



Pacific Economic Cooperation Council

Pacific Economic Outlook: Structure 2007 – Aging and Economic
Growth Potentials in the Pacific Region
Background Papers

NEW ZEALAND

JOHANNAH BRANSON*

1. PURPOSE

This paper was prepared at the request of the Pacific Economic Cooperation Council for the Pacific Economic Outlook Structure Specialists Meeting in Osaka, Japan, 23-24 September 2006, on the topic of *Aging and Economic Growth Potentials*.

Many developed countries around the world, including New Zealand, are experiencing aging populations – older age groups comprising an increasing proportion of the total population. This gradual shift in population age structure is set to continue, and in many countries become more pronounced, over the next few decades. This has prompted policy makers to consider the possible economic implications of population aging. The focus of this paper is effects on economic growth in New Zealand.

2. NEW ZEALAND

New Zealand is a relatively small, sparsely populated country of 4.1 million people on a land area 271,000 square kilometres (average population density of 15 people per square kilometre).

In 2004, New Zealand's total annual GDP was NZ\$150 billion (US\$100 billion), an average per capita of NZ\$36,400 (US\$24,600). This is quite low by OECD standards. New Zealand's GDP per capita has grown more slowly than the OECD average, falling to 21st from ninth highest in the OECD in 1970 (OECD, 2006a; OECD, 2006b; OECD, 2006c).

Explanations for New Zealand's poorer economic performance have focused on its relatively low labour productivity, attributed in part to low capital per worker, the causes of which are unclear (OECD, 2006a; OECD, 2006d; NZIER, 2006a).

Total labour force participation is high, as are employment and hours worked (OECD, 2006a; OECD, 2006e). Household saving has fallen to half the OECD average (NZIER, 2006b). The prospect of added pressures on labour supply, labour productivity and saving as the population ages therefore presents a particular challenge to improving New Zealand's GDP per capita ranking (IMF, 2005). This may be exacerbated by aging populations in other countries, given that New Zealand is a small open economy heavily reliant on international markets for goods, services and capital.

* Senior Economist, New Zealand Institute of Economic Research (NZIER) The New Zealand Institute of Economic Research (NZIER) is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia and further afield. NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions. Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project. NZIER was established in 1958.

This report has been prepared at NZIER by Johannah Branson and reviewed by Jean-Pierre de Raad. The assistance of Brent Layton and Deborah O'Connor is gratefully acknowledged.

3. DEMOGRAPHIC TRENDS

3.1 TOTAL POPULATION

New Zealand's population is projected to reach five million by 2041. Population growth will gradually slow, mainly due to the large increase in deaths as the population becomes older (Figure 1). Births exceeded deaths by around 30,000 in 2005, but deaths are projected to outnumber births from the early 2040s. The median age of the population rose from 26 in 1971 to 35 in 2004 and is projected to rise to 46 in 2051. The main drivers of the aging of New Zealand's population have been declining fertility and increasing longevity, together with the demographic event of the post-World War II "baby boom".

The 65+ years age group is projected to make up over one quarter of New Zealand's population from the late 2030s, compared with 12 percent in 2005 (Figure 2, 3 and 4). The number of people aged 65+ years is projected to increase from 0.5 million in 2005 to 1.3 million in 2051. The largest increases in the 65+ years age group will occur in the 2020s and 2030s, when the large birth cohorts of the 1950s and 1960s move into this age group.

The populations of all cities and districts are expected to become older, although with considerable variation between regions due to regional migration and differences in ethnic mix. All ethnic groups will age, although the Māori, Pacific and Asian populations are likely to remain younger than the broad European population due to ethnic differences in fertility, mortality and migration.

3.2 WORKING AGE POPULATION AND LABOUR FORCE

The working age population (15-64 years) is projected to increase by 11 percent from 2.7 million in 2004 to just under 3 million in 2024, before declining gradually to 2.9 million in 2051. The older half of this age group (40-64 years) will account for most of this increase. Despite this increase, the working age population will drop from 66 percent of the total population in 2004 to 58 percent in 2051.

In the mid 1960s there were 7.1 people of working age for each person aged 65+ years. By 2004 this ratio had fallen to 5.5 and is projected to drop to 3.0 in 2028 and 2.2 in 2051.

New Zealand's labour force is aging (Figure 5). The median age of the labour force rose from 36 years in 1991 to 39 years in 2001 and is projected to stabilise at around 42 years from 2012. The number of people aged 65+ years in the labour force is projected to treble from an estimated 38,000 in 2001 to 118,000 in 2026 (above statistics from Dunstan and Thomson, 2005; Statistics New Zealand, 2004a).

The effect of an aging labour force will vary by industry sector. The primary sector has a larger proportion of older workers, including farmers who are mainly self-employed. Manufacturing and wholesale and retail trade have larger numbers of younger workers, although with labour and skill shortages, relative wage rates might alter and employers adjust the age mix of their workforces. Business and personal services have similar participation across age groups, but more females

than males in personal services at all ages. Self-employment, which allows greater control over working arrangements and hours, increases with age and includes a significant number of workers aged 65+ years (Davey, 2005).

Bryant (2003a) concludes that demographic trends are likely to afford New Zealand a small advantage over most other OECD countries: a slower decline in the proportion of the population of working age; a continuing increase in the size of the working age population over the next 20-30 years; higher fertility rates in New Zealand than in Europe and Japan (Figure 6); a younger working age population in New Zealand than in Europe and Japan; and a comparatively low old-age dependency ratio and high youth dependency ratio.

