news media to transmit the voices of academics. New Zealand's population means we have a small media with little diversity amongst the mainstream print and broadcast offerings and limited funding for public broadcasting. As a former journalist, it was sad to encounter through this research a widespread feeling of despondency about the current state and future prospects of journalism in New Zealand. Mass media organisations, especially newspapers, have been hit hard by the GFC, at a time when they were already struggling to deal with the implications of technological advances on their business model. Newsrooms have always struggled to retain their experienced personnel because of the lure of higher paying jobs in public relations, but, with them now having to operate on small budgets, there are even fewer senior reporters with the knowledge and experience to pursue complex stories of major public interest, such as the GFC. One journalist identified a trend towards

'churnalism', where press releases are published with little or no intervention by a journalist, either to check facts or source an opposing view. The quality of New Zealand's business and economic journalism is especially vulnerable as there is no specialised training and it is not a popular destination for graduates. This environment of increasingly scarce resources reinforces journalists' reliance on their established sources, such as bank economists, on whom they can rely to provide an informed comment at short notice, and makes it less likely that they will search out an academic perspective, unless they are already an established source.

The end result is a New Zealand mass media ill-equipped to perform their function as the 'fourth estate' by holding powerful institutions in our democracy accountable for their actions. In an increasingly commercialised industry, it is becoming less obvious that they even identify with those responsibilities. Capital + Merchant Finance sponsored TVNZ's nightly news updates until it was placed in receivership in 2007, and we must not forget TVNZ's infamous voiceover provided by former news presenter Richard Long: 'This *One Weather Update* is brought to you by Hanover, a New Zealand business with the size and strength to withstand any conditions.' Might New Zealanders have been better informed by our public broadcaster about the finance company sector without commercial arrangements such as this?

The extent of academics' public contribution depends on a range of interactions between the funders of universities, universities, the media, and of course, individual academics. There are, then, no simple solutions to New Zealand universities' neglect of their statutory responsibility to act as the critic and conscience of society. Apart from being an effective means to raise their profile and demonstrating that the university is engaged with contemporary issues, there are few tangible rewards for universities making an active public contribution. There are some costs, since it reduces the time academics have for the seemingly all-important task of performing on the PBRF. In a more conducive policy environment, there is much more universities could do to encourage, support and recognise the public contributions of academics, including giving this work greater weight in promotion processes, creating awards to recognise outstanding public contributions, awarding honorary degrees to those in society who act as critic and conscience, making media training for academics more freely available and getting those academics active in public to mentor colleagues.

The risk for universities is that they have limited control over the public contributions of their faculty, since they speak as individuals and not on behalf of the university.

An issue for policy makers is whether the PBRF, in its current form, really provides taxpayers with value for money from their investment in university research. When New Zealand's academics have such little to say in public about an issue as significant as the GFC, perhaps this is indicative of good intentions producing unintended consequences. The PBRF could be changed to value more highly research published locally, and greater weight could be given for academics having an impact on a wider audience than other academics and even industry; but then measuring impact is problematic.

It should also be remembered that there is risk for universities in encouraging their academics to reach out to the public. Acting as critic and conscience might involve raising difficult questions, exposing uncomfortable facts and presenting unpopular positions, meaning the potential for controversy is ever-present. A recent example of this concerned the comments of Massey University management academic Greg Clydesdale, who, in 2008, sent a report to New Zealand media which questioned the economic contribution of Pacific Islanders' to New Zealand society. The report became the lead story in Wellington's *Dominion Post* newspaper, sparking accusations of racism and counter-claims of political correctness, which led to a review by the race relations conciliator. Two peer reviews commissioned by the Ministry of Pacific Island Affairs questioned the quality of Dr Clydesdale's research, and, while Massey University had concerns about the way he had made the work public, it affirmed his right to academic freedom (Chalmers and Ling, 2008).

Without entering into the debate about the quality of Dr Clydesdale's work, the manner in which he distributed it to media or the actions of the *Dominion Post* in giving it such prominence, Dr Clydesdale was asserting his role, and that of Massey University, as the critic and conscience of society. The risk for universities is that they have limited control over the public contributions of their faculty, since they speak as individuals and not on behalf of the university. While universities have staff whose job it is to manage public communications, academics will often work independently of them. We must be careful that the freedom of academics be respected because if academics can only make public comments which are approved by their universities, the very essence of the critic and conscience role will have been lost.

This article has focused academics' engagement with a wider public, but I acknowledge that this is but one form of public contribution. Many academics are active in providing expertise to various public bodies and in conducting research for government. For example, my own dean, Professor Bob Buckle, had a recent high-profile appointment as chair of the Tax Working Group, an independent group of experts endorsed by government

ministers to consider tax policy challenges facing New Zealand. I am also aware that academics from a range of policy fields have been advising the government behind the scenes on their response to the GFC. My aim is not to discount these activities, but to suggest that there is also a responsibility for academics to engage with an audience beyond academics, policy makers and others with specialist expertise. This is the concept of academics as public educators, helping to translate complex events in a manner accessible to a lay audience.

While it has become common for governments around the world, including New Zealand's, to justify public expenditure on tertiary education with reference to productivity and economic growth, we would be foolish to neglect the broader contributions of universities to society. The events of the GFC have challenged received wisdom about risk, the financial services industry, corporate governance and many other aspects of business. Experts who work New Zealand universities have been largely silent in public about these issues. Our understanding of the effects of the GFC on New Zealand, and therefore our ability to avoid making the same mistakes again, is poorer for that. One hopes that we can learn from this experience to take more seriously universities' fulfilment of their distinctive role as the critic and conscience of society.

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A loss of 'white' male privilege? Gender and ethnic dimensions of domestic student participation in bachelor degree studies

by Paul Callister

Against a background of constrained government finances that have led to the government capping funding for bachelor degree study, this research considers the changing ethnic and gender composition of domestic students. In particular, it explores who is now under-represented in bachelor level study.

IPS WP 10/12 September 2010

Why are a group of mid-life men on the margins of work and family? A literature review

by Paul Callister and David Rea

Since the 1960s and 1970s New Zealand and other industrialised countries have moved away from a situation where most mid-life men were in full-time paid work, married and living with dependent children, highly unlikely to be in receipt of benefit income, and most likely to be economically supporting their partner and children. This study explores why these changes have taken place.

