Disclaimer: The views, opinions, findings, and conclusions or recommendations expressed in this Working Paper are strictly those of the author(s). They do not necessarily reflect the views of the Ministry of Economic Development. The Ministry takes no responsibility for any errors or omissions in, or for the correctness of, the information contained in these working papers. The paper is presented not as policy, but with a view to inform and stimulate wider debate.
Title: Getting Auckland on Track: Public Transport and New Zealand’s Economic Transformation

Date: August 2007

Authors: Sam Abusah & Clinton de Bruyn

Contact: Aucklandpublictransport@med.govt.nz
Executive summary:

New Zealand’s economic development strategy – the Economic Transformation Agenda – identifies the critical role that Auckland needs to play in the transformation of New Zealand’s economy.

As New Zealand’s only city of scale, Auckland will need to lead the country’s economic transformation and become an international, outward-facing city. Comparative evidence suggests Auckland has not realised the benefits of scale and agglomeration to the extent that may be expected.

There are a range of possible reasons why a city has not realised agglomeration benefits. The paper contends that Auckland’s traffic congestion and resultant poor accessibility characteristics may be one of a possible number of constraints that is preventing Auckland from realising the benefits that are often associated with scale and density. A number of studies support this view and suggest that achieving higher levels of transport accessibility supports higher density activities and employment.

The Auckland transport network is characterised by relatively high levels of congestion. Grimes (2007) found that Auckland has lower travel speeds than any Australian city during peak hours (at 40km/hr compared to the Australian range of 41-53 km/hr). Auckland’s transport accessibility issues are further highlighted by regional forecasts which show that congestion levels are expected to deteriorate over the next decade. In the next decade an additional 195,000 cars are expected to be on Auckland roads, increasing traffic levels by nearly 25 per cent.

If the current trends for transport congestion in Auckland are to be reversed, a deliberate and sustained shift in the current approach to transport planning is likely to be required. There are a range of options available, including improving the public transport network, travel demand management measures and an accelerated road building programme. Due to incomplete road networks, further development of the road network is likely to be part of any future component of Auckland’s transport solution. However, the solution most probably lies in a combination of options, including alternative modes of transportation to car usage.

This paper focuses on the public transport option on the basis that it appears to be an area of underperformance and it is likely that addressing Auckland’s congestion on a long-term, sustainable basis would include a significant public transport component.

Auckland’s public transport system does not rate well against other comparable cities in terms of patronage – levels have fallen from 127 trips annually per head in 1960 to around 41 trips per head in 2006. Further, Auckland’s patronage continued to fall over the last 25 years, whereas patronage levels in other key cities generally increased over the period. This decline has reversed in the last 10 years; however, the recent increase is smaller than that of comparator cities.

It is likely that public policy approaches over the past five decades have contributed to the current situation. Current policy thinking is beginning to address many of these issues, but some key underlying policy framework issues require further consideration.
• The New Zealand public sector discount rate (at 10 per cent real) is high relative to other OECD countries. By comparison, the UK uses 3.5 per cent real, the EU 5 per cent real, the US 7 per cent real, Australia 6 per cent real (Victoria) and Germany 3 per cent real. Canada has a discount rate of 10 per cent real as does New Zealand; however, the option of a lower rate is suggested for projects with long-term benefits. It is possible that the New Zealand rate, set in 1971, is being used as a proxy for rationing funds rather than as a device to properly account for time preference and cost of capital which are both significantly lower than the current public sector discount rate. The policy implications of a relatively high discount rate are that it favours those infrastructure projects that provide short-term benefits over those core infrastructure projects that generally provide longer-term benefits.

• Dynamic, long-term positive externalities are not sufficiently considered in the assessment of public transport and other infrastructure projects. Wider benefits such as agglomeration, productivity gains, employment, liveability and sustainability are generally not assessed sufficiently in a conventional cost-benefit framework. Studies indicate that these additional benefits could be in the range of 3 to 80 per cent of a traditional project assessment, with the highest benefits accruing to those projects targeted at relieving congestion in agglomerated areas. Further, negative externalities such as environmental considerations are also not fully considered in a standard assessment. As a result, traditional cost-benefit approaches can lead to an under-representation of those public transport and other infrastructure projects designed to address accessibility and other issues in agglomerated areas such as Auckland.

• There may be opportunities to better align urban and transport planning in the Auckland region, including through developing and implementing clear planning principles and measures in relation to the provision of public transport and other key infrastructure. Despite current Auckland strategy and planning documents acknowledging the importance of achieving a sustainable and liveable city with a regard to public transport provision, the reality is that cars are often the only travel choice for a large proportion of Aucklanders – due in part to incomplete passenger transport networks. International experience provides a guide to how other cities have been able to implement their transport strategies more effectively.

The paper contends that improving Auckland’s accessibility, including reversing the significant decline in public transport patronage, will contribute to achieving a world-class city. This is broadly consistent with the Auckland region’s current strategic view and the Auckland Transport Strategic Alignment Project’s report which concluded that a significant shift from private to public transport modes is required in Auckland.

The paper suggests that addressing the above mentioned policy framework issues would lead to a longer-term, economic development focused approach to developing and implementing solutions to Auckland’s accessibility issues. More fully incorporating these framework issues into project assessments would likely have the effect of shifting the project mix towards public transport projects with longer-term benefits.
1. Introduction

New Zealand’s economic development strategy – the Economic Transformation Agenda – identifies the critical role that Auckland needs to play in the transformation of New Zealand’s economy. This element of the strategy is based on international evidence that highlights the importance of outward-facing, world-class cities to a country’s economic development.

As New Zealand’s only city of scale, Auckland will need to lead the country’s economic transformation by becoming an international, outward-facing city with a concentration of economic activity that leads to greater specialisation, increased knowledge flows and higher levels of productivity.

2. Constraints to agglomeration

In order for Auckland to lead the way for New Zealand, it will need to achieve the agglomeration benefits that often arise from having sufficient scale and density. This is supported by numerous studies which indicate that large, densely populated cities have higher productivity levels than less populated, less dense areas (Paling et al 2007). Given Auckland’s significantly larger population relative to other New Zealand centres, agglomeration theory would suggest that Auckland could be expected to contribute disproportionately to New Zealand’s economy, all else being equal. However, compared with other major cities around the world, evidence suggests that Auckland has not realised the benefits of scale and agglomeration to the extent that could be expected of a city of its size.

To understand why a city is not realising agglomeration benefits, it is important to identify the potential constraints. There are a range of possible reasons why a city may not realise agglomeration benefits. These include the degree of accessibility/connectivity, cultural factors (e.g. entrepreneurial aspirations), educational attainment, social factors (e.g. crime rates), regulatory environment and economic structure (e.g. an agriculturally-based economy in New Zealand’s case). For Auckland, it is possible that the interaction of a number of these factors has created a constraint to more fully achieving agglomeration benefits.

