The Economics of Population Ageing

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N Z T R E A S U R Y **W O R K I N G P A P E R** **S E R I E S 0 2 / 0 5**	The Economics of Population Ageing

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Abstract

Demographic forecasts predict that over the next fifty years the proportion of people in New Zealand over the age of 65 will more than double, from 12 percent in 1999 to 26 percent in 2050. This paper reviews potential economic implications of this demographic change in the following broad categories: Demographic change, Labour Markets, Fiscal Impacts, Capital Markets, and Long-run economic growth effects. A synopsis is made of the key economic and demographic issues relating to each category, and the paper highlights those issues to be prioritised in further research.

The paper also questions the existing frameworks and methodologies that have been used to study population ageing. Two issues stand out in this regard. Firstly, there is a tendency to view population ageing as a "static" phenomenon. The economic implications of population ageing are pervasive and complex. Future research may benefit from attention to individual behavioural responses to ageing and into the underlying demographic dynamics of population ageing. Secondly, the future economic impacts of an ageing population are inherently uncertain. Future research could well incorporate methodological approaches that attempt to account for these inherent uncertainties.

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1   Introduction

Throughout the world industrialised economies are experiencing a shift in the age structure of their populations. The advent of ageing populations will impact considerably upon the way in which these economies function. It is difficult, however to be sure what the economic implications of ageing populations will be given that it is a globally unprecedented phenomenon.

This paper provides a synoptic view of the economic issues that surround the phenomenon of ageing populations. Its goal is to provoke debate and to provide a catalyst for discussion on the economic "problem" of population ageing. Particular emphasis has been placed on raising issues that require further investigation and on developing a framework that will prove useful for further research.

The paper is structured as follows. In the next section we consider demographic changes, summarising projections for the New Zealand population and examining the key demographic issues that arise out of expected structural changes in the age distribution.

In the third section of the paper we discuss of the impacts of demographic change upon the labour force. In this section, while we consider aggregate participation rates, the emphasis is on the interrelationship between individuals' labour force participation decisions and population ageing.

Section 4 discusses the implications of ageing populations upon the demand for public resources and their financing. The section is concluded with brief reference to the role that the political process may have upon future demands on public resources. Section 5 discusses the effect of population ageing upon capital markets, while Section 6 introduces some of the salient issues regarding ageing populations and long-run economic growth. The final section consists of concluding remarks and suggestions for further research.

2   Demographic change

The age structure of New Zealand's population is projected to change considerably in the first half of this century. This demographic change is a dynamic, multi-faceted

phenomenon. The aggregate age structure of our population will change and so will the age structure in different regions in New Zealand. Furthermore, these demographic changes have the potential to affect and be affected by human behaviour. This section seeks to introduce these issues of population ageing, spatial differentials in population ageing, and individual ageing, which necessarily underpin any discussion of the economics of population ageing.

2.1   Population ageing

Three demographic phenomena summarise age-structural change in New Zealand's population (Statistics New Zealand 2000; 2001c). Firstly, fertility rates have declined to sub replacement levels (that is, less than 2.1 births per woman in 1999), which means that the base of New Zealand's age-distribution pyramid is "thinning". Secondly, fertility rates between 1947 and 1973 rose above 3 births per woman for the entire period, peaking at 4.3 births per woman in the early 1960's. The first cohorts of this "baby boom" will start to retire by the year 2010, and subsequently the age-distribution pyramid is beginning to "fatten" at the top. Thirdly, the average life expectancy for newborn males has increased from 68.2 years in 1956 to 74.3 years in 1996, and for women there has been an increase from 73 years to 79.6 years over the same period. These increases in life expectancy further accentuate the fattening at the top of the age-distribution pyramid.

By the year 2050 we may expect that the number of people in New Zealand over the age of 65 will make up 26 percent of the population, up from 12 percent in 1999. Furthermore, we may expect a change in the overall population growth rate. If in the future fertility remains at a sub-replacement level and migration trends remain the same (an assumed net average annual gain of 5000), then the New Zealand population growth rate will move into negative figures some time around 2040, with the total population peaking at about 4.75 million[1] (Khawaja 2001).

The most frequently cited summary statistics regarding these projected demographic changes are so-called "dependency ratios". The *old-age dependency ratio* is the number of people over the age of sixty-five relative to the number of working aged people (15-64). Similarly we measure the *youth dependency* ratio as the ratio of the number of people in the population less than fifteen years of age relative to the working age population. The *total dependency* ratio is the sum of those people above and below the working age, all relative to the number of people in the working age population.

These conventional definitions of "dependency" provide an incomplete picture. As we shall see later individuals are apt to leave the workforce at ages younger than sixty-five. Furthermore, the ages at which people join the workforce varies considerably from individual to individual; certainly the lower bound of age fifteen leads to an overestimate of labour force participation now that compulsory education in New Zealand continues until the age of seventeen and rates of tertiary enrolment continue to increase. Also, the degree to which people outside the working age population represent a burden upon productive members of society depends largely on their needs, such as healthcare or education, and respective consumption patterns.