IPS WP 10/13 October 2010

Harshan Kumarasingham

Executive Power 60 Years On Has Anything Changed?

When New Zealand changed its electoral system from first-past-the-post (FPP) to mixed member proportional representation (MMP), the move was heralded as the end of old politics. Prime ministers and their Cabinet would no longer be the 'elected dictatorship'. The executive would now be constrained by greater checks and balances. The two-party system that had held New Zealand politics hostage for at least 60 years would end and instead a greater diversity of interests would be represented in the House of Representatives, a House that could better hold the executive to account. This was the aim, but has it happened? This article examines recent instances of executive actions that are akin to those taken in the FFP era that MMP has been unable to eliminate. It also offers suggestions for how to increase the accountability of the executive by strengthening the constitution and other branches and offices of state.

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After being prime minister for three terms, the Labour leader conceded defeat after a convincing loss at the general election. The long and eventful Labour administration was to be replaced by a National one headed by an energetic and ebullient leader untested in experience as prime minister, but primed and prepared for power. John Key, the 11th National Party leader, in 2008 replaced Helen Clark, the 11th Labour Party leader, as prime minister after nine years just as Sid Holland succeeded Peter Fraser almost 60 years earlier.

Key, like Holland (except for a few months in the War Cabinet in 1942), became prime minister without having critical experience of government, and yet both Key and Holland had long held the ambition to become leader of New Zealand. They had also both campaigned on the promise that National had something new to offer the electorate after the long years of Labour rule. However, Holland and Key astutely did not seek to tamper with many of the successful policies of the previous administration. Instead they projected their vitality and freshness, because, although government had become almost synonymous with 'Old Peter' and 'Aunty Helen', the

New Zealand people had decided it was only fair to 'give the other fellow a go'.

Clark, like Fraser, had generous experience of the Treasury benches and had won three election victories. These Labour titans, however, after nine years in the top job were both unable to persuade the voters to give them another term in office, allowing the National Party to gain office with a mandate for reform, but not revolution.

The MMP era

So, 60 years on is executive government in New Zealand the same? No. The MMP representation system has revolutionised the electoral system and changed the political landscape without question. The hegemony over the political system that Labour and National governments exerted under Fraser and Holland is effectively over. The two-party dominance is gone and instead the House of Representatives and the Cabinet table must be shared by other parties and partners in a way that a parliamentary historian would have to look way back to the Massey–Ward era to find some form of precedent for. The proportional system has compelled the 'Wellington model' of the Westminster system to adopt governing arrangements and parliamentary accommodations that would have been unthinkable and unnecessary 60 years ago.

However, many of the constitutional issues that faced the era of Fraser and Holland can also be seen in the era of Clark and Key. The change to New Zealand's electoral system did not cause the evaporation of concerns over the excesses of the executive. Indeed, it would be delusional to heap on MMP the responsibility for curing all our constitutional ills. The executive may no longer be unbridled, but nor has it become completely bridled. The Westminster system's innate flexibility allows many of its core principles to continue despite key changes that MMP has demanded. As legal scholar Philip Joseph argues:

> 'The more things change, the less they change.' And so it is with MMP. MMP has wrought major changes to the New Zealand political landscape. It has changed the way we do the business of government but has left untouched the essential ground-rules of Westminster government … In its essential respects, the Cabinet system New Zealand inherited in the 1850's has remained remarkably resilient … From a constitutional perspective, there has been an almost seamless transition from the former plurality voting system to MMP. The cabinet remains much as it was before … Retaining the confidence of the House remains the axis around which the entire system revolves. This imperative facilitates the democratic ideal and is the bedrock of the Westminster system. It has been so ever since the cabinet system was introduced in 1856. (Joseph, 2008)

MMP has given more choice and more representativeness to the New Zealand voter, but this is not the same as giving more formal or informal checks and balances on the political executive. New Zealand in 2010 is still unitary, unicameral, and governed by an unwritten constitution. The executive, and prime minister in particular, still retains many of the prerogatives that were available to Fraser and Holland. In the Clark–Key era there have been subtle and not so subtle executive emanations that have demonstrated that prime ministerial power is still alive and well.

Enduring executive prerogatives

Helen Clark's political style has been described as 'presidential' since '[h]er focus is squarely in her ability to go over Parliament, front for the Executive and work her way through and around the constitutional checks and balances, and persuade New Zealanders of the rightness and rectitude of her policies and unite them behind her' (O'Sullivan, 2005). The commentator cited admits, however, that 'the move towards a more presidential style of direct action did not suddenly emerge under Clark's regime. Over the past 20 years New Zealand prime ministers have increased the Executive's reach'. An analysis of Clark's leadership by a respected political journalist assessed that Clark 'imposed iron discipline on colleagues, her caucus and the party … As Prime Minister, she puts the emphasis on "prime", being well briefed on what is happening across all portfolios, jumping on colleagues who muck up and even taking over if things are not fixed' (Armstrong, 2008). The same could have been written of Fraser. Clark had a loyal deputy prime minister and finance minister in Michael Cullen (just as Fraser had Nash concurrently in the same positions) to buttress this state and provide much of the policy grunt required to action prime ministerial edicts often without the involvement of Cabinet.

The Clark government's decision to abolish appeals to the Privy Council and create a Supreme Court in New Zealand as the final appellate court in 2003 was arguably, after MMP, the biggest constitutional change since the abolition of the Legislative Council.

Executive vs. judiciary

This method of government increased tension between the executive and judiciary as well. The Clark government's decision to abolish appeals to the Privy Council and create a Supreme Court in New Zealand as the final appellate court in 2003 was arguably, after MMP, the biggest constitutional change since the abolition of the Legislative Council. Unlike MMP, the abolition of the right to appeal to the Privy Council was not put to a referendum (Harris, 2006, pp.117-9). Thus, as with the removal of the upper house, the Privy Council appeal was eliminated from the

... New Zealand's unicameral Parliament is dangerously the 'plaything of the executive', lacking even with its select committees 'the multiple layers of consideration that bicameralism provides'.