4. EFFECTS ON ECONOMIC GROWTH

Guest *et al.* (2004) estimates the aging of New Zealand's population to result in 12 percent lower growth in real incomes over the next 50 years, relative to a scenario of no population aging. The remaining growth is sufficient to enable living standards to double over this time even with population aging. From this perspective, an aging population does not present a great risk to New Zealand. The government has, however, set a target of returning New Zealand's GDP per capita to the top half of the OECD rankings. This paper therefore investigates the implications of population aging for economic growth through effects on:

- labour supply and productivity
- private and public expenditure and
- saving and investment.

4.1 LABOUR SUPPLY AND PRODUCTIVITY

4.1.1 LABOUR SUPPLY

Labour supply is determined by the combination of:

- size of working age population
- labour force participation rate (the proportion of the working age population who are available for work)
- employment rate (the proportion of the labour force in work) and
- hours worked per person in employment.

a) Working age population

Ceteris paribus, an aging population implies a smaller proportion of the population of working age and a higher old-age dependency ratio. This could reduce the supply of labour, depending on population growth and age-specific participation rates in particular.

b) Participation rate

New Zealand has a high total participation rate, although there may exist impediments to some groups who would like to work more.

Rising participation in New Zealand over recent decades has been driven largely by increased female participation, enabled by greater availability of childcare facilities, changing social attitudes to mothers working, declining family sizes, increasing employment opportunities in the service sector and growth in part-time and casual positions (NZIER, 2004a). Female participation is still relatively low in New Zealand, especially in the 25-45 years age group, compared with other countries. There is some scope for female participation to grow further, but certainly not to the extent previously and it is likely to stabilise at a maximum in the next few decades (NZIER, 2004a).

Participation is considerably lower in older people (Figure 7). Whilst the average age of retirement has declined over the past 50 years in most OECD countries (Auer and Fortuny, 2000), participation in older age groups rose substantially in New Zealand over the 1990s in response to an increase in the age of eligibility for publicly funded superannuation (reinstated to 65 in 2001, after it had previously been reduced to 60).

As in other countries, life expectancy has increased significantly and is likely to rise further in future decades (Figure 8). Increased longevity may raise participation by older workers if they remain fit and healthy to an older age. The length of working life may be extended to fund consumption over a longer expected life. The decision of when to retire is influenced by not only health and wealth, but also uncertainty of economic conditions and the rising cost of living. Retirement policy in New Zealand has sought to enhance certainty to allow workers to plan more easily for retirement. A further influence on the decision to retire is attitude, in choosing to continue working to remain mentally and physically active and to feel productive and useful. In New Zealand, there is no compulsory retirement age and the current superannuation system does not penalise later retirement (pension payments are not reduced if the claimant has other income).

c) Employment

Workers who lose their jobs after the age of 50 tend to have diminishing prospects of re-employment. Older workers in employment may also find that they have fewer training and promotion opportunities (McGregor, 2000). This may be due to the actual or perceived health, skills, training potential and pay expectations of older workers.

Counter to some employer expectations, Turner (2000) finds the incidence of sickness to be no higher in older workers. Older workers may have longer recovery times, but accident rates are higher in younger workers (Patrickson and Hartman, 1995). Furthermore, avoidable absence has been found to decrease with age (Bennington and Tharenou, 1997).

Older workers may not have the skills employers require (McGregor and Gray, 2001). They are, however, capable of acquiring and applying new knowledge, although may require different learning environments and sometimes a longer training period. Their lower job turnover may make training a worthwhile investment

(Warr, 1994).

Pay expectations tend to increase with age (McGregor, 2000). This can make older workers more expensive to take on if pay scales are based on seniority and experience, but no disadvantage where pay is performance-based.

With pressure on labour supply, employers are likely to have to change their attitudes to employing older workers and adapt their employment practices to the needs of older workers. Internationally, with labour and skill shortages in aging developed countries, there may be some shift in production from developed to developing countries with younger populations.

d)Hours worked

Not only is participation lower at older ages, but the average number of hours worked also declines, with workers demanding more leisure. In New Zealand, male workers aged 45-54 years worked an average of 48 hours per week in 2001 compared with 34 hours per week by male workers aged 65-74 years. Similarly, hours averaged 36 hours per week for female workers aged 45-54 years compared with 25 hours per week for female workers aged 65-74 years (Dunstan and Thomson, 2005). Whilst hours worked are high in New Zealand compared with other countries, an aging population increases demand for part-time and casual work and more flexible working arrangements such as working from home.

Whilst on the topic of labour supply, we cannot ignore the significant contribution of older population groups to the voluntary sector. Unpaid and voluntary work for non-profit organisations has been estimated to be equivalent to over 127,500 jobs, over five percent of the total New Zealand Workforce (Statistics New Zealand, 2001a).

4.1.2 LABOUR PRODUCTIVITY

An aging population raises two questions with regard to implications for labour productivity:

- Does productivity decline with age of worker?
- Is productivity affected by the size of the working age population?

a)Productivity and age

Aging might affect labour productivity directly or through capital deepening and total factor productivity, although the literature is mixed on whether these effects are positive or negative.

The Australian Productivity Commission (2005) estimates productivity to rise with age until starting to decline from middle age. Whilst experience and level of expertise generally increase with age, some functions may decline, such as ability to learn new skills, and older workers may be perceived as less dynamic and innovative. In reviewing the research in this area, the Human Rights Commission (1998) concludes that older workers are just as productive as younger workers and make more stable employees, with lower rates of absenteeism. International studies indicate greater variation in productivity within age bands than between them (Warr,

1994). Davies *et al.* (1991) finds no clear evidence of universally poorer performance. Older workers may be disadvantaged in jobs that require physical strength and fast reaction time, but are otherwise able to perform just as well, if not better (Griffiths, 1997; Warr, 1994).