Venables (2003) identifies traffic congestion, urban sprawl and overall poor accessibility characteristics as being potential key constraints to agglomeration. To the extent that these factors are present in Auckland, they could represent potential opportunities for government to encourage further agglomeration. Importantly, unlike a number of the other constraints, the government has at its disposal the direct levers to address these factors.

It would appear likely that current levels of accessibility and connectivity may be a relevant factor constraining Auckland’s economic potential. In a study on agglomeration in Auckland, Paling et al (2007) suggest that accessibility to Auckland’s CBD is acting as a constraint to its development. They found that while Auckland’s CBD is the largest employment centre in New Zealand, its employment growth rate over the period 2000 to 2004 was only 0.6 per cent per annum. This compares with employment growth of 3.6 per cent per annum across the wider Auckland region. The significance of this low employment growth for Auckland CBD

---

1 Based on an indicative assessment of Auckland’s share of New Zealand’s population compared with its share of total economic activity.
is that it is contrary to what would be predicted by agglomeration theory and suggests there may be a specific factor or range of factors that are constraining Auckland CBD’s economic development. Paling et al suggest that a possible explanation may relate to the relatively poor accessibility of Auckland’s CBD. They cite a recent Gravitas survey of business motivations for locating within the CBD which concluded that “possibly the biggest attractor to an out of CBD location is the access it provides and the ability to provide more parking at lower cost” (Paling et. al. 2007).

A number of other studies also suggest that achieving higher levels of transport accessibility supports higher density activities and employment (Venables 2003; Paling et al 2007). Although productivity is not always positively correlated with employment rates in all sectors, the employment of highly skilled labour in the CBD would generally support additional productivity gains.

3. Accessibility constraints and costs

The importance of good transport accessibility to support agglomeration is particularly relevant in the case of Auckland where the transport network is characterised by relatively high levels of congestion. Grimes (2007) demonstrates that based on a comprehensive 2003 Transit New Zealand report, Auckland had lower travel speeds than any Australian city during peak hours, at 40km/hr, compared to an Australian range of 41-53km/hr. Auckland’s result is even more significant given that it performed worse than the substantially more populated Australian cities of Sydney and Melbourne. In Auckland, uncongested travel speeds averaged 65km/hr, which was towards the bottom of the range for the Australian cities (which were between 63 and 72 km/hr).

Pollution levels, a by-product of congestion, appear to be increasing in Auckland. The Auckland Regional Transport Authority (ARTA) has advised that the PM10 air quality measure\(^2\) was tested for in 2005-06 and the threshold was exceeded 84 times in that period, with excess limits exceeded on 24 more occasions than in the previous 2004-05 period (ARTA 2007a).

Auckland’s transport accessibility issues are further highlighted by regional forecasts which show that congestion levels in Auckland are expected to deteriorate over the next decade. The draft Auckland Transport Strategic Alignment Project (ATSAP) report 2007 notes that:

“Under current policy settings, and particularly given rapid past and anticipated future growth, congestion is not expected to reduce over the next ten years, even allowing for current planned major investments in the region’s transport system”(ATSAP 2007, p.13).

This highlights that despite the recent significant increases in road funding for Auckland, the pace at which new roads will be added to the network will be insufficient to offset the expected increase in vehicle numbers and usage. In the next decade, an additional 195,000 cars are expected to be on Auckland roads, increasing traffic levels by nearly 25 per cent (Auckland Regional Land Transport Strategy 2005, p.3).

\(^2\) a suggested standard for maximum pollution levels for detecting ambient particulate matter larger than 10 micrograms
These trends are also evidenced in the Auckland Regional Council’s ten year planning target for inter-peak travel speeds which is expected to decrease by 5.6 per cent (i.e. greater levels of congestion) and its target for CO₂ emissions which predicts a 22 per cent increase over the same period (Auckland Regional Council 2005).

The effects of transport congestion are numerous and include longer and less predictable travel times; increased pollution levels; higher operating costs for businesses relying directly or indirectly on transport; reduced productivity; increased driver stress; and passenger discomfort due to overcrowding on peak-hour public transport services. The Auckland Road Pricing Evaluation Study estimated the costs of congestion in Auckland at $750 million per annum in 2006 (Ministry of Transport 2006).

If the current trends for transport congestion in Auckland are to be reversed, a deliberate and sustained shift in the current approach to transport planning is likely to be required. There are a range of options available that could have a positive effect on Auckland’s congestion levels. These include, but are not limited to:

- Expanding and improving the public transport network;
- Implementing travel demand management measures; and
- Further accelerating the road building programme.

The solution most probably lies in a combination of these options. This paper focuses on the public transport option on the basis that it appears to be an area of underperformance and it is unlikely that addressing Auckland’s congestion on a long-term, sustainable basis would exclude a public transport component. For instance, travel demand management strategies are only effective in the long-run if there are alternative transport options available to divert demand away from road usage. In Auckland’s case, there are often no practical travel alternatives available to many of its residents. The Draft Auckland Land Transport Programme 2007/08³ states:

“Incomplete passenger transport networks and services lead to private cars often being the only choice for a large proportion of the [Auckland] region’s population” (ARTA 2007a: p. 12).

Building more roads at an increased rate remains an option; however, there are considerable limits to this approach. Firstly, it is unlikely that more roads can be built indefinitely to sufficiently offset the effect of Auckland’s growing population. The cost of expanding a road network to accommodate increasing numbers of patrons will continue to increase, particularly given the land restrictions which will become increasingly important as the network is expanded. Further, road expansion in the long-run is unlikely to be consistent with environmental sustainability goals, including achieving reduced carbon emissions. It also raises questions around Auckland’s liveability and its urban form in a world-class city context.

It must be acknowledged that due to the current increased investment in road-building and road development designed to address perceived under-investment in the road network from the 1950s to the 1990s, the expansion of the network will to some extent continue as a part of an overall strategy for supporting Auckland’s

³ Prepared by the Auckland Regional Transport Authority (ARTA)
development. However, a strategy based only on road expansion is not a viable alternative due to the land restriction and sustainability issues previously raised.

An approach to tackling urban traffic congestion that has been implemented successfully in a number of leading, international cities such as Portland, Melbourne and Brisbane has involved increasing the availability and usage of public transport, and reducing the reliance on private motor vehicles. This paper focuses on how Auckland’s public transport system compares to other leading, international cities and identifies some of the factors that may have contributed to the current situation. It is acknowledged that this partial analysis would need to be complemented by a more detailed assessment of the additional congestion management options identified above, particularly in relation to how they could contribute to a more integrated, strategic approach to addressing Auckland’s traffic congestion in the long run.