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[1]   This statistic, along with other projections in this paper for the New Zealand population, is based on series four projections from Statistics New Zealand (2000), which assume a total fertility rate of 1.90, an increase in longevity of six years between 1999 and 2051 and net annual migration of 5,000 (the historical average over the past 100 years).

It is possible to create more complex definitions of dependency ratios[2] but even in their crude form they provide readily understood summary statistics of the way in which the age-structure of a country's population is changing (Grimmond 2000). Figure 1 plots the projected ratios for New Zealand. From a low point of 50 percent in 2010, the total dependency ratio is projected to rise by over 20 percentage points by 2040, with the majority of the increase occurring by 2030.

Figure 1. **Projected New Zealand Dependency Ratios. 1999 - 2051**
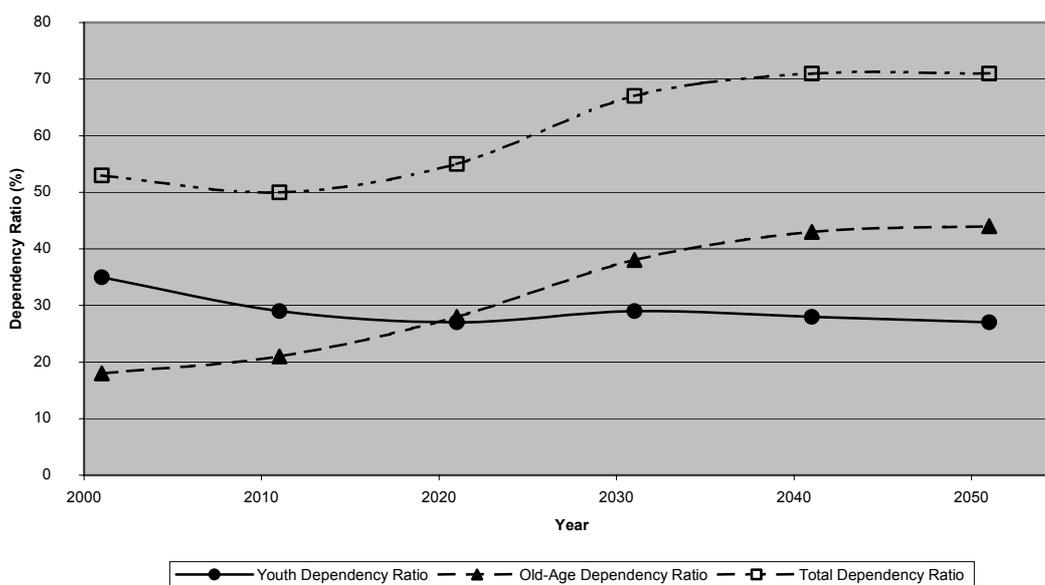
Source: Statistics New Zealand (2000) Table 3 (Series 4 Projections).

Demographic projections are, in general, fraught with uncertainties that are important to think about when considering the economic implications of population ageing. The number of elderly in New Zealand's population over the next fifty years can be projected fairly accurately given that the relevant cohorts have already been born. However, we cannot be sure what the future path of mortality rates will be and so our projections of the number of elderly in population carry some degree of uncertainty. Furthermore, fertility rates are difficult to project because they are disposed towards major structural change – one example being the spike in fertility rates that drove the baby boom. Subsequently projections of the size of the future labour force and hence future dependency ratios carry large degrees of uncertainty and this uncertainty grows with the length of the projection horizon.

The current approach for predicting future population changes is to use scenarios based on different levels of input variables such as fertility, mortality and migration (Statistics New Zealand 2001b). Assumptions are made as to the future levels of these variables and scenarios are created where high, low, and medium rates of growth for each variable are bundled together. Notably, these static scenario based models do not provide us with a measure of the size of likely errors in our projections. As such it is important to recognise that while they are useful one ought not to treat them as anything more than projections.

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[2]   For example, the raw data can be weighted by relative consumption "needs". See for example Scobie, (2000).

2.2   Spatial aspects of ageing

Another important aspect of population ageing in New Zealand concerns the spatial differentials in age-structural change. Regions of New Zealand will experience the effects of population ageing in different ways depending on their respective age-structures currently and inter-regional migration patterns in the future (Lepina 2000).

Currently, region specific age-structures differ considerably and one of the major drivers of this is ethnic composition. For example, Auckland has a large Pacific Island population (the largest of any city in the world) and twelve percent of the population is Maori (24 percent of New Zealand's total Maori population). These groups have relatively young age distributions[3] (Koopman-Boyden 1993), which means that population ageing will probably be less severe in Auckland compared with other regions in New Zealand. Conversely, Southland is a region that is predominantly Pakeha - a group that dominates the number of elderly in New Zealand. As such we expect Southland's population will age at a faster rate than Auckland (Koopman-Boyden 1993).