New Zealand political landscape without direct public involvement. Questions over judicial independence arose during the Clark era when the government, clearly annoyed with the judiciary, overturned the Court of Appeal's 2003 decision in *Attorney-General v Ngati Apa*[1] with the Foreshore and Seabed Act 2004. Around the same time the chief justice, Dame Sian Elias, was also worried that the judiciary's independence was being eroded by many of its administrative functions being taken over by the Ministry of Justice (similar concerns have been made about the Office of Governor-General being administered by the Department of the Prime Minister and Cabinet) and it therefore being 'beholden to a minister', further ensuring the judiciary to the executive. Clark replied to Dame Sian's position by stating she should 'stick to the bench'. Further to this Clark appointed Cullen, 'who had led the parliamentary charge against the Chief Justice', as attorney-general, thereby charging a non-lawyer, finance minister and deputy leader of the Labour Party (among his other important political roles) to become the 'principal legal advisor to the Government' and 'disregard partisan advantage in exercising his duties' in recommending judicial appointments (see Stockley, 2006; NZ Herald, 2005).

National's justice minister, Simon Power, has carried on the executive tradition of expecting the other branch of state to keep away from its exercise of power. Dame Sian delivered a speech which, among other issues, raised concerns about overcrowding in prisons and the question of whether alternatives to prison sentences might have to be discussed. Power immediately responded, with the prime minister's backing, stating brusquely, 'This is not Government policy. The Government was elected to set sentencing policy, judges are appointed to apply it'. Even though Dame Sian's speech acknowledged that the elected politicians must decide on this the head of the judiciary was again told to 'stick to the bench', even though constitutionally it is within her role to discuss such matters, especially with her 'extensive first hand experience of criminal justice matters' (Geddis, 2009).

Strained conventions

The new National-led government in its short time in office has already tested many

constitutional conventions in asserting the New Zealand practice of impressing executive power over the other branches and offices of state. The legislature in the Westminster system has always been open to dominance by the executive. MMP has lessened this trend, but it has not succeeded in completely evading this political reality. In fact, the Key Cabinet is almost like the FPP cabinets of old, since there is only one party at the Cabinet table – the support party ministers sit outside Cabinet – and has been acting like an FPP one. National's November 2008 result 'mirror[ed] the certainty that had resulted from elections under the FPP system' since '[f]or the first time under MMP it seemed a coalition agreement would not be necessary' (Hayward, 2010, p.227). The Clark ministry had already tested concepts of ministerial and collective responsibility when Clark creatively allowed for an 'agree to disagree' concept to reign. However, this left, for example, a constitutionally awkward situation and, especially for our international partners, the confusing spectacle of having a foreign minister (Winston Peters, the New Zealand First leader) vocally and publicly against critical aspects of foreign policy trade initiatives. Despite this, the foreign minister retained his authority over the ministry that implements foreign policy and the confidence of the Cabinet by representing the government overseas. In terms of the coalition politics expected of MMP this was pragmatic politics on the part of Prime Minister Clark in accommodating Peters, but for the health of conventions and executive accountability it was a further strain on responsible Westminster constitutional practice.

Executive vs. legislature

After just a week in office the new government surprised many by using urgency to rush through five major legislative enactments. The previous administration had also used urgency. What this showed to one astute observer was that 'National appears to be behaving no better. Its first week in control of the new Parliament indicates that it also intends treating this institution's lawmaking power as nothing more than a convenient means of getting the outcomes it wants'. Parliament would be relegated to the inglorious role of being 'a rubber stamp that transforms the wishes of the government parties into law as quickly as possible' (Geddis, 2008). The more deliberative democracy role of the House of Representatives hoped for under MMP has not eventuated enough to stymie executive inclinations, as urgency has become a more frequent practice which raises too few constitutional eyebrows.

Distinguished political and legal philosopher Professor Jeremy Waldron recently argued that New Zealand's unicameral Parliament is dangerously the 'plaything of the executive', lacking even with its select committees 'the multiple layers of consideration that bicameralism provides'. Looking at our slender institutional structures, Waldron confesses that he is 'worried that New Zealand not only abandoned its second chamber, but abandoned also other safeguards in its legislative process', leaving the country 'with virtually none of the safeguards that most working democracies take for granted' (Waldron, 2008). The purity of the executive largely remains.

Select committees were a New Zealand innovation meant to provide a pragmatic parliamentary check on the executive. The appointment of the associate local government minister, John Carter, in May 2009 to chair a special select committee dealing with Auckland local government issues has been described as 'unconscionable' and an act that shows the government 'riding roughshod over parliamentary convention', since it 'draw[s] the executive too closely into Parliament's role of scrutinising how ministers spend the money that Parliament votes for the running of their portfolios'. Labour had allowed comparable practices during its term, and the Carter episode is a further reminder 'that the independence of select committees is more a mirage than reality' (Armstrong, 2009). And government members of Parliament making up the majority of the committee's membership is a further reminder of the danger of select committees being facsimiles of executive instruction as they were in the FPP days.

Guardians of the state

Senior public servants have increasingly had to deal with their advice competing for ministers' attention with that of political advisers during the Clark–Key years.[2] The public service, as Colin James has argued, has the 'opportunity – I would say the duty – to develop and keep in mind a longer perspective on what constitutes the public interest'. However, National ministers, he observes, like their Labour predecessors have taken on an influential phalanx of personal policy advisers, endowing them with

> quasi-public service status despite being clearly political [they are often paid for by departments though answerable to the minister and not the chief executive] … Ministers are often frustrated by constitutional niceties. They want things done. Departments and agencies often fall short of ministers' hopes, for ideas and in execution. So ministers are tempted to, and occasionally do, step over the boundary. (James, 2009b)

Whether New Zealand is a republic or realm, the necessity of checks and balances on the executive is critical.

Therefore, if the public service is not guarding the guardians, who, asks James, is? He states that although it should be the the governor-general this is actually a nominal power, since the contemporary truth is that 'in our constitution now the Governor-General is the cabinet's gopher', which is a great concern when there is 'a Prime Minister who is accumulating constitutional minuses' (James, 2009a).

How to check the excesses of the executive?

What is the solution to all these conspicuous exercises of executive power? Can they be remedied? Should they be

changed? Do we care? Yes, we should care, but the solutions, remedies and changes are not as easy to determine. There is no constitutional crisis in New Zealand, but we cannot be mollified by that tired cliché 'if it ain't broke, don't fix it'. Crises are not in the habit of providing a detailed forward agenda. Small events can quickly spiral into the chasm of constitutional unrest. We need only look to comparable constitutional monarchies for constitutional crises such as what occurred in the United Kingdom during the early part of the 20th century, when the monarch was actively drawn into a parliamentary fracas; in Australia in 1975, which witnessed 'The Dismissal' by Sir John Kerr of Gough Whitlam; and more recently in Canada in December 2008, when the governor-general controversially prorogued Parliament, thus anticipating a vote of confidence that could have brought down the government. In our own backyard Pacific pool, Fiji (as both a constitutional monarchy and a republic) and Solomon Islands have demonstrated the potential constitutional calamities that can arise in rapid sequence.