4. Public transport in Auckland

In international terms, Auckland’s public transport system does not rate well in terms of patronage when compared with other key cities.

The relatively low levels of public transport usage in Auckland become apparent when viewed in the context of the long-term trend. Chart 1 shows that the relative contribution of Auckland’s public transport system has reduced significantly, with patronage levels falling dramatically from 127 trips annually per person in 1960 to around 41 trips annually per person in 2006 (ARTA 2007b). Further, according to Mees and Dodson, earlier data suggests patronage levels were as high as 290 trips per person in the early 1950s. This implies an 86 per cent fall in patronage levels over the period (Mees and Dodson, 2006).

![Chart 1: Public transport boardings in Auckland per head](chart1.png)

Source: Abusah, de Bruyn and Chu, correlated from ARTA data (ARTA 2007b)
The OPEC oil crisis of 1973-74 and subsequent restrictions on driving introduced by
the government of the day (the “Carless days” policy of 1979 in particular, limiting the
number of days a vehicle owner could drive) had effects on car usage, contributing to
halting the decline in public transport usage from 1975-1980, at approximately
80 boardings per head. The reduction of the tariff rate (from 45 per cent in 1984 to
15 per cent in 1988 on imported used and new cars compiled in New Zealand) may
also have had unintended consequences, with less expensive vehicles leading
consumers to favour driving over using public transport (Ministry of Economic
Development 1998).

It is also reasonable to assume the elimination of importing licence restrictions in
1989 and substantial further reductions in tariff levels from 1993-2000 contributed to
the sharp decline in public transport usage over the period. The import of second-
hand vehicles jumped from 2019 vehicles in 1984 to 117,025 in 1996, leading to "first
time” vehicle registrations increasing from 101,675 in 1984 to 189,612 in 1996 – an
increase of 86.5 per cent over 12 years (Ministry of Economic Development 1998).
While reductions in tariffs and import restrictions increased car ownership, they also
had the unintended consequence of preferencing private over public transport usage.

Mees and Dodson (2006) state that the privatisation of the Auckland bus services in
1989 may also have contributed to this downturn, due to a lack of effective
coordination between different modes of public transport. According to their paper,
bus boardings declined from 42 million per year in 1990 to 31 million in 1994 – a drop
which is not correlated with urban density or dispersed employment, as neither of
these factors changed substantially over the period.

While there has been a decline in public transport usage in many other cities over the
last 50 years, the decline is not observed as sharply as in Auckland. The available
data for a number of cities (sourced from the Booz Allen Hamilton report, 2006)
shows many cities have increased their patronage levels (on a per capita basis) while
others have experienced only small declines over the last 25 years. This contrasts
with Auckland where patronage has fallen by almost 50 per cent. The following table
demonstrates the decline of Auckland’s public transport boardings compared to other
key cities:

<table>
<thead>
<tr>
<th>City</th>
<th>Percentage change in patronage (per capita)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland</td>
<td>- 49.4%</td>
</tr>
<tr>
<td>Perth</td>
<td>- 5.7 %</td>
</tr>
<tr>
<td>Calgary</td>
<td>+ 6.8 %</td>
</tr>
<tr>
<td>Christchurch</td>
<td>- 6.7 %</td>
</tr>
<tr>
<td>Portland (from 1987)</td>
<td>+ 40.9 %</td>
</tr>
<tr>
<td>Brisbane (busways from 1985)</td>
<td>+ 15.7 %</td>
</tr>
</tbody>
</table>

Source: Data from Booz Allen Hamilton Report 2006

N.B. – Selection of cities has been based on the availability of data. The % change in patronage levels
for Brisbane and Portland is calculated from 1985 and 1987 respectively; these are the earliest data
sets available.
In the last ten years, Auckland has reversed this decline and has experienced an increase in patronage of 9.5 per cent. However, this increase is more modest than any of the comparator cities listed above over this recent period.

The falling usage of public transport in Auckland could be indicative of a possible deficit in the provision of public transport infrastructure. The current situation can be linked directly to public policy approaches over the last 50 years. In the 1950s, the New Zealand Railways proposed an upgrade of Auckland’s rail system, including electrification and underground CBD loop as well as integration with bus services. The region’s road engineers, inspired by then-contemporary US planning ideals and new road building techniques, proposed an alternative plan for a network of motorways. The Auckland Regional Planning Authority, predecessor to the Auckland Regional Council, appointed a committee to resolve the issue. The committee’s report (published in 1956) dismissed the rail proposal as unsuited to a dispersed city and adopted the motorway plan (Mees and Dodson 2001).

There is a path dependency element to the public transport debate. The early adoption of an extensive freeway network as a strategy for facilitating mass transport in Auckland hindered the development of public transport. In comparison, many other cities (such as Brisbane and Melbourne) only began large-scale freeway building in the 1960s, first allowing public transport to develop a critical mass of support.

In addition to per capita patronage figures falling, the absolute figures also suggest a decline. Overall, total patronage (for buses, ferries and trains) was higher in 1959 (at 57,423,000 boardings per year) than in 2006 (51,129,478 boardings) despite a threefold increase in Auckland’s population. It can be seen that bus trips constitute the majority of public transport trips throughout the period (82 per cent in 2006) as shown in Chart 2.

**Chart 2: Patronage history for public transport boardings in Auckland**

![Chart 2: Patronage history for public transport boardings in Auckland](image)

Source: Auckland Regional Transport Authority 2007b
In 2005, ARTA published the following comparative table (Chart 3) showing Auckland as the worst performer amongst a group of international comparator cities.

**Chart 3: Comparison of Passenger Transport trips per person in selected cities**

![Chart 3: Comparison of Passenger Transport trips per person in selected cities](image)

**Source:** Auckland Regional Transport Authority 2005

It has been suggested that one of the reasons for low public transport patronage is due to Auckland’s apparently low urban density when compared to other larger cities. It is therefore said to be geographically “spread out”, making it better suited to an extensive road network as opposed to a comprehensive public transport network.