Future region-specific age-structures are also likely to be shaped by the migration of elderly to "retirement zones" in New Zealand. A number of different regions have retirement zones in them, often in the periphery of urban areas. These retirement zones, referred to as "sun-belts", will almost certainly grow in years to come. Furthermore "Almost all regions that will have a rapid growth in their elderly population are equally well the areas whose overall growth will exceed that of New Zealand as a whole"(Lepina 2000, p.406). Such a change in the spatial-variation of New Zealand's population would almost certainly have important implications for the economy.

2.3   Individual ageing

Population ageing is being driven by falling fertility rates and rising longevity, a reflection of the fact that individuals are living longer and having fewer children. These demographic parameters are both affected by and affect how individuals behave over their life cycle and subsequently it is important to attempt to understand these, "individual ageing", dynamics if we are to assess the economic impacts of population ageing.

Studying how individuals behave over their life cycle is an important approach widely used for analysing the economics of population ageing.[4] It allows us to understand the dynamics of fundamental economic variables, such as consumption and savings, at the individual level. In particular, over-lapping generation (OLG) models allow us to analyse life-cycle effects when some people observed in a particular period are in the workforce while others are retired[5].

 Examining individual behaviour within the OLG framework can often yield insights over and above those of more traditional macroeconomic models. For example, a simplified view of savings in an economy would suggest that as the proportion of working age people in the population declines, so too will total savings in the economy. Conversely, an

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[3]   The age distributions of the Maori and Pacific Island populations are younger than that for Pakeha because generally their fertility rates are higher and their life expectancies are lower.

[4]   For an accessible introduction to this approach see Disney (1996, especially Chs. 1 and 3).

[5]   For a recent example of the application of a life cycle model to simulate the effects of ageing on output, the current account, savings, debt and investment and the capital stock see Faruqee (2002).

OLG model may be constructed that is sensitive to changes in demographic variables such as making the savings-consumption decision dependent, in part, on life expectancy. As life expectancy increases individuals are apt to increase their individual rate of savings, offsetting the reduction in the number of individuals saving as the population ages (Zhang 2001).

Modelling the dynamics of human behaviour may prove particularly useful in analysing the impacts of policy changes within the context of population ageing. At present there is little work being done on this. Some work is being done, however, on microsimulation models which, although they do not directly consider human behavioural responses, can be used to assess the responses of individuals in given income, social, or age groups to changes in policy[6].

Alternatively attention to the dynamics of individual ageing contributes to understanding how economic and social conditions affect demography. There exists an expanding literature that focuses on models that explain how fertility is affected by economic and social variables (Heckman and Willis 1974; Poot and Siegers 1998). One such model suggests that fertility rates in open economies increase with positive changes in long –run real interest rates and decline with positive changes in social security and technological progress (Becker and Barro 1988).

3   Labour force

The ageing of New Zealand's population will have profound effects on the size and composition of the labour force. The ramifications for the economy are varied and depend on how both labour supply and labour demand respond to the age-structural changes in the working population.

3.1   Supply-side issues

The growth rate of New Zealand's working age population is projected to decline and become negative by the year 2041 (Statistics New Zealand 2001c). At the same time its composition will be changing with the working age population getting older, the proportion of Maori and Pacific Islanders in the working age population increasing, and labour supply becoming increasingly concentrated in "young" regions such as Auckland (Koopman-Boyden 1993).

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[6]   See for example Harding, (2002).

Figure 2. **Labour Force Participation Rates**
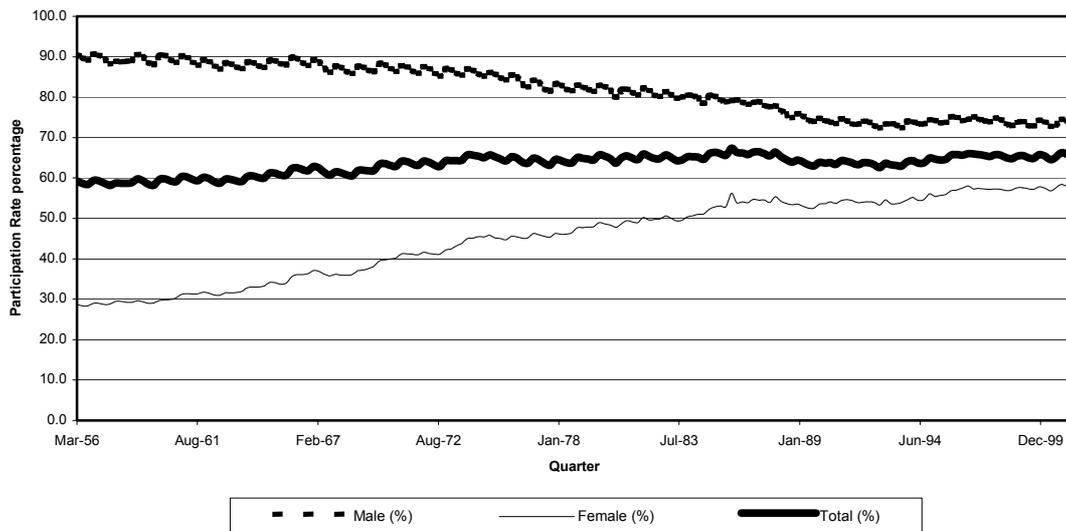
Source: Statistics New Zealand Household Labour Force Survey (Statistics New Zealand INFOS Database).