An aging population may also have implications for the productivity of younger workers. With fewer younger workers, future cohorts may face less immediate competition for jobs, which may reduce incentives to invest in acquiring advanced qualifications. A countervailing force is greater earning potential for increasingly scarce highly qualified workers. In New Zealand, Māori and Pacific Islanders would comprise an increasing proportion of the workforce, especially the younger workforce. These groups are currently proportionately under-represented in tertiary education, which could lead to lower productivity through a shortage of advanced skills.

A decline in the working age population might increase capital per worker, raising labour productivity. This could be particularly beneficial in New Zealand, where labour productivity and capital per worker are low. Scarcer labour also provides greater incentive to substitute capital for labour and to adopt labour-saving technologies.

With regard to total factor productivity, labour scarcity might prompt increasing innovation (Romer, 1990). Higher taxes to fund increased public expenditure could reduce the incentive to innovate. As the population ages, consumption patterns change, with reduced demand for manufactured goods and increased demand for services. Productivity growth is typically lower in service than manufacturing sectors, with technological developments generally more readily applied in the latter. Service industries have played a greater role than manufacturing in New Zealand's recent economic growth, however, and New Zealand is less reliant than most developed countries on manufactured exports. Martins *et al.* (2005) finds no significant effect on aggregate productivity growth from changes in consumption patterns due to population aging.

b) Productivity and size of working age population

Both the theoretical and empirical literature are inconclusive on whether, and if so in which direction, changes in working age population might affect labour productivity.

Many models of endogenous economic growth and agglomeration effects (economies of scale and scope from the geographical concentration of population and economic activity) suggest a positive relationship between population growth and labour productivity. A larger population comprises more people to have innovative ideas and provides opportunity for increased specialisation, thicker markets and greater potential for knowledge spillovers (Romer, 2001). New Zealand is already at a disadvantage in this respect, given its small size, internal geography (low population density, relatively small and widely scattered cities) and distance from global economic activity. Conversely, an abundance of labour may undermine incentives to provide workers with more capital or to introduce labour-saving technology.

Romer (1990) and Little and Triest (2002) for the USA and Cutler *et al.* (1990)

across 29 high income countries find increased growth in working age population to be associated with a reduction in labour productivity (and conversely, therefore, decreased growth in working age population to increase productivity). In contrast, Bloom and Williamson (1998) for East Asia and Brander and Dowrick (1994) for 67 middle and high income countries find no evidence that the size of the working age population affects productivity growth.

4.2 PRIVATE AND PUBLIC EXPENDITURE

4.2.1 PRIVATE EXPENDITURE

Average household expenditure in New Zealand declines at older ages, steadily increasing with age until dropping in the 55-64 years age group and falling further in the 65+ years age group (Statistics New Zealand, 2004b).

Older consumers also have different tastes and may demand different goods and services, such as fewer manufactured goods and more services. In particular, an aging population is likely to raise demand for medical goods and healthcare and residential care services, whether privately or publicly funded (see below). The changing structure of demand would likely be gradual and predictable, to which most markets would be able to adjust fairly smoothly.

4.2.2 PUBLIC EXPENDITURE

Across OECD countries including New Zealand, government social expenditures are higher per old person than per younger person (Weil, 1997). This implies that a rise in population in high cost age groups would increase New Zealand's total social expenditure (Creedy and Scobie, 2002). Public expenditure is likely to come under particular pressure in the areas of healthcare and superannuation (Treasury, 2006).

New Zealand healthcare costs per capita rise steeply from middle age (Rodway and Wilson, 2006). NZIER (2004b) estimates the demand for health and disability services to rise by 40-69 percent by the year 2021. Increased longevity may raise the amount of healthcare resource consumed per person beyond the age of 65, although not necessarily if greater longevity is accompanied by longer maintenance of health and fitness.

Projections suggest that healthcare spending in New Zealand is more sensitive to non-demographic pressures (Bryant *et al.*, 2004). Improved or new technologies and treatments are generally more expensive than those they replace, although may provide efficiency gains such as quicker recovery. Additionally, the health sector is heavily dependent on labour and may therefore face supply pressures with an aging population. Income in older age groups may be unable to keep pace with the rising costs of healthcare, increasing dependence on public funding.

As superannuation is publicly funded in New Zealand, an aging population increases the fiscal burden (Rodway and Wilson, 2006). With increasing longevity and improved health, however, the length of working life could be extended. The retirement age and age of entitlement to superannuation could be raised, both to reduce the fiscal burden and to increase labour force participation.

An aging population could also affect other areas of public expenditure. Spending on education is likely to decline with a reduction in relative numbers of young people through falling fertility rates (Rodway and Wilson, 2006). Spending on law and order may also decrease, given the negative correlation between crime and age, with the majority of crime committed by 15-30 year olds (Statistics New Zealand, 2001b). There could be a need for increased spending on public infrastructure at regional and local levels, such as healthcare, accommodation, transport, care and community services, particularly in areas to which retirees migrate.

Taxation might be increased to fund the rising demands on public expenditure. Higher taxation of labour income, including the implicit tax rate on pension payments if continuing to work prevents entitlement or pensions are taxed in addition to any income from work, could discourage labour force participation. Depending on the tax regime, higher corporate taxes can also discourage investment and innovation and thereby impede productivity improvement and economic growth.