However, the available evidence does not support this widely-held view – Auckland’s urban density is actually *higher* than Montreal, Vancouver, Melbourne and Brisbane, cities which all have higher rates of per capita boardings than Auckland:

**Table 2: Urban density (population per sq km) in selected cities**

<table>
<thead>
<tr>
<th>City</th>
<th>Population per square km, 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toronto</td>
<td>2450</td>
</tr>
<tr>
<td>Sydney</td>
<td>2100</td>
</tr>
<tr>
<td><strong>Auckland</strong></td>
<td><strong>2100</strong></td>
</tr>
<tr>
<td>Montreal</td>
<td>1850</td>
</tr>
<tr>
<td>Vancouver</td>
<td>1650</td>
</tr>
<tr>
<td>Melbourne</td>
<td>1500</td>
</tr>
<tr>
<td>Brisbane</td>
<td>950</td>
</tr>
</tbody>
</table>

**Source:** Demographia World Urban Areas – World Agglomerations, 2007
5. Key framework Issues

5.1 Overview

In looking at the current public transport system in Auckland, it is reasonable to assume that public policy approaches over the past five decades have contributed to the current situation. It is promising that current public policy thinking is starting to recognise that greater effort is required to improve Auckland’s accessibility characteristics, including through an increased emphasis on public transport. The draft ATSAP report makes particular reference to the low public transport patronage levels in Auckland, consistent with the Auckland region’s current strategic view. It acknowledges that a shift from private to public modes of transportation is required over the next 30 years (ATSAP 2007).

It is also acknowledged that the government has recently taken a number of significant actions which recognise the critical role of public transport in Auckland. In Budget 2007 the government announced the possibility of a regional fuel tax to support the electrification of Auckland’s urban passenger network and extra funding for public transport upgrades, including $600 million over six years for urban rail development projects in Auckland and Wellington. An additional $50 million was provided for general track improvements to the national rail network for 2008-09 and 2009-10, on top of the $100 million allocated for this purpose under Budget 2004 (Land Transport New Zealand 2007). For example, developments such as the Northern Busway extension (scheduled for completion in 2008) are being developed to ease traffic congestion in the north of Auckland by providing a dedicated link between North Shore City and the Auckland CBD.

In order to better enable a sustainable, long-term improvement in accessibility within Auckland, some underlying policy framework issues should be addressed.

Given the nature of this paper, we have not undertaken a comprehensive assessment of the current framework. However, our preliminary work has highlighted a number of issues with the current approach that may warrant further consideration:

- The public sector discount rate used to assess infrastructure proposals is high by international standards (10 per cent real). In the last decade, many OECD nations have reduced their discount rates.

- Dynamic, long-term positive externalities are not sufficiently considered in the assessment of public transport and other infrastructure projects (e.g. benefits such as agglomeration, productivity, employment and liveability).

- There may be opportunities to better align urban and transport planning in the Auckland region, including through developing and implementing clear planning principles and measures in relation to the provision of public transport and other key infrastructure.

Other relevant policy areas, such as the role of prices in influencing people’s transport choices have not been considered in this paper. However, as noted earlier, pricing mechanisms (e.g. travel demand management) are only effective in the long-run if there are alternative transport options available to individuals.
5.2 Public Sector discount rate

Introduction

Discount rates are used in the Public Sector to compare costs and benefits which occur over different time periods. It is based on the principle that in general, people prefer to receive goods and services now rather than later. This is called a “time preference”. When calculating such costs and benefits, it is accepted that a discount rate should be applied to future costs and benefits to allow for this time preference (The Green Book, 2003).

The 10 per cent public sector discount rate recommended by the New Zealand Treasury was set by Cabinet in 1971 to represent the opportunity cost of capital, based on the expected return from a low risk private sector investment at that time. Originally this was set as a nominal rate but was later re-set to 10 per cent real. The discount rate was reviewed and reconfirmed in 1982. Although this rate is only a guideline, it is widely applied to assessments of public sector proposals.

This rate may no longer be an appropriate guideline due to the liberalisation of New Zealand’s economy, improved capital mobility, changes in interest rates and long-term borrowing rates and changes in the cost of capital in the last 35 years. It may be noted that most other OECD nations utilise a lower discount rate than that of New Zealand:

<table>
<thead>
<tr>
<th>Country / Region</th>
<th>Discount rate (real)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand</td>
<td>10%</td>
</tr>
<tr>
<td>Canada</td>
<td>10% (lower for long-term projects, typically between 3-7%)*</td>
</tr>
<tr>
<td>Victoria, Australia</td>
<td>6%</td>
</tr>
<tr>
<td>United States</td>
<td>7% (Federal recommendation)</td>
</tr>
<tr>
<td>European Union</td>
<td>5% recommended, 0-4% recommended for essential infrastructure</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3.5%</td>
</tr>
<tr>
<td>France</td>
<td>0 - 4% depending on type of project^</td>
</tr>
<tr>
<td>Germany</td>
<td>3% (approximated from long-term bond rate)</td>
</tr>
</tbody>
</table>

Source: Abusah and de Bruyn, based on various sources including Rose (2006)

* N.B. Canada has applied a real discount rate of 10% since 1976. In 1998, this was altered to allow a lower real discount rate for “projects whose benefits may be long-term”, typically between 3-7% (Treasury Board of Canada 1998)

Appendix One provides further information on the methodologies used in these key countries/regions.

On balance, evidence suggests that the New Zealand Public Sector discount rate may be too high for a number of reasons:

- New Zealand’s discount rate is out of step with other OECD nations. While direct comparisons of discount rates may be misleading due to country-specific risk-free rates, different tax regimes and the cost of capital, even allowing for such variables provides a rate much lower than the current 10 per

^ See Appendix One for more information
cent rate (see Rose 2006, Draft New Zealand Energy Strategy 2006 and Appendix One).

- The discount rate is significantly higher than the long-term borrowing rate (cost of capital). The current New Zealand inflation-adjusted long-term bond rate is 3.62 per cent, with the current New Zealand public sector discount rate being 6.38 per cent higher than this (at 10 per cent real). Even using the non-inflation adjusted bond rate of 6.84 per cent and assuming 2 per cent inflation p.a. over the period, the discount rate is still 5.16 per cent higher than this. Therefore, the public sector discount rate could be reduced without creating a risk of “crowding out” private sector investment.

- There is an argument that a high discount rate should not apply to essential long-term infrastructure, because benefits for users in the future will be more significant than the 10 per cent real rate of discounting would suggest. For example, the benefits to public transport commuters are not likely to substantially diminish over a 30 year period. Based on these arguments, France and the EU have, at times, applied a discount rate as low as 0 per cent, particularly in cases where an infrastructure deficit is perceived to exist.

A counter-argument to a zero discount rate is based around the high degree of uncertainty that exists in predicting economic events (and benefits) that will occur in the distant future. A zero discount rate does not take account of this inherent uncertainty and forces decisions to be made in the present period about highly uncertain future events. (Grice 2003; Nordhaus 2006) For the reasons outlined above, this paper supports a lower discount rate, but does not advocate a zero discount rate. See Appendix One for further information.

It is important to realise that the consequence of a higher discount rate is to reduce the emphasis on the long-term benefits of a project and provide more weight to the short-term benefits. A high rate, therefore, tends to favour short-term projects ahead of longer-term projects. It effectively discriminates against long-term infrastructure projects such as ‘backbone’ infrastructure.