The British prime minister, like ours, exercises 'authority in the name of the Monarch without the people and their elected representatives in their Parliament being consulted', and when using these prerogative powers 'it is difficult for Parliament to scrutinise and challenge government's actions'.

Republic?

Will becoming a republic allow New Zealand the comfort of being immune from constitutional emergency? No. If the country were to change from the Realm to the Republic of New Zealand it is almost certain that it would remain a parliamentary-based democracy, which means most of the same issues would apply. Comparable systems that have similar characteristics of multi-party politics, non-executive heads of state, Cabinet and parliamentary-based government which we could credibly emulate in becoming a republic are India, Ireland and Italy. Their vaunted republicanism has not prevented executive excess.

Whether New Zealand is a republic or realm, the necessity of checks and balances on the executive is critical. However, most countries, including our own, have the checks and balances; the problem is how aware we and our representatives are of them. A greater awareness and appreciation of the responsibilities and duties of our governor-general, prime minister, Cabinet and individual branches of state, and of our own as conscientious citizens would do much to limit the excesses of executive power. Too often there have been major constitutional changes and executive actions without comprehensive review or participation. The principal political actors have, knowingly or not, abdicated their responsibility. If not abdicated, then they have willingly colluded to abuse constitutional safeguards by their actions or inactions that have resulted in change to our system with worrying ease.

Get rid of MMP?

The prime minister as part of a campaign pledge promised a referendum on the electoral system. This is more than what Sid Holland did with the change to unicameralism, or Fraser with the end of the country quota.

However, there is still a fear that despite a referendum being held in conjunction with a general election there would be, in Philip Temple's understanding (*NZ Herald*), 'no consultation with the voters, no review of inquiry, no select committee hearings'. Temple and others such as Green Party co-leader Metiria Turei believe 'an independent review of how MMP was working with full public consultation would be better in the first instance than spending millions on a referendum'. Indeed, rather than weighing in against or for MMP, many feel jilted by having the issue decided by Cabinet decree with its 'simplistic yes–no referendum' which does not give opportunity to examine the merits and demerits of the electoral system and any alternatives (NZ Herald, 2009b). Justice minister Simon Power confirmed that a referendum will be held in 2011 on MMP and that voters will be asked two questions: 'the first will ask voters if they wish to change the voting system from MMP. The second will ask what alternative voting system they would prefer from a list of options'. However, even the Cabinet papers released with this October 2009 announcement voice concern about the potential that 'voters will not know the alternative voting systems they will have to choose from' and therefore could 'have difficulty in making an informed choice' (Power, 2009).

A new separation of powers

Such feelings illustrate the need and the importance of knowing and being involved with our constitution before undertaking system change. Whatever your view on the change itself, it should be elementary that comprehensive contemplation and participation be demonstrated before any action is taken. A greater emphasis on and understanding of the separation of powers is required, and that relies on the executive admitting and supporting the fact that it is just one of the branches of state. A 'new separation of powers' could see a 'constrained' prime minister and Cabinet by granting independence and influence to 'other checking institutions' and give a renewed impetus to providing constant attention to checks and balances (Akerman, 2000).

How can a new separation of powers be realised in New Zealand? Our constitutional infrastructure is somewhat bare so it would require an enhancement – though sometimes nothing more than a realisation – of the powers of existing

institutions whose duty it is to check the executive and hold it accountable.

An upper house?

Parliament is the natural fulcrum and forum of our system. I have argued elsewhere on the value an upper house could have added to the New Zealand system (Kumarasingham, 2010). Even an appointed upper house could use its position, despite a weak veto power, to highlight legislative or political questions about government policy.

A legislative council could have copied Britain's approach and created an independent and effective appointments commission to make recommendations on 'non-party-political members'. The commission could have the power to 'vet all recommendations to the House of Lords', including political appointments, which would enhance the convention of political parity in the upper house (House of Lords Appointments Commission, 2008). Recent scholarship in the United Kingdom argues for the importance of an appointed chamber as a critical source of 'deliberative democracy'. Rather than focusing on elections and voting procedures to define democracy, 'deliberative democrats concentrate on the processes by which opinion is formed and alternatives debated': as such, the less politicised House of Lords has the power with its 'scrutiny and accountability role' to force government 'to defend in public its actions and intentions' by being effective in 'drawing media or activist attention to an issue'. Therefore, the House of Lords can 'catalyse public debate and influence the nature of that broader democratic discussion' (Parkinson, 2007). At the very least an upper house in New Zealand would have added another level for legislation to go through, and would have potentially halted the fast-tracking of bills and other constitutionally questionable methods of enacting controversial policy (Cooke, 1999, pp.140-1).

More power to Parliament?

In response to the rumblings over his predecessor's creative constitutionalism and executive power, Gordon Brown and his lord chancellor, Jack Straw, published a green paper in July 2007. The paper outlined recommendations that would restrict executive power to the benefit of Parliament. The British prime minister, like ours, exercises 'authority in the name of the Monarch without the people and their elected representatives in their Parliament being consulted', and when using these prerogative powers 'it is difficult for Parliament to scrutinise and challenge government's actions'. Based on the recommendations in the green paper, here are some proposals for reform that could restrict executive power in our own Westminster.