4.3 SAVING AND INVESTMENT

4.3.1 SAVING

Under the life cycle model, in which an individual seeks to smooth consumption over his/her lifetime, saving increases with income, which generally increases with age, until retirement, from which point saving becomes negative as accumulated wealth is used to fund consumption. An aging population might therefore reduce total saving, which in turn might reduce funds available for capital investment. Gibson and Scobie (2001) finds, however, that (flow) saving rates in New Zealand are still relatively high at older ages. The majority of lifetime saving occurs between the ages of 40 and 64 years. Saving rates peak at around 55-60 years and decline thereafter. An aging population may even result in increased saving as people save more during their working life to allow for greater life expectancy (Zhang and Zhang, 2001). Bloom *et al.* (2002) finds that increased longevity tends to lead to higher saving at all ages.

New Zealand already has a relatively low level of household saving compared with other countries, for which government saving may be compensating. Increased public expenditure due to an aging population, such as to meet greater healthcare and superannuation demands, would likely reduce government saving. This might also reduce private saving if funded through increased taxation.

An aging population could have implications for asset prices. Some commentators suggest that we could see a widespread fall in asset prices around 2020 as the population spike of “baby boomers” reach retirement age and seek to realise their equity all around the same time (Siegel, 1994). Poterba (1998) and Poterba (2000) find only a weak link between demographics and asset prices in the USA, however. More generally, an aging population may cause a shift in the types of assets held, particularly towards investments offering fixed income returns. This may increase the demand for government bonds and reduce the demand for and price of equities. It has been suggested that this preference for fixed return assets might negatively affect economic growth, as variable return investments, such as investment in capital equipment, yield greater benefits for economic growth (Ahn and Hem-

mings, 2000; De Long and Summers, 1991).

New Zealand has a very high rate of home ownership, with most household wealth held in housing. Historically, house prices have been driven by population growth. Slowing population growth, together with an aging population wishing to realise equity from housing, may ease demand relative to supply and reduce pressure on house prices. House prices may not actually fall, but simply exhibit slower and smoother growth, with less speculative volatility. Indeed, house prices may be buoyed by rising wages as labour becomes more scarce.

Financial markets are unlikely to be adversely affected, given their flexibility and the gradual and predictable nature of population aging. The main adaptation required is the development of a wider range of financial products, able to provide a stable income stream in retirement, protected against inflation and uncertainty. New Zealanders hold relatively low levels of pension fund assets compared with other developed countries, financial products providing annuities are currently scarce in New Zealand (possibly due to tax treatment, consumer attitudes or availability of universal publicly funded superannuation) and there is a shortage of equity withdrawal products despite the dominance of housing in household wealth.

4.3.2 INVESTMENT

If an aging population does reduce total saving, this might reduce the supply of funds available for investment if foreign sources do not compensate. This fall in supply of investment capital may exert upward pressure on its cost, raising interest rates, in turn discouraging private investment (Crocombe *et al.*, 1991). Studies of economic growth in small open economies such as New Zealand, however, have not yet provided evidence of a link between domestic saving, capital accumulation and economic growth (Claus *et al.*, 2001).

Increased indebtedness due to reduced saving could raise the risk premium on investing in New Zealand and reduce New Zealand's ability to source investment capital from offshore. New Zealand has little difficulty accessing foreign investment capital currently, but the developed countries from which this is sourced also have aging populations and may face similar reductions in domestic saving in the future. Global interest rates may therefore rise unless investment capital becomes more mobile between developing countries, with younger populations and higher saving, and developed countries. Even with adequate flows of investment capital between countries, it has been suggested that domestically sourced capital is more productive than foreign capital due to domestic investors' superior knowledge of the local economy (Gordon and Bovernberg, 1996), although there is no evidence of this in New Zealand.

An aging population may also affect the demand for investment capital, through changes in labour supply and consumption patterns outlined above. Although an increase in capital to labour ratio may raise labour productivity, it reduces the returns to capital. A fall in labour supply may reduce the demand for capital also where capital augments, rather than substitutes for, labour inputs (NZIER, 2005). That a fall in the working age population reduces investment demand is supported by Cutler *et al.* (1990) for the USA and Guest *et al.* (2004) for New Zealand.

5. POLICY IMPLICATIONS

Many countries have begun to review their social and economic policies and to develop national strategies for addressing the effects of their aging populations. This is hampered by, as seen above, often inconclusive findings in the theoretical and empirical literature on whether population aging would have negative or positive effects on key variables. Nevertheless, the literature points to a number of policy implications.

5.1 CONSEQUENCES FOR NEW ZEALAND

The population projections of Section 3 suggest that New Zealand's population will continue to grow, albeit at a slower rate as the population ages. By the late 2030s, one quarter of the population will be aged 65+ years. The working age population will continue to increase until 2024, before gradually declining. The median age of the labour force will rise further, before stabilising at around 42 years from 2012. New Zealand's higher fertility and younger population than many other countries afford it some protection from more marked demographic changes with population aging.

Increased participation and employment of older workers are likely and would partially mitigate the slower and eventually negative growth in size of working age population. More older workers in the labour force may reduce average hours per worker, but not necessarily reduce labour productivity per hour worked. The latter may benefit from a possible improvement in New Zealand's currently low capital to labour ratio.

Private expenditure is likely to decrease and change in composition, whilst public expenditure is likely to increase significantly, particularly on healthcare, although not only due to age, and superannuation.

Population aging would not necessarily reduce total savings, given increased life expectancy, but is likely to change the types of assets held in favour of investments providing fixed income returns. It is also likely to increase the demand for financial products enabling withdrawal of the considerable equity held in housing. Consequently, a fall in the supply of investment funds available domestically and, of particular importance for New Zealand, from overseas, which could exert upward pressure on interest rates, is possible but not inevitable. Nor is a fall in demand for investment capital, depending on changes in labour supply, whether capital augments or substitutes for labour, the cost of and returns to capital, and changes in private expenditure.