**UK and New Zealand Comparisons**

As demonstrated in Appendix One, the UK’s 3.5 per cent discount rate allows 70.9 per cent of the benefit of a project in year 10 to be factored in the project assessment, while New Zealand’s 10 per cent discount rate means that just 38.6 per cent of the benefit is included in the assessment. By year 30, a UK project’s assessment still factors in 35.6 per cent of the benefit in that year, compared with just 5.7 per cent of these longer-term benefits under the New Zealand approach.

The UK public sector discount rate was reduced from 6 per cent to 3.5 per cent (real) in 2003. Joe Grice, Chief Economist of the UK Treasury, explained the reduction:

“the new edition [of the UK Treasury Green Book] ‘unbundles’ the discount rate, introducing a rate of 3.5% in real terms, based on social time preference, while taking account of other factors which were in practice often implicitly bundled up in the old 6% real figure” (Grice 2003: p.5).

Therefore, factors such as risk assessments for projects and the rationing of public funds are explicitly withdrawn from the real discount rate.
The rationale for a 10 per cent discount rate

Two principal arguments are usually asserted to justify the 10 per cent discount rate in New Zealand when compared to other countries.

- The higher cost of capital in New Zealand, compared to other OECD countries, is often given as a justification for a higher real discount rate.
- A fund rationing approach, implicitly using the public sector discount rate as a rationing device for limited public funds.

Higher cost of capital arguments

One argument used to justify a high public sector discount rate relates to the cost of capital. It is generally accepted that the higher cost of capital in New Zealand compared to other OECD nations should be allowed for in the discount rate, meaning that the discount rate itself should be relatively higher.

However, it is important to understand the 10 per cent real discount rate cannot be attributed solely to the higher cost of capital compared to other nations. Rose (2006) considered the New Zealand discount rate based on UK methodology, where time preference is measured but implicit assumptions concerning project risk or rationing of public monies are not included. The discount rate figure for New Zealand was given at 4 per cent real, based on the approximate current real rate of return on New Zealand government 10 year bonds (Rose 2006). Further, the Draft New Zealand Energy Strategy to 2050, released by the Ministry of Economic Development in December 2006, reviewed the methodology used to determine the discount rate for energy infrastructure projects in New Zealand and suggested a real rate of 5 per cent be applied rather than the current 10 per cent (DNZES 2006).

In addition to this, many countries (such as Australia and Germany) suggest the long-term bond rate as a guideline when calculating their discount rate for many infrastructure projects with long-term benefits. The long-term rate in New Zealand can be provided through examining the Reserve Bank of New Zealand’s 10-year inflation-indexed bond rate. That rate is currently 3.62 per cent as of the 1st May 2007, lower than the current discount rate of 10 per cent (Reserve Bank 2007).

Calculating the discount rate for New Zealand using UK methodology

The discount rate (or Social Time Preference Rate) is the rate used for discounting future costs and benefits, based on the value society attaches to present as opposed to future consumption. The formula used to determine this rate in the UK Green Book is as follows:

\[ s = \tau + \mu g \]

\[ = (\pi - L) + \mu g \]

Where \( \tau \) is the rate of time preference, \( \mu \) is the elasticity of the marginal utility of consumption, and \( g \) is the expected growth rate in average per capita consumption. The “life chances” (risk) variable is given by the variable \( L \).

If New Zealand variables are used in the UK equation provided (above) the rate is determined to be approximately 4.4% (real) with a lower rate applied if over 30 years. Allowing for differences in variables (for example, the rate of time preference, \( \tau \), and the “life chances” variable, \( L \), are subject to differing values depending on the degree of risk assumed) a range of between 4.5% and 6.5% would be provided.

Source: Based on Ministry of Economic Development internal analysis, 2006
Rationing of funds

A second argument used to support high real discount rates is based around the rationing of limited public funds. While stakeholders may agree more funding should be provided for infrastructure projects, there are simply limited funds for government to allocate and some method of discrimination must be applied. Therefore, a high public sector discount rate acts as a crude proxy for rationing funds, limiting the total number of projects which can be accepted under a cost-benefit analysis.

As discussed earlier, the key issue with using a high discount rate as a rationing device is that it creates an inherent bias towards funding projects with shorter-term benefits, effectively discriminating against core, longer-term projects that provide benefits over a 20 to 50 year period. What is particularly problematic with using the discount rate as a rationing device is that many long-term core infrastructure projects may have a significant proportion of their long-term payoffs excluded from the overall assessment and therefore may not be presented as viable options to stakeholders.

It is acknowledged that public funds are finite; however, other mechanisms should be used to manage fiscal constraints. The public sector discount rate should be used as a comprehensive tool to deal with the long-term costs, benefits and externalities of infrastructure projects, while rationing of public funds could be better effected through adjusting cost-benefit ratios. This approach would maintain the appropriate level of fiscal constraint, while removing the existing project-mix bias towards shorter-term projects. It would also allow the Minister, rather than the department, to determine whether a long-term infrastructure project is preferred over a shorter-term project.

Ranking New Zealand’s discount rate

The following table provides a comparison of New Zealand’s discount rate to other countries, New Zealand’s estimated discount rate using UK methodology and the long-term borrowing rate:

Table 4: New Zealand discount rate comparison

<table>
<thead>
<tr>
<th>Rate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>Current real rate in New Zealand</td>
</tr>
<tr>
<td>10%</td>
<td>Canadian rate (lower for long-term projects)</td>
</tr>
<tr>
<td>7%</td>
<td>US discount rate (Federal recommendation)</td>
</tr>
<tr>
<td>6%</td>
<td>Victoria, Australia discount rate</td>
</tr>
<tr>
<td>4.5% - 6.5%</td>
<td>Suggested range for New Zealand discount rate</td>
</tr>
<tr>
<td>5%</td>
<td>Draft NZ Energy Strategy recommendation (MED)</td>
</tr>
<tr>
<td>4.4%</td>
<td>Estimated NZ discount rate (using UK methodology)</td>
</tr>
<tr>
<td>3.6%</td>
<td>New Zealand long-term bond rate</td>
</tr>
<tr>
<td>3.5%</td>
<td>U.K. discount rate</td>
</tr>
<tr>
<td>3%</td>
<td>German discount rate (based on the bond rate)</td>
</tr>
<tr>
<td>0 - 4%</td>
<td>Discount rate for France, EU (for essential infrastructure projects)</td>
</tr>
</tbody>
</table>

Source: Abusah and de Bruyn 2007
Implications for infrastructure development

A key risk with the current New Zealand approach to setting discount rates is that it creates an artificial constraint to the approval and development of key infrastructure that may be needed to secure New Zealand’s long-term economic development. Irrespective of the extent to which a higher discount rate may have reduced funding for long-term projects in the past, the risk going forward is that core, long-term, public transport and other infrastructure proposals will not be adopted due to the current methodological bias towards projects with shorter-term benefit profiles.