- The royal prerogative powers exercised by the prime minister are put onto a statutory basis and brought under stronger parliamentary scrutiny and control (though this does not propose changes to the governor-general's 'constitutional or personal prerogatives, although in some areas the Government proposes to change the mechanism by which Ministers arrive at their recommendations on the Monarch's exercise of those powers').
- A convention is developed under which the government could deploy armed forces without the approval of the House of Representatives.
- A prime minister requires the approval of the House of Representatives before asking the governor-general for a dissolution.
- A majority of members of Parliament can ask the speaker to recall the House, 'including in cases where the Government itself has not sought a recall'.
- The attorney-general is no longer a senior member of the government and attends Cabinet only when legal issues are directly concerned. This could enhance public confidence and trust in the office of attorney-general as the chief legal adviser to the Crown and his/her role as guardian of the public interest.
- Greater transparency, more consultation and a greater role for Parliament in major public appointments that are carried out by executive instruction. In addition, for certain appointments, where appropriate, the government nominee is subject to a pre-appointment hearing with the relevant select committee.[3]

Another recommendation is that the granting of honours has strictly limited political involvement. Indeed, an editorial by the *New Zealand Herald* which backed the Key government's decision to bring back titular honours in March 2009 nonetheless advocated that:

> The whole system should be taken out of politicians' hands. The honours are awarded in the Queen's name and there seems no reason that her representative, the Governor-General, could not appoint a panel to sift nominations and recommend a list of worthy recipients. So long as it was one function for which the office did not have to act on ministers' advice, the system would be relieved of suspicion that it might be used for political rewards. (NZ Herald, 2009a)

The Council of State could act like a Privy Council, but without political executive domination, advising the governor-general in the discharge of the office's powers.

Greater role for the governor-general?

This conveniently suggests another proposal: strengthen the role of the governor-general as our de facto head of state to act more confidently as the 'guardian of the Constitution'. This would give the office that sits atop the entire system a greater check on the system. Brown's green paper for Britain did not make direct proposals for changing the Queen's personal and constitutional prerogatives (reserve powers), instead

concentrating on those the government exercised in her name. However, it is useful to reform (not remove) those ancient prerogatives to strengthen a governor-general's authority over them. Sir Michael Hardie Boys has outlined the five powers, 'which need not be exercised in accordance with advice', as being:

- to appoint a prime minister;
- to dismiss a prime minister;
- to refuse to dissolve Parliament;
- to force a dissolution of Parliament; and
- to refuse assent to legislation. (Hardie Boys, 1997)

These five powers are all, or at least can be if the situation is not clear, controversial and critical. However, a governor-general in such situations where the decision is far from obvious or where he or she is unsure as to the validity of the choice is compelled to make decisions with minimal opportunity for consultation. The governor-general in the exercise of the reserve powers, and in making other judgements concerning such responsibilities as Crown appointments and honours, could rely on a 'Council of State' to assist and add credence to the his or her choices. This Council of State with a membership similar to the Irish Council of State[4] could act as an 'integrity branch' (Akerman, 2000, pp.294-6) made up of the highest practitioners from the three branches of state and chaired by the governor-general (see Power, 2008). The Council of State could act like a Privy Council, but without political executive domination, advising the governor-general in the discharge of the office's powers. The Council of State would thus strengthen the governor-general by not only providing expert advice, but also by removing through its existence and mana a sense of submissiveness towards the political executive. It would end the isolation a modern governor-general feels when making major decisions to become a real guardian of the constitution.

No magic formula or constitutional fantasy will make New Zealand into some democratic utopia. There can be no hope of some divine oracle announcing granite laws of constitutional perfection to a Moses or Maui on Mount Sinai or Mount Ruapehu. We should, however, be ever mindful of the dangerous potential for executive excesses that have been demonstrated since before the time of Fraser and Holland, and certainly since, due to ignorant or lazy observance and understanding of the New Zealand constitution. We would do well to be vigilant and prevent further misuse.

1 [2003] 3 *New Zealand Law Reports* 643
2 For a more thoroughgoing analysis of these issues see Boston and Halligan (2009).
3 These recommendations are taken directly from Secretary of State for Justice (2007).
4 The Irish Council of State is composed of the prime minister, deputy prime minister, chief justice, president of the High Court, presiding officers of the two houses of Parliament, attorney-general, any former president, prime minister or chief justice willing to serve and up to seven presidential nominees.

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Clair Mills

Health, Employment and Recession

The Impact of the Global Crisis on Health Inequities in New Zealand

Introduction

New Zealand entered a period of economic recession in early 2008, intensified by the global economic crisis of September 2008. Gross domestic product (GDP) fell consistently during 2008,[1] and that year saw the economy's worst performance in over a decade (The Treasury, 2010a). Real per capita GDP contracted through 2009 and, despite some market optimism in early 2010, economic indicators remain sluggish. Unemployment rates have risen and remain the highest seen since the last recession in 1997–98. The Treasury recently stated that 'the current recovery is likely to remain muted relative to past recoveries' (The Treasury, 2010b).

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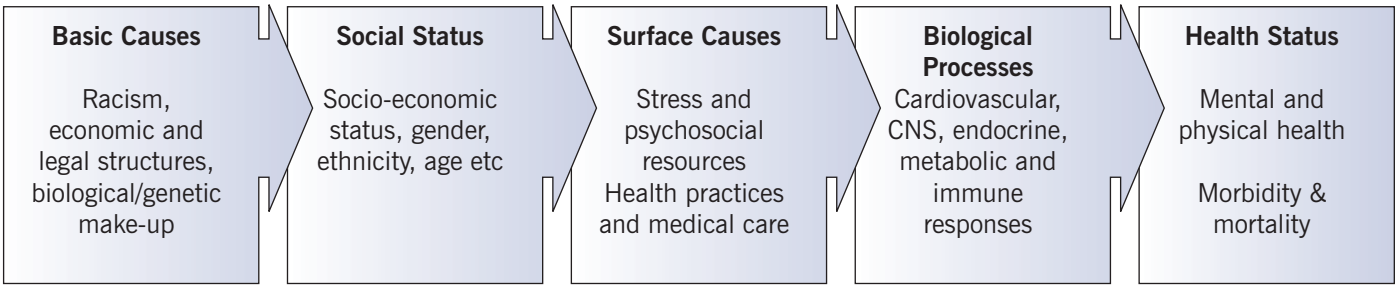
The recession has given rise to debate in the public health literature over the effect of such economic changes on population health (McLeod and Blakely, 2009; Horton, 2009; Bambra, 2010; Bartley and Ferrie, 2010). However, there has been less focus on its potential impact on health inequities (defined here as inequalities in health between population groups that are preventable, can be considered unfair and that are amenable to policy intervention (Whitehead, 1991; World Health Organisation, 2008)). This article discusses the relationships between economic recession, determinants of population health and health inequities. A conceptual framework is proposed to explain why health inequities may increase in times of recession. The limited evidence for public policies and strategies that may protect or promote equity in health is reviewed and, from this, priority areas for intervention during recession outlined.