5.2 POLICY OPTIONS

In suggesting policy options, the main focus in the literature is on labour supply and productivity. These are particularly important for New Zealand if it is to succeed in improving its low GDP per capita ranking as its population ages, given its already low labour productivity and high participation, employment and hours worked.

Historically, immigration has been an important source of population growth in

New Zealand. Immigration may increase the size of the population, but tends not to alter its age structure significantly (Bryant, 2003a; United Nations, 2000). There may nevertheless be a role for targeted immigration in addressing specific skills shortages.

A policy objective of raising fertility is generally rejected due to the delay until additional births reach working age, the increase in youth dependency and associated public expenditure in the meantime, and the effects on female labour force participation and family income. Fertility is already high in New Zealand and projected to remain so, relative to other OECD countries. New Zealand's already high labour force participation might be raised further by identifying and easing impediments to population groups that would like to work more, such as by providing greater access to childcare facilities and flexibility in working arrangements.

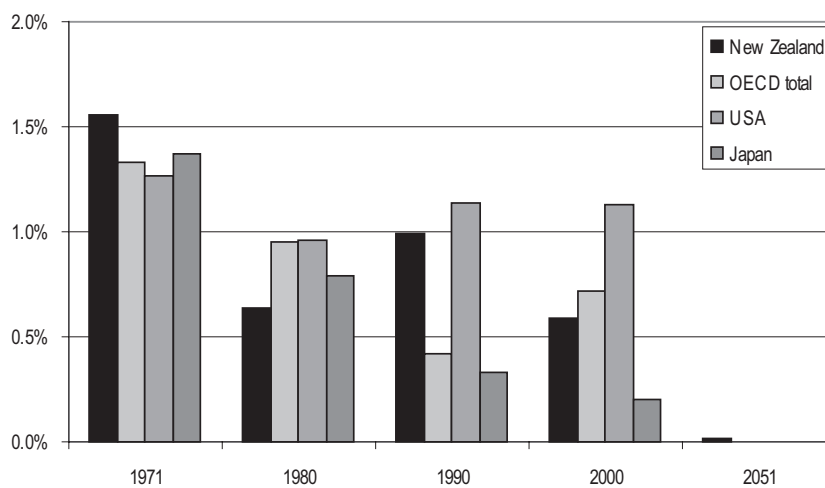
Heralded as offering the greatest potential, in New Zealand and internationally, is maintaining participation and productivity to an older age. Options for assisting this include:

- promoting maintenance of health and fitness into old age
- improving employment prospects for older workers, including fostering more positive attitudes to employment of older workers and penalising age discrimination
- adapting training programmes to the learning needs and styles of older workers
- encouraging availability of flexible working arrangements, such as part-time and casual work and working from home and
- providing flexibility in retirement age, improving incentives to postpone retirement or, ultimately, raising the age of entitlement to publicly funded superannuation.

Accompanying these policies targeted at older age groups is improving education and training for younger people, including Māori and Pacific Islanders, to provide a continuing supply of skilled workers; promoting the cost-effectiveness of health-care services; and ensuring that the tax regime does not create undue disincentives to continuing labour participation by older workers, saving, supply of annuity and equity withdrawal financial products, and investment and innovation.

Figure 1. Population growth 1971-2051

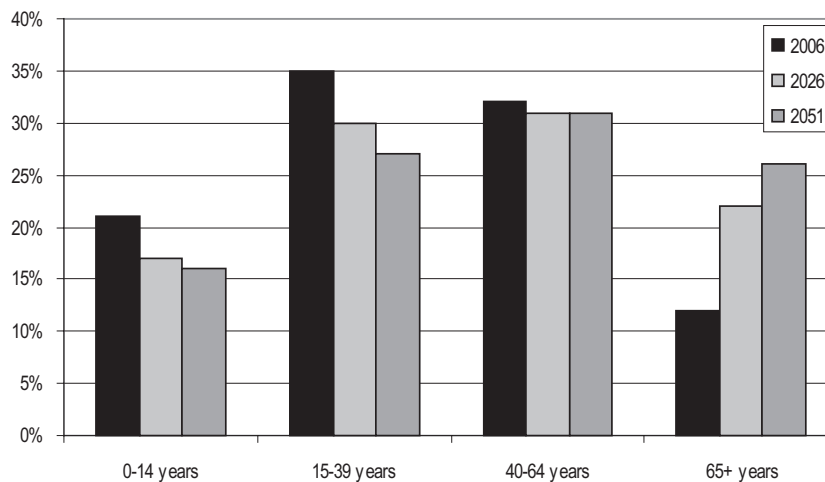
Annual percentage change



Source: OECD (2006a); Statistics New Zealand (2004a)

Figure 2. Age distribution of New Zealand population 2006-2051

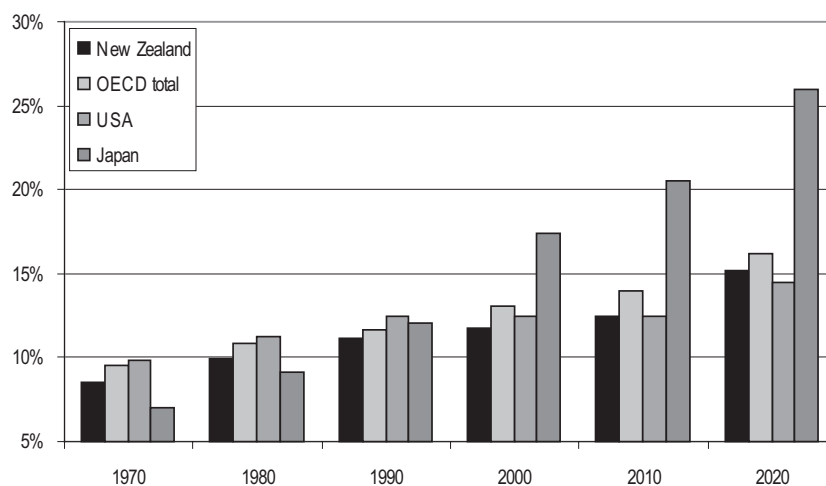
Percentage of total population



Source: Statistics New Zealand (2004a)