Implementing a lower public sector discount rate would have the effect of increasing the proportion of long-term infrastructure projects that are funded relative to shorter-term projects. From a transport perspective, this could include a greater proportion of both long-term road and public transport infrastructure projects. However, as public transport projects generally promote higher urban density, improved urban form, liveability and sustainability – characteristics less associated with road-based projects – public transport projects are more likely to provide long-term spill-over benefits arising from agglomeration such as the labour market effects of increased productivity and employment.

It may be noted that the total funding dedicated to infrastructure projects is also important in determining the type and number of projects that are selected, even if the discount rate is lowered. However, if long-term spill-over benefits were incorporated more fully in the project assessment or cost-benefit analysis, a lower public sector discount rate would likely have the effect of shifting the project mix towards public transport projects and away from road-based projects. Section 5.3 further discusses incorporating spill-over benefits into project assessments.

5.3 Spill-over benefits

An additional factor that may have contributed to the under-investment in public transport infrastructure relates to the relatively narrow approach of traditional cost-benefit methodologies. These approaches tend to focus on the direct benefits that a project can provide, but largely exclude the dynamic, second order spill-over benefits that can arise. For example, the traditional assessment of a public transport project would include direct benefits such as reduced road congestion. However, the assessment would not consider the wider, long-term economic benefits that would accrue as a result of the investment – that is, benefits such as increased density, agglomeration and the resulting labour market effects of increased productivity and employment (Venables 2003; Grimes 2007). In simple terms, increased levels of transport accessibility lead to a larger labour catchment area and an increased labour supply. This then results in increased choice for businesses, as well as greater opportunities for individuals to move to more productive jobs. Other spill-over benefits include a more liveable and sustainable city which in turn can promote a greater in-flow of high-skilled labour and foreign direct investment.

As a result of these spillover benefits being excluded, traditional cost-benefit methodologies can result in an under-representation of public transport and other infrastructure proposals with significant spill-over benefits in the government’s infrastructure investment plans. New Zealand is not unique in this regard, as traditional cost-benefit methodologies have been applied across the OECD to assess infrastructure and other projects.
In recent years, the shortcomings of these approaches have been highlighted in a number of studies. In a paper on transport improvements and wider economic benefits, Mann (2006) found that the uplift to conventional appraisal methods from including wider economic benefits and transport improvements would be relatively modest, but there were exceptions, particularly for projects targeted at relieving congestion in agglomerated areas. From a New Zealand perspective, Auckland-focused infrastructure investment would likely be in this latter category. Mann notes that evidence provided to the UK’s Standing Advisory Committee on Trunk Road Assessment (SACTRA) suggests that these additional economic benefits could be in the range of between 3 per cent and 30 per cent. He also notes a study from the Netherlands that suggests wider economic benefits of 65 per cent to 80 per cent in relation to a high speed rail link.

The size of the potential benefit resulting from including wider economic considerations in project assessments highlights the importance for having a methodology that is able to estimate these additional benefits robustly. In New Zealand, recent cost benefit analyses have attempted to take some of these broader benefits into account – for example, the analysis of the Auckland Rail Development Plan took agglomeration benefits into account. This is not an easy task and there is likely to be further scope to improve the New Zealand methodology, particularly through leveraging off related work being undertaken in other OECD countries. It should be noted that Land Transport New Zealand (LTNZ) are currently examining agglomeration benefits and how these can be better factored into future New Zealand Transport assessments.

The UK has recently considered issues around incorporating wider economic benefits into project assessments in the context of two major public transport infrastructure proposals – the Thames Gateway Bridge and Crossrail. By including agglomeration benefits in the projects’ assessments and not factoring risk into the calculation of the Public Sector discount rate, the total schemes benefits could be seen to be substantially increased (Paling et al, 2007).

5.4 Urban planning

Urban planning plays a key role in influencing the level of congestion and public transport usage in a city. For example, creating new urban developments along existing public transport corridors encourages increased public transport usage and reduces the negative externalities usually associated with growing populations, such as increased congestion and pollution.

Conversely, a pattern of urban development that has less regard to the key existing and proposed public transport corridors and networks can create a path dependency that results in a greater reliance on private motor vehicles which in turn can create additional pressure to fund new road infrastructure.

The Melbourne 2030 plan (2002) provides an example of a more sustainable approach to planning for a growing city. The Melbourne region’s population is expected to increase by up to an additional one million people between 2002 and 2030. Melbourne’s plan is designed to protect the city’s liveability, with a key objective to reduce the number of private motorised vehicle trips. The plan outlines a

---

vision for a ‘compact’ city that is based around encouraging higher density residential development on sites that are well located in relation to public transport. The plan also proposes extending public transport to those existing suburbs where people are currently car-dependent.

To support the Melbourne 2030 plan, detailed planning guidelines for creating new communities in Melbourne’s Growth Areas have been developed. These guidelines include an objective to provide sustainable transport networks and are supported by clear planning principles and measures. For example, Measure 3.1 states:

“…include indicative provision for: at least 95 per cent of all housing in the precinct located within 400 metres of safe, convenient and well lit walking distance of a bus stop; and bus stops spaced an average of 300 metres along proposed routes” (Precinct Structure Planning Guidelines: 2006).

Singapore also utilises a comprehensive urban planning approach that is integrated with transport planning. When housing development projects are undertaken, a LRT (Light Rapid-Transit) line is connected from the newly-constructed development to the MRT (Mass Rapid Transport) system allowing a direct link to the underground network. This is implemented as a compulsory addition to all new, sizeable developments, just as roads are constructed to provide private access.

Auckland region’s growth strategy promotes urban development within a defined metropolitan urban limit (MUL) that is indirectly linked with public transport provision. However, these urban limits have been extended five times since 1999, adding close to 1,500 hectares of land for urban development. This approach has created a number of large, new urban developments on Auckland’s fringe. From a transport perspective, the increase in Auckland’s land footprint can make it more difficult to achieve the critical mass required for public transport infrastructure to be viable, if not densely populated.

Current strategy and planning documents for Auckland such as the Auckland Regional Land Transport Strategy 2005 (ARLTS) recognise the importance of achieving a sustainable and liveable city, including through ensuring the effective provision of public transport in the region. The ARLTS includes an objective to improve access and mobility, with one of the desired outcomes being:

“A high level of travel choice to all key destinations including employment areas, retail centres, tertiary institutions, major health facilities and other key community facilities” (ARLTS 2005: p. 40).