Effects of recession on population health and inequities in health

Since the beginning of the 20th century mortality rates in developed countries have consistently declined, with an oscillating pattern around that downward trend line. This trend appears resistant to even major

Figure 1: Model – 'basic causes' of inequities in health (adapted from Williams, 1997)



shocks, such as recession or conflict. International evidence also suggests that economic recession is associated, somewhat counter-intuitively, with short-term decreases in total population mortality. The largest recession effect on mortality appears to be a decrease in road traffic deaths, with smaller reductions seen in child mortality, cardiovascular deaths and cancer deaths (Tapia Granados, 2005; Gerdtham and Ruhm, 2006; Bezruchka, 2009; Stuckler et al., 2009).

However, the *differential* distribution of the impact of economic recession on differing population groups is not as well studied. Effects have been shown to vary for different age groups and diseases, by sex, and by method of measurement of economic change (Brenner, 1983; Brenner, 1987; Edwards, 2008; Stuckler et al., 2009). Importantly, from an equity perspective, a net positive effect of economic recession on life expectancy could occur despite some groups being negatively affected.

Evidence from New Zealand research also suggests that if past trends and policy responses to economic recession are replicated, relative and in some cases absolute, inequities in health have the potential to increase during this current economic downturn, despite ongoing decline in overall mortality (Pearce et al., 2006; Blakely et al., 2007; Blakely, Tobias and Atkinson, 2008; Tobias et al., 2009). During the period of economic recession and major economic reforms in New Zealand from 1984 to the mid-1990s, unemployment became a structural feature of the economy, median income levels declined, and income inequality increased dramatically. Even by 2009, the incomes of the bottom 30% of the population were on average only a little better in real terms than those of their counterparts two decades earlier in 1988, while the upper income quintile was proportionately much better off (Ministry of Social Development, 2010).

In parallel, health inequalities increased from 1984 to the mid-1990s: relative inequalities in child mortality by income group (Shaw et al., 2005) increased, as did relative inequalities in adult mortality. These were particularly evident in low-income young men, in whom rates of suicide, and absolute and relative mortality inequities, increased (Blakely et al., 2007; Blakely, Tobias and Atkinson, 2008). Geographical and ethnic inequalities also widened in the period 1984–1996, and for Māori men life expectancy stagnated (Pearce et al., 2006; Blakely, et al., 2008). Overall, relative inequalities in mortality and life expectancy gaps between Māori and non-Māori widened in the mid-1980s–1990s, in parallel with trends in social inequalities; these were most noticeable in the period 1991–94, and in men (Tobias et al., 2009).

How does economic recession affect population health and equity?

A conceptual framework or theory must be able to satisfactorily explain the long-term decline in mortality; the *relative* (and sometimes absolute) inequalities in mortality between socio-economic and ethnic groups, which have largely persisted or even increased over time; and the effects of economic recession on both population heath and inequities.

Three dominant theories for the consistent reduction in mortality are postulated in the literature (Murray and Chen, 1993). McKeown (1976) argued that declining trends in mortality preceded major medical advances, and that economic growth, resulting in improved incomes and standards of living, improved housing, sanitary engineering and nutritional status (i.e. the 'social' determinants of health), were largely responsible for the impressive fall in mortality seen since the end of the 19th century. The impact of modern health care and technology, and changes in culture and in societal and personal health behaviour, such as tobacco use or the increased autonomy of women, are the other theories proposed. All three have likely contributed to mortality decline, with debate continuing over the proportion and importance of each over different time periods. What is well established is that population health is significantly influenced by broader social determinants, rather than solely by genetics, personal behaviours or access to medical care (Marmot and Wilkinson, 2006; World Health Organisation, 2008; Adler and Stewart, 2010). But although these mortality declines and 'determinants of health' models may explain how improvements in population health have occurred, they generally fail to make explicit the key drivers of inequities in health: that is, what has created, and maintains, inequities between socio-economic and ethnic groups.

Williams (1997) identifies these drivers as the 'basic causes': those factors that require change to fundamentally create changes in population health outcomes, and thus address inequities (Figure 1).

In this conceptual model, 'surface' causes are related to the outcome, but altering these factors alone does not produce corresponding changes in the outcome (i.e. health inequalities persist). As long as the 'basic' causal forces driving inequities are in operation, the inequitable distribution of socio-economic factors such as income, employment and education will remain, and alteration of surface factors alone will give rise to new intervening mechanisms to maintain the same outcome (Williams, 1997). The persistence of socio-economic and ethnic

Table 1: Unemployment trends in New Zealand 1992–2009

Population Group	1992[i]	1998 [ii]	June 2008	December 2009	June 2010
Unemployment rate (total)	10.9%	7.1% [iii]	3.9%	7.3%	6.8%
Youth (15-24 years)	n.a.	17.4%	15.8%	26.5% (15-19yrs)	24.7% (15-19yrs)
				12.2% (20-24yrs)	13.7% (20-25yrs)
Pākehā	8.1%	5.5%	2.8%	4.6%	4.4%
Māori [iv]	26.1%	18.3%	6.3%	14.8%	14.3%
Pacific [iv]	28.8%	16.4%	6.7%	14.0%	14.1%
Total Unemployed	100,000+	129,000	87,500	168,000	159,000
Total "Jobless"	n.a.	208,300	170,500	275,900	255,700

Notes: Data from Statistics NZ Household Labour Force surveys or Department of Labour unless otherwise stated.
(i) The peak period of unemployment during the 1980-1990s recessions.
(ii) The last economic recession in New Zealand was in 1998-1999
(iii) Statistics That Matter: Employment and Unemployment in NZ May 1998 See: http://www.jobsletter.org.nz/stt/stathome078.htm#age
(iv) Ethnicity collection methods have changed since September 2008 so direct comparisons over time from published data are not possible. "Total response" data are presented for Māori for 2009 & 2010. See: http://www.stats.govt.nz/browse_for_stats/work_income_and_spending/Employment/HouseholdLabourForceSurvey_HOTPDec09qtr/Technical%20Notes.aspx

inequalities in health during this past century, despite the overall mortality decline, changes in the major causes of death and in their underlying risk factors, is consistent with this analysis (Krieger, 2000).