Figure 3. Population aged 65+ years 1970-2020

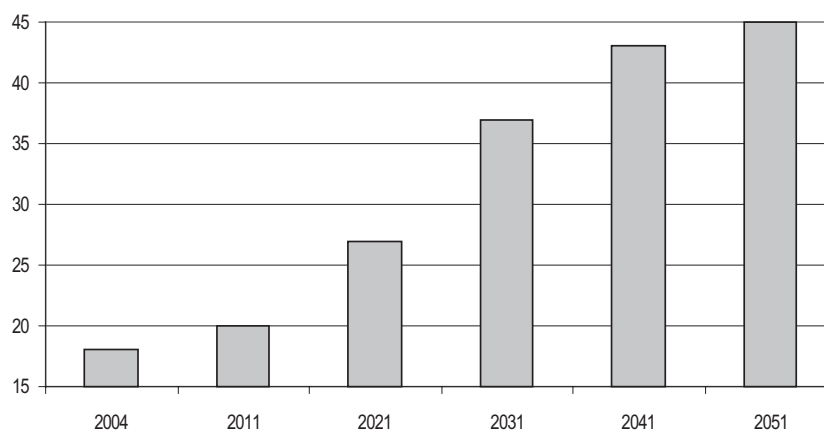
Percentage of total population



Source: OECD (2006a)

Figure 4. New Zealand old-age dependency ratio 2004-2051

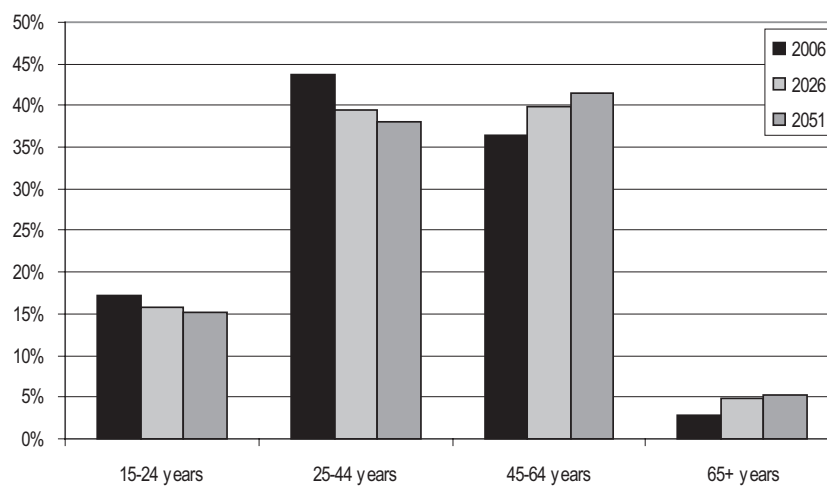
Number of people aged 65+ years per 100 people aged 15–64 years



Source: Statistics New Zealand (2004a)

Figure 5. Age distribution of New Zealand labour force 2006-2051

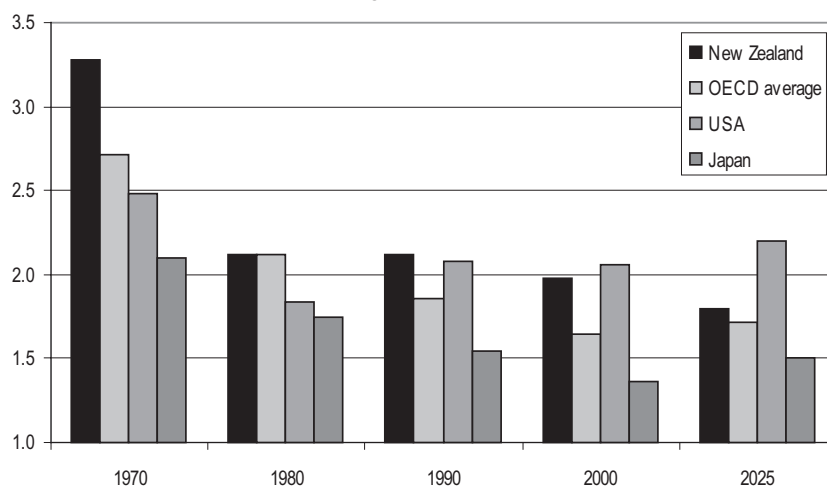
Percentage of total labour force



Source: Statistics New Zealand (2002)

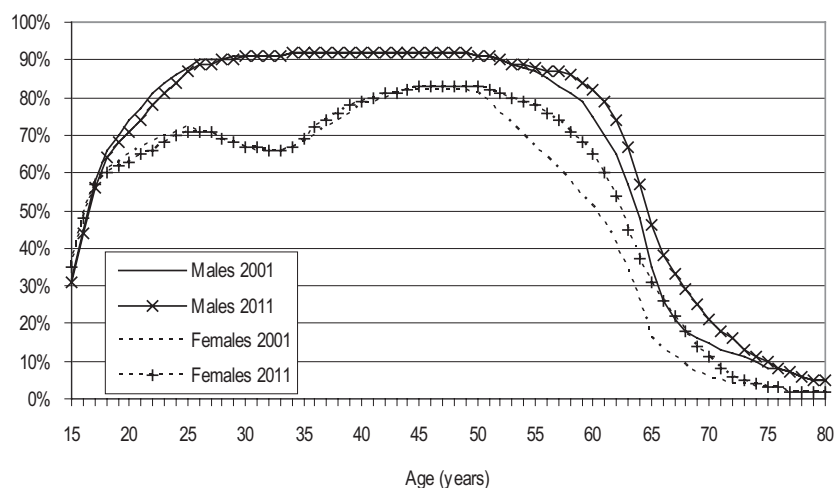
Figure 6. Total fertility rate 1970-2025