However, despite these stated strategic outcomes, the reality is that cars are often the only travel choice for a large proportion of Aucklanders due to incomplete passenger transport networks (Draft Auckland Land Transport Programme 2007-08).

International experience provides a guide to how other cities have been able to implement their transport strategies more effectively. For instance, it is important that the strategy objectives are clearly reflected in planning and implementation-related guidelines and directions. Relevant factors that can facilitate these clear linkages include: a strong alignment of vision and objectives across the responsible organisations (e.g. central govt agencies and Auckland local councils); and having in place a stable, long-term funding commitment that is clearly linked to the strategic objectives. In addition, setting clear planning guidelines and measures around the
provision of public transport can assist in ensuring that the vision is implemented more effectively.

The first element is being addressed by the Auckland Transport Strategic Alignment Project which is seeking to achieve agreement by central government and Auckland local government leaders on a common strategic view for Auckland’s land transport system.

The box below provides an example of a major new urban development in the Auckland region.

---

**Example – Auckland’s Flat Bush Urban Development**

Flat Bush is a new urban development in the Auckland region that is expected to be home to around 40,000 people by 2018. The area consists of approximately 1,700 hectares of land in the south-eastern part of Manukau City and is the largest “new town” identified in the Auckland Regional Growth Strategy (Manukau City Council 2007).

This new development is flagged as “New Zealand’s largest and innovative new town”; however, despite the development being located only around 4.5 kilometres from an existing rail line (via Papatoetoe), no rail spur or light rail link has been proposed or constructed to connect this major, growing population centre to Auckland’s mass rail transit system.

This paper has not attempted to assess the overall merits of this specific proposal. This example is intended to highlight the differences in the public transport/urban planning outcomes in some Auckland developments and the stated approaches of ‘best-practice’ regions such as Singapore and Melbourne (as discussed above).

---

It should be noted that while better integration of urban and transport planning is a necessary condition for addressing congestion and public transport usage in a city there are other complementary factors to consider, such as the provision of social infrastructure (schools, hospitals) and quality, affordable housing.
6. Conclusion

This paper has examined the decline in public transport patronage in Auckland and contends that improving Auckland’s accessibility, including by reversing this decline, will contribute to the development of a world-class city. This is broadly consistent with the Auckland region’s current strategic view and the Auckland Transport Strategic Alignment Project’s conclusion that a significant shift from private to public transport modes is required in Auckland.

The paper suggests that the decline in Auckland public transport patronage has been partly driven by public policy frameworks. The framework issues identified in this paper include:

- a path dependency argument – that is, previous policy decisions such as the 1950’s US-inspired motorway plan and the more recent abolishment of excise duties on imported used and new motor vehicles have created a car-dependent culture which in turn has constrained the further development of public transport;

- a high Public Sector discount rate (10 per cent) applied to transport and other infrastructure projects;

- a focus on a cost-benefit approach to public transport and other infrastructure projects that may not sufficiently consider the positive externalities and spill-over benefits from public transport and other infrastructure developments, particularly in high density areas such as Auckland; and

- opportunities to better align urban and transport planning in the Auckland region, including through developing and implementing clear planning principles and measures in relation to the provision of public transport and other key infrastructure.

The paper suggests that addressing these key policy framework issues would lead to a longer-term, economic development-focused approach to developing and implementing solutions to Auckland’s accessibility issues. More fully incorporating these framework issues into project assessments would likely have the effect of shifting the project mix towards public transport projects with longer-term benefits.
Appendix One - Comparison of Public Sector Discount Rate, by country

The UK Treasury

The UK Treasury uses a Public Sector discount rate of 3.5 per cent over a 30 year period, recognising the significant short-term costs and longer-term benefits of such projects. The Green Book 2003 – used as a current guide for UK Treasury analysts to make appraisals on specific public projects – recommends a discount rate of 3.5 per cent, reduced from the previous rate of 6 per cent. According to the guide, this is based on the following approach:

“The new edition [of the Green Book] ‘unbundles’ the discount rate, introducing a rate of 3.5 per cent in real terms, based on social time preference, while taking account of the other factors which were in practice often implicitly bundled up in the old 6 per cent real figure” (Grice 2003).

Importantly, the UK Treasury places emphasis on separating the risk assessment and fund-rationing elements from the discount rate, explicitly using the rate to account for time preference, rather than other (implicit) assumptions. A project’s risk is handled through a different process, usually in the form of a separate risk assessment report.

European Union (EU) recommendations

In the EU, guidelines suggest the discount rate for public transport infrastructure for member nations not exceed 6 per cent and recommendations have been suggested to implement a guideline of 5 per cent by the European Parliament, depending on the cost of capital and interest rates applicable to individual nations. However, in practice the application of discount rates has, at times, been lower than 3.5 per cent, particularly regarding “structural adjustment” infrastructure funding for newly-joined members of the EU.

A zero discount rate?

A zero per cent discount rate has been applied by the EU to certain project proposals from member nations under specific circumstances. A number of economists, including Caplin and Leahey, have supported a real discount rate of zero based on removing the assumption of a time preference applying to investment (Caplin and Leahy 2000). 6

The counter-argument to this is that infrastructure cannot be discounted indefinitely, as is implied by a discount rate of zero. This is because there is uncertainty in predicting the economic benefits of infrastructure for future generations as compared to the benefits accrued now, particularly over the long-term. A zero discount rate factors in all benefits equally from now to infinity and does not take account of this uncertainty (Grice 2003). Nordhaus (2006) reaches a similar conclusion that a near-zero social discount rate forces decisions to be made in the present period about highly uncertain events (or benefits) that are expected to occur in the distant future even though the estimates are highly speculative.

Despite this counter-argument, some countries have applied a zero discount rate to infrastructure projects, even if not stated explicitly. Countries such as France use a

---

6 This is partially based on the reasoning that although individuals prefer to spend money now rather than later, there is a countervailing tendency – historical regret from consumers regarding some of their past consumption choices. Therefore, the overall “real” time preference rate is argued at zero.
zero discount rate for certain projects, particularly where a future benefit is envisaged to outweigh the present benefit (such as an Art Gallery). A number of the new EU8 countries (the newly-joined EU states of Eastern Europe) have applied a zero or near zero discount rate to many of their allocated infrastructure projects from 2007-2013. The rationale for this is based on coordination failure and externality arguments and appears to have been applied in those cases where there is a perceived, significant deficit in core infrastructure.

**Australian government recommendations**

The Department of Finance and Administration (DOFA) suggests using the producer or cost of capital rate for shorter-term projects while allowing the government bond rate to be used as the long-term infrastructure discount rate, depending on the nature of the project and without enforcing a specific rate. This is a guideline and subject to fluctuation, but suggests the “break-even point” the Australian government is prepared to accept is adjusted to the lowest-risk financial instrument provided, not to the estimated market rate. The Victorian government uses a rate of 6 per cent real.