When economic recession occurs, Williams' model predicts that although there may be a range of factors contributing to ongoing overall population mortality decline, the power and structural factors in society that determine access to these socio-economic and 'surface' elements (e.g. income, employment, access to health care) are not random, and will continue to operate differentially. It is thus highly plausible that there will be differential health impacts of economic recession. This may then result in an *increase* in relative and/or absolute inequities in health, despite overall reductions in mortality.

How might this play out in the New Zealand context? As demonstrated above, health outcomes in New Zealand closely mirror socio-economic and ethnic inequalities in income, employment and other social determinants of health. There are significant Māori: non-Māori inequities in a range of child and youth illness and injury outcomes (Craig et al., 2007). Ethnic and socio-economic inequities in most major causes of adult morbidity and mortality persist; after generally widening in relative terms from the mid-1980s to 1996, there has been some narrowing since 1996–99, in parallel with increasing median income levels and lessening income inequalities from 2001 to 2007 (Ministry of Social Development, 2010, p.65).

As Williams' model predicts, the impact of economic recession on two key determinants of health, employment status and income, is not equally distributed across population groups in New Zealand (McLeod and Blakely, 2009). The effect of unemployment on health and health inequities will be used here to illustrate further Williams' model, and propose potential policy interventions for reducing inequity.

Unemployment increased steadily over 2008–09, peaked in December 2009 at 7.3% (a ten-year high) and remains elevated (Statistics New Zealand, 2010). Unemployment is highly differentiated by age, ethnicity and place. Youth (15–24 years), Māori, Pacific people and those living outside major urban centres have the highest rates and are most affected (see Table 1). As in previous recessions, increased unemployment is expected to be prolonged, well beyond the return of positive GDP growth.

Increasing unemployment is associated with a wide range of adverse social outcomes, particularly when prolonged (Welfare Working Group, 2010). Low socio-economic status and unskilled men in the United Kingdom, especially those who had illness, never regained the employment rates seen before the 1990s recession (Bartley and Owen, 1996), and a similar pattern has been seen in New Zealand, with rises in the rates of long-term unemployed, sickness and invalid beneficiaries. Secure employment increases the likelihood of recovery from limiting illness, and deterioration in job security may be an important factor in the increasing prevalence of limiting illness in the community (Bartley and Ferrie, 2010).

Unemployment also has significant acute impacts on health, particularly poorer mental health status and parasuicide (Platt, 1984; Bartley and Owen, 1996; Morrell, et al, 1998; Keefe et al., 2002; Blakely et al., 2003; Gunnell et al, 2009; Stuckler et al., 2009). Those with mental illness are at greater risk of losing jobs, but even where there is no history of serious mental illness, longitudinal studies show a 70% greater suicide risk and evidence for a causal influence of unemployment on depression and suicidal thinking (Jin et al., 1995; Mathers and Schofield, 1998; Lundin et al., 2010). New Zealand already has the highest youth suicide rate in the OECD and Māori rates of youth suicide remain 1.5 times higher than non-Māori (Te Rōpū Rangahau Hauora a Eru Pōmare, 2007). Increasing unemployment rates in young adults, particularly given their unequal distribution by ethnicity and region, should therefore be a grave concern, not least for mental health equity.

Reduction in income associated with increased unemployment is likely to be another key mediator of the effect of economic recession on health (McLeod and Blakely, 2009). Income is a marker of tangible material resources, and may indicate limited access to basic needs like adequate housing and nutrition. Recent adjustments to social benefit levels have not aligned with increases in the net average wage (Work and Income, 2010), and as increasing numbers of households rely on unemployment benefits, this will likely contribute to increased numbers of households on lower incomes, as well as resulting in greater income inequality.

In addition, changes in individual and societal behaviour such as changes in tobacco and alcohol use or decreased access to health care are thought to be likely mediators of the effect of recession on health (Tapia Granados, 2005; Stuckler et al., 2009). Tobacco and alcohol use is already highly patterned by socio-economic status and ethnicity in New Zealand. Reforms to primary care have increased access over the last decade, but reversal due to restrained health sector funding, increased fees or cuts in services would have a deleterious impact on those already worst off, as was shown in the 1980s–1990s (Malcolm, 1996).

Williams' model predicts that, given the unequal impact of unemployment and related reduction in household incomes outlined above, already existing inequities in health may increase – at least in relative terms – unless the 'basic' structural causes are also addressed.

Table 2: Strategies to protect and promote equity in health

Level of intervention	Potential interventions to protect/promote equity in health during recession
'Basic causes'	Macroeconomic policy: balance focus on growth with equity concerns: • Monitor monetary policy for employment and equity effects. • Progressive taxation policy to address income thresholds; extend 'Working for Families' approach to reduce wage-benefit gap and proportion of families/children living in poverty. • Crown to meet Treaty of Waitangi obligations, and promote Māori economic development and educational achievement, especially in regions of high unemployment. • Enhance economic and legal rights of workers to ensure adequate job security.
Social status	A comprehensive employment strategy with an equity focus, including: • Alternatives to early entry to the job market (e.g. increased quality apprenticeships and tertiary places). Lift current caps on tertiary funding and enhance skills-based, industry-based training. • Maintain an adequate minimum wage and social benefit levels in line with wages; develop active labour market policies including support for those choosing to move off non-unemployment benefits (e.g. childcare, training and removing other barriers to paid work) (Martin, 2000). • Address the 'demand' side: promotion of job creation in regions most affected by unemployment, for example through evidence-based housing interventions (environmental and rent/income/loan assistance interventions, construction of social housing, improvements to existing housing, etc); small business support; relevant public works. • Given the importance of the early childhood years in establishing social and health inequities (Poulton et al., 2002), increase funding for evidence-based quality parenting and early childhood interventions, especially in areas of high unemployment/deprivation.
'Surface causes'	• Implement and monitor strategies to increase access to and utilisation of primary health care in relation to need (e.g. free primary health care access for children, including after-hours care). • Enhance mental health, domestic violence and drug and alcohol services in areas of high unemployment. • Avoid stigmatisation of unemployed.
Biological processes	• Monitor and improve equity of access to, and utilisation of, quality treatment, e.g. for hypertension, diabetes, heart disease, cancers, especially in areas of high unemployment and deprivation.