Number of children born to women aged 15-49



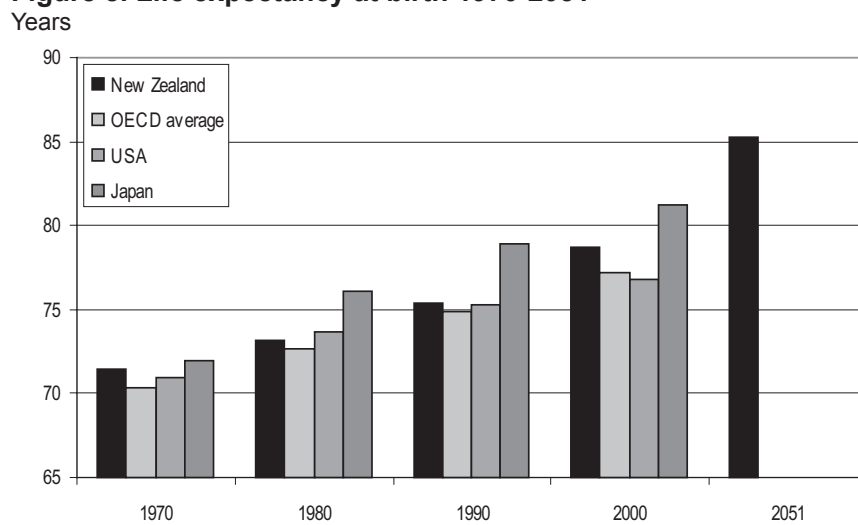
Source: OECD (2006a); US Census Bureau (2004)

Figure 7. New Zealand labour force participation by age and sex 2001-2011



Source: Statistics New Zealand (2002)

Figure 8. Life expectancy at birth 1970-2051



Source: OECD (2006a); Statistics New Zealand (2004a)

REFERENCES

- Ahn, S. and Hemmings, P. (2000) *Policy Influences on Economic Growth in OECD Countries*, Organisation for Economic Co-operation and Development, Economics Department Working Paper ECO/WKP(2000).
- Auer, P. and Fortuny, M. (2000) *Ageing of the Labour Force in OECD Countries: Economic and Social Consequences*, International Labour Office, Employment Paper 2000/2.
- Australian Productivity Commission (2005) *Economic Implications of an Ageing Australia*.
- Bennington, L. and Tharenou, P. (1997) Older workers: myths, evidence and implications for Australian managers, *Asia Pacific Journal of Human Resources*, 34(3), pp.63-76.
- Bloom, D.E., Canning, D. and Graham, B. (2002) *Longevity and Life Cycle Savings*, National Bureau of Economic Research Working Paper 8802.
- Bloom, D. and Williamson, G. (1998) Demographic transitions and economic miracles in emerging Asia, *World Bank Economic Review*, 12 (3), pp.419-56.
- Brander, J. and Dowrick, S. (1994) The role of fertility and population in economic growth: empirical results from aggregate cross-national data, *Journal of Population Economics*, 7, pp.1-25.
- Bryant, J. (2003a) *Demographic Change and New Zealand's Economic Growth*, New Zealand Treasury Working Paper 03/04.
- Bryant, J. (2003b) *The Ageing of the New Zealand Population, 1881-2051*, New Zealand Treasury Working Paper 03/27.
- Bryant, J., Teasdale, A., Tobias, M., Cheung, J. and McHugh, M. (2004) *Population Ageing and Health Expenditures in New Zealand, 1951-2051*, New Zealand Treasury Working Paper 04/14.
- Claus, I., Haugh, D., Scobie, G. and Tornquist, J. (2001) *Saving and Growth in an Open Economy*, New Zealand Treasury Working Paper 01/32.
- Creedy, J. and Scobie, G. (2002) *Population Ageing and Social Expenditure in New Zealand: Stochastic Projections*, New Zealand Treasury Working Paper 02/28.
- Creedy, J. and Scobie, G. (2005) Population ageing and social expenditure in New Zealand, *The Australian Economic Review*, 38(1), pp.19-39.
- Crocombe, G., Enright, M. and Porter, M. (1991) *Upgrading New Zealand's Competitive Advantage*, Oxford University Press, Auckland.
- Cutler, D., Poterba, J., Sheiner, L. and Summers, L. (1990) An aging society: op-
-

portunity or challenge?, *Brookings Papers on Economic Activity*, 1, pp.1-73.

Davey, J. (2003) Human capital issues in an ageing workforce, *Social Policy Journal of New Zealand*, 20, pp.156-172.

Davey, J. (2005) *Implications of Population Ageing for the Labour Market*, Implications of Population Ageing Workshop, New Zealand Ministry of Social Development, September 2005.

Davies, D., Matthews, G. and Wong, C. (1991) Ageing and work, *International Review of Industrial and Organisational Psychology*, 6, pp.149-211.

De Long, B. and Summers, L. (1991) Equipment investment and economic growth, *Quarterly Journal of Economics*, 106(2), pp.445-502.