**The Canadian rate**

Since 1976 the Canadian Treasury Board has suggested a sensitivity band of between 8 – 12 per cent, recommending 10 per cent as the guideline discount rate. However, the Canadian Treasury has suggested that for projects with longer-term benefits, parameters including discount rates must be chosen that “are consistent with the point of view of the analyst”. It goes on to consider where high and low discount rates should be considered:

“The choice of a discount rate is extremely important. It has a strong (although hidden) influence on the direction of an organization.

A low discount rate is favourable for the following:
- an active investment program, because capital seems inexpensive;
- outright purchase of assets;
- many and larger projects and programs; and
- projects whose benefits may be long-term. [emphasis added]

A high discount rate is favourable for the following:
- a cautious capital investment program, because capital seems expensive;
- leasing and other kinds of deferred-payment options;
- short-term, flexible planning; and
- labour-intensive rather than capital-intensive solutions.”

**Source:** Treasury Board of Canada 1998

In practice, infrastructure developments considered to have long-term benefits such as crime prevention infrastructure have used a rate of between 3 and 7 per cent (NCPS 2007).

**The New Zealand approach so far**

The 10 per cent public sector discount rate was set in 1971 as a nominal rate to represent the opportunity cost of capital, based on the expected return from a low risk private sector investment at that time. In 1982 it was reaffirmed as a guideline (at a real rate) for all public sector projects and from the mid-1980s to the present day it appears to have been applied more rigorously than in the earlier period.
New Zealand’s Public Sector discount rate of 10 per cent real has had the effect of progressively distorting funding towards smaller investments with shorter-term payoffs, at the expense of longer-term projects, particularly “backbone” public transport infrastructure. Because public transport often requires significant infrastructure investment initially, such projects often incur a large capital cost in the short-term. Although the break-even point for many projects takes longer to occur (and in many cases is perpetually loss-making), the long-term externalities can be extremely high, as discussed in this paper.

### The Discount Rate: UK and New Zealand comparisons

Below is a comparison of the effect of two different discount rates over a 30 year period – 3.5% (UK) and 10% (NZ). This demonstrates how much a project is discounted when evaluated over a specific timeframe:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>3.5% (UK real)</th>
<th>10% (NZ real)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.0000</td>
<td>1.0000</td>
</tr>
<tr>
<td>1</td>
<td>0.9662</td>
<td>0.9091</td>
</tr>
<tr>
<td>2</td>
<td>0.9335</td>
<td>0.8264</td>
</tr>
<tr>
<td>3</td>
<td>0.9019</td>
<td>0.7513</td>
</tr>
<tr>
<td>4</td>
<td>0.8714</td>
<td>0.6830</td>
</tr>
<tr>
<td>5</td>
<td>0.8420</td>
<td>0.6209</td>
</tr>
<tr>
<td>6</td>
<td>0.8135</td>
<td>0.5645</td>
</tr>
<tr>
<td>7</td>
<td>0.7860</td>
<td>0.5132</td>
</tr>
<tr>
<td>8</td>
<td>0.7594</td>
<td>0.4665</td>
</tr>
<tr>
<td>9</td>
<td>0.7337</td>
<td>0.4241</td>
</tr>
<tr>
<td>10</td>
<td>0.7089</td>
<td>0.3855</td>
</tr>
<tr>
<td>11</td>
<td>0.6849</td>
<td>0.3505</td>
</tr>
<tr>
<td>12</td>
<td>0.6618</td>
<td>0.3186</td>
</tr>
<tr>
<td>13</td>
<td>0.6394</td>
<td>0.2897</td>
</tr>
<tr>
<td>14</td>
<td>0.6178</td>
<td>0.2633</td>
</tr>
<tr>
<td>15</td>
<td>0.5969</td>
<td>0.2394</td>
</tr>
<tr>
<td>16</td>
<td>0.5767</td>
<td>0.2176</td>
</tr>
<tr>
<td>17</td>
<td>0.5572</td>
<td>0.1978</td>
</tr>
<tr>
<td>18</td>
<td>0.5384</td>
<td>0.1799</td>
</tr>
<tr>
<td>19</td>
<td>0.5202</td>
<td>0.1635</td>
</tr>
<tr>
<td>20</td>
<td>0.5026</td>
<td>0.1486</td>
</tr>
<tr>
<td>21</td>
<td>0.4856</td>
<td>0.1351</td>
</tr>
<tr>
<td>22</td>
<td>0.4692</td>
<td>0.1228</td>
</tr>
<tr>
<td>23</td>
<td>0.4533</td>
<td>0.1117</td>
</tr>
<tr>
<td>24</td>
<td>0.4380</td>
<td>0.1015</td>
</tr>
<tr>
<td>25</td>
<td>0.4231</td>
<td>0.0923</td>
</tr>
<tr>
<td>26</td>
<td>0.4088</td>
<td>0.0839</td>
</tr>
<tr>
<td>27</td>
<td>0.3950</td>
<td>0.0763</td>
</tr>
<tr>
<td>28</td>
<td>0.3817</td>
<td>0.0693</td>
</tr>
<tr>
<td>29</td>
<td>0.3687</td>
<td>0.0630</td>
</tr>
<tr>
<td>30</td>
<td>0.3563</td>
<td>0.0573</td>
</tr>
</tbody>
</table>

As shown above, the UK’s 3.5% discount rate allows 70.9% of the benefit in year 10 to be factored in the project assessment, while NZ’s 10% discount rate means that just 38.6% of the benefit is included in the assessment. By year 30, a UK project’s assessment still factors in 35.6% of the benefit in that year, while the NZ approach largely ignores these longer-term benefits, with just 5.7% of the estimated benefit in that year included in the net present value calculation.

In practice, this means that projects in the UK provide more than six times the emphasis on benefits that accrue to a project at the 30 year mark as compared to a similar project in NZ. This effectively results in investment decisions in NZ being skewed towards shorter-term investment projects with a near-term benefit profile.

The effect of using different discount rates will not be the same for all projects; rather, projects with estimated longer-term benefits will be better preferred with a lower rate, as shown above.
References


Auckland Regional Transport Authority 2006, Draft Auckland Transport Plan, ARTA, Auckland.

Auckland Regional Transport Authority 2007a, Draft Auckland Land Transport Program, ARTA, Auckland.

Auckland Regional Transport Authority 2007b, Patronage by mode – 1963 to present, (Excel Spreadsheet), ARTA, Auckland.


Rose, D. 2006, The Public Sector Discount Rate, NZ Association of Economists, Auckland