Implications for policy

Addressing health inequities remains a 'wicked problem' in public policy (Petticrew et al., 2009); that is, a complex challenge unsuited to evaluation by randomised trials, and one that requires different sectors to work together, often with inadequate evidence for how positive outcomes can be best achieved. Despite considerable national and international research describing and analysing health inequalities over the last three decades, our understanding of the potential pathways between socio-economic determinants and their distribution, their intersection with ethnicity, and health status remains incomplete. There are also many fewer studies that examine the equity effects of public policies than studies *describing* inequity. Although descriptive studies frequently draw associations between policy interventions and outcomes, there is a lack of strong evidence that *implementing* such an intervention will be effective in reducing social inequities in health, and even less specifically during economic recession. A recent 'umbrella'[2] review found that relatively few interventions beyond those aimed at modifying lifestyle factors, such as smoking, had been developed with the aim of reducing inequalities, and of those, few were well evaluated. Perhaps unsurprisingly given the methodological difficulties, there were no systematic reviews found of macroeconomic, cultural or environmental interventions and their effect on health equity, and a paucity of evidence on educational interventions. This review found that interventions relating to health services, education and transport policies were inconclusive in terms of their impact on health inequities (Bambra et al., 2009).

However, there was consistent international evidence for positive effects on health equity in some areas of social policy, which may equally apply during recessionary periods. Housing interventions, such as rental assistance and structural improvements, have the potential to positively impact on health and equity (Anderson et al., 2003; Bambra et al., 2009). The significant evidence base established in New Zealand on housing and health supports this (Baker et al., 2000; Howden-Chapman et al., 2007; Howden-Chapman et al., 2008). Interventions in the work environment, such as increased employee participation in organisational and task changes, also showed improved safety and enhanced self-reported mental and physical health (Bambra et al., 2009). Given the limits of this current evidence, further strategies to protect and promote equity in health during recession are proposed below, operating at the different intervention

levels conceptualised in Williams' model (see Table 2).

The rationale for these interventions is primarily based on evidence from policy interventions in previous recessions and well-established associations, but monitoring and evaluation is needed to assess their impact on inequities in practice, as well as for possible unintended consequences. Additionally, addressing inequities at the 'basic causes' level often requires opposing the most entrenched, politically contentious and structurally embedded factors in our society (World Health Organisation, 2008; Navarro, 2009) – a shift in paradigm not without challenge.

Unemployment is a major contributor to reduced incomes, and is itself related to significant adverse social and health outcomes. A major strategic focus on unemployment is needed, underpinned by an equity perspective. Priorities that have the potential to promote equity in health during this period of economic stagnation are identified below:

- Active intervention in the labour market is important, given the consistent evidence for the significant negative associations of unemployment with health outcomes. There is evidence that these types of interventions, although not a panacea, can be partially successful in addressing both structural and cyclical unemployment (Martin, 2000; Betcherman et al., 2004; USAID, 2009). Evidence from the 1980–90s in Finland and New Zealand – the former experiencing greater increases in unemployment – suggests that higher social spending in Finland on active labour market interventions was associated with lower male suicide rates (Howden-Chapman et al., 2005). Stuckler et al.'s analysis (2009) across 26 European Union countries supports this finding, as do other studies (Gunnell et al., 2009). In the United Kingdom, temporary youth unemployment schemes in the 1980s were almost as detrimental to mental health as unemployment, and quality apprenticeships and tertiary education opportunities provided much better mid-term outcomes (Dorling, 2009).
- Interventions addressing the 'demand' side (especially in regions of high unemployment). These could include social housing and infrastructure improvements, which would stimulate the construction sector and which have been shown to have positive effects on health inequity, as well as other social outcomes. New Zealand has very low levels of social housing by OECD standards, with high entry costs. Strategies to stimulate the housing market and increase access to housing, such as extending the 'Welcome Home Loan' scheme (including review of the maximum loan amount) and low-interest government-backed 'first home' loans, could also be implemented. Other public works and small business support schemes should also be considered, despite less positive evidence for their impact, balanced against the immediate and future costs of non-intervention.
- Support for the unemployed and those partially employed includes maintaining adequate household incomes, especially social benefit levels. The 'Working for Families' package has had a significant positive impact on low-income working

household incomes, and a similar level of support should be extended to other low-income households. Tax policy and social benefit changes need to be critically analysed and monitored not only for their potential for economic stimulus or reduction in government spending, but for their effect on low-income families and income inequality. Increases in income inequality have been strongly associated with greater inequities in health *and* poorer total population health outcomes (Wilkinson and Pickett, 2009; Kondo et al., 2009).

- Finally, the potential importance of the health sector in alleviating and addressing health inequities during recession must be recognised (Tobias and Yeh, 2009). Population health interventions and clinical health services should be strengthened to respond adequately to increased unemployment and its consequences. Mental health, youth health, and drug and alcohol services are already the 'poor cousins' of the health sector but need to be prioritised and reinforced to address the current and future impacts of unemployment. Funding constraints in the health sector should not reduce quality or access to services, particularly those delivering health care to Māori, Pacific, children and youth.

Conclusion

International evidence indicates that economic recessions are associated with short-term decreases in total population mortality. However, evidence from the 1980s–90s recessions in New Zealand and from international studies suggests that, conversely, inequities in health may increase. Williams' model may explain this conundrum: the negative effects of economic recession, especially on key determinants of health such as employment and income, impact differentially on population groups, and predominantly on those already less privileged.

There is some evidence for macroeconomic and social policy interventions which can moderate unemployment and its consequences, and potentially reduce health inequalities even during periods of economic recession. These include active labour market strategies, housing policies and maintaining adequate household incomes. The health sector has an important role in monitoring equity in health, to ensure it remains a priority and is not rapidly undermined during recession. It is also critical to address inequities in access to health services so that these do not further exacerbate inequity in health outcomes.

Without changes in the 'determinants of inequity' – the structural features of society which drive the unequal distribution of determinants of health – Williams predicts that health inequities will persist or widen, even while total mortality falls. There is little to suggest that a return to positive GDP growth alone – especially with current high levels of unemployment – will reduce relative health inequities. The reversal during the post-1996 period of the trend in increasing health inequities indicates that health outcomes are very sensitive markers of social inequality, and remarkably rapid, positive effects on health inequities can be achieved. However, this positive trend will be in part dependent on the economic and social policy responses to recession. A concerted focus on equity and appropriate policy interventions is needed, alongside a return to economic growth.

1 Real GDP per capita fell from the last quarter of 2008, and the annual average percentage change remains negative.
2 'Umbrella' reviews identify, appraise and synthesise systematic review evidence on a given topic.

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