Dunstan, K. and Thomson, N. (2005) *Demographic Aspects of New Zealand's Ageing Population*, Statistics New Zealand.

Gibson, J. and Scobie, G. (2001) *Household Saving Behaviour in New Zealand: a Cohort Analysis*, New Zealand Treasury Working Paper 01/18.

Gordon, R. and Bovernberg, A. (1996) Why is capital so immobile internationally? Possible explanations and implications for capital taxation, *American Economic Review*, 86(5), pp.1,057-1,075.

Griffiths A. (1997) Ageing, health and productivity: a challenge for the new millennium, *Work and Stress*, 11(3), pp.137-214.

Guest, R., Bryant, J. and Scobie, G. (2004) Population ageing in New Zealand: implications for living standards and the optimal rate of saving, *New Zealand Economic Papers*, 38(1), pp.1-20.

Human Rights Commission (1998) *Age and Retirement in the Public Service: Legal and Human Resource Implications of the Abolition of Compulsory Retirement*, New Zealand State Services Commission.

IMF (2005) *New Zealand: Selected Issues*, International Monetary Fund Country Report 05/153.

Little, J. and Triest, R. (2002) The impact of demographic change on U.S. labor markets, in *Seismic Shifts: The Economic Impact of Demographic Change*, Federal Reserve Bank of Boston.

McGregor, J. (2000) *Employment of the Older Worker Survey*, Massey University, New Zealand.

McGregor, J. and Gray, L. (2001) *Mature Job-Seekers in New Zealand*, Massey University, New Zealand.

Martins, J.O., Gonand, F., Antolin, P., de la Maisonneuve, C. and Yoo, K.Y. (2005) *The Impact of Ageing on Demand, Factor Markets and Growth*, Organisation

for Economic Co-operation and Development, Economics Working Paper 420.

NZIER (2004a) *Economic Growth: a Note on Demographic and Economic Issues*.

NZIER (2004b) *Ageing New Zealand and Health Disability Services: Demand Projections and Workforce Implications 2001-2021*, report to the Ministry of Health.

NZIER (2005) *Population Ageing, Capital Markets and Markets for Goods and Services: Implications for New Zealand*, report to the Ministry of Social Development.

NZIER (2006a) *The New Zealand-Australian Income Differential*, NZIER working paper 2006/5.

NZIER (2006b) Jam-jar economics? The economics of saving, *Update*, June, pp.1-2.

OECD (2005) *OECD Economic Outlook*.

OECD (2006a) *OECD Factbook 2006 – Economic, Environmental and Social Statistics*, Organisation for Economic Co-operation and Development.

OECD (2006b) *National Accounts of OECD Countries*, vol.1, May 2006 update, Organisation for Economic Co-operation and Development.

OECD (2006c) *National Accounts of OECD Countries*, vol.1, March 2006, Organisation for Economic Co-operation and Development.

OECD (2006d) *Productivity Database*, January 2006, Organisation for Economic Co-operation and Development.

OECD (2006e) *Employment Outlook 2006*, Organisation for Economic Co-operation and Development.

Patrickson, M. and Hartman, L. (1995) Australia's ageing population: implications for human resource management, *International Journal of Manpower*, 16(5/6), pp.34-46.

Poterba, J. (1998) *Demographic Structure and Asset Returns: an Empirical Investigation*, National Bureau of Economic Research Working Paper W6774.

Poterba, J. (2000) *Population Age Structure and Asset Returns*, Harvard University Review of Economics and Statistics Lecture.

Rodway, P. and Wilson, P. (2006) *Modelling New Zealand's Long-Term Fiscal Position*, New Zealand Treasury Policy Perspectives Paper 06/01.

Romer, P. (1990) Capital, labor, and productivity, *Brookings Papers on Economic Activity*, pp.337-367.

-
- Romer, P. (2001) *Advanced Macroeconomics*, McGraw Hill.
- Siegel, J. (1994) *Stocks for the Long Run: a Guide to Selecting Markets for Long-Term Growth*, McGraw Hill.
- Statistics New Zealand (2001a) *Around the Clock – Findings from the New Zealand Time Use Survey (1998-99)*.
- Statistics New Zealand (2001b) *Crime in New Zealand (1994-2000): Analytical Reports*.
- Statistics New Zealand (2002) *National Population Projections (2001 (base) -2051)*.
- Statistics New Zealand (2004a) *National Population Projections (2004 (base) -2051)*.
- Statistics New Zealand (2004b) *Household Economic Survey*.
- Stephenson, J. and Scobie, G. (2002) *The Economics of Population Ageing*, New Zealand Treasury Working Paper 02/05.
- Treasury (2006) *Statement on the Long-Term Fiscal Position*, New Zealand Treasury.
- Turner, G. (2000) *The Value of the Older Worker: a Guide to Employing the Older Worker*, New Zealand Open Polytechnic.
- United Nations, (2000) *Replacement Migration: is it a Solution to Declining and Ageing Populations?*, Population Division, Department of Economic and Social Affairs, United Nations Secretariat.
- US Census Bureau (2004) www.census.gov
- Warr, P. (1994) Age and job performance, in Suel, J. and Creemer, R. (eds.) *Work and Ageing: a European Perspective*, Taylor Francis.
- Weil, D. (1997) The economics of population aging, in Rosenzweig, M. and Stark, O. (eds.) *Handbook of Population and Family Economics*, Elsevier.
- Zhang, J. and Zhang, J. (2001) *Effects of Longevity and Dependency Rates on Saving and Growth: Evidence from a Panel of Cross Countries*, Chinese University of Hong Kong and Victoria University of Wellington, New Zealand.
-