The shrinking of the working age population raises the prospect of an economy-wide reduction in total labour supply by the middle of this century. However the actual size of any reduction will depend critically on future labour force participation rates. Over the past fifty years there has been a slight increase in total labour force participation[7] (see *Figure 2*). A long term decline in male participation rates has been offset by an increase in female participation rates[8], however while female rates may continue to rise it is reasonable to expect that they will reach a plateau and no longer be the source of a growing labour force.

If we decompose female labour force participation rates by age we find that there is a significant reduction in labour force participation rates amongst women over the age of fifty. This is in contrast to male participation rates that decline rapidly for workers over the age of 60. There is evidence to suggest that this difference in age-specific participation rates is a cohort effect. In 1986 the decline of female labour force participation appeared to begin at the ages of 40 to 44, whilst in 1992 the change looks to have occurred between the ages of 45 and 49. Overall, between 1987 and 1996 there was a 12.3 percent increase in female labour force participation rates for women between the ages of 50 to 54 (Dixon 1996). These increases may well be due to cohort specific participation rates and what we are seeing in the data is cohorts of women, with higher lifetime participation rates, displacing cohorts with lower lifetime participation rates. Subsequently we may find that the trend of increasing labour force participation amongst women will cease when older cohorts reach retirement age.

In the absence of female labour force participation driving up overall labour participation rates, there is another potential source for growth in the labour supply. Increases in

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[7]   These rates are inclusive of part-time employment, which has risen considerably relative to full-time employment – so an increase in participation rates does not imply proportional increases in labour input per working age person.

[8]   The labour force participation rate is defined as the percentage of the working age population that is either employed or unemployed - according to the official definitions of unemployed and employed set out in the "Household Labour Force Survey " (HLFS). The HLFS defines the working age population as non-institutionalised, usually resident, civilians aged fifteen or over.

longevity indicate that there is potential for an overall increase in labour force participation rates amongst older workers as better health extends individual's productive working lives. This is in contrast however, to current trends in labour force participation amongst older workers in New Zealand. The average age of retirement has declined over the last fifty years with the average age of retirement for men falling from 64.8 in 1950, to 62 in 1995 and the average age of retirement for women has falling from 61.2 to 58.6 (Auer and Fortuny 2000).

A key question for enquiry then is: What affects the decision to retire? One contributing factor is the disincentive to work from the implicit tax rate that workers face around the age of retirement. In the case of countries with public pension schemes the decision to delay retirement carries the cost of foregone public benefits or higher tax rates, and the cost of foregone income from a private pension scheme (for which an extra periods contribution may make little or no difference to the level of entitlement post-retirement). This sort of implicit tax rate in New Zealand was, when the superannuation surcharge applied, estimated to be, on average, twenty-eight percent of gross income (Blondal and Scarpetta 1998). Although the surcharge no longer applies a superannuitant would still face higher tax rates if he or she chose to work after the age of 65.

The decision to retire is also related to health, wealth, and education (Haider and Loughran 2001) (Quinn 1998). In a study of older workers in the Engineering, Printing, and Manufacturing Union in New Zealand respondents were asked what factors they felt were important in the decision to retire. The largest response (95.9 percent) was in the category of "Your health" and the second largest was "financial security" (McGregor 2000). Education was not explicitly considered; however the strong correlation between education and wealth and income suggests that it is also a factor in the retirement decision.

Equally, uncertainty is an important aspect of the decision to retire (Lumsdaine 1995). Individuals are apt to delay retirement in expectation of retiring when conditions are more favourable; uncertainty of when such a time will be keeps people in the labour force. In the study of older workers cited above, 84.4 percent of respondents considered "the increasing cost of living" as an important factor in the decision to delay retirement. Although the statement is not an explicit reference to uncertainty the implication is that workers are concerned about potential future increases in living costs reducing their living standards in retirement.

The role that uncertainty has in the decision to retire is particularly pertinent for New Zealand, where retirement income policy has sought to create certainty in order to allow people to plan more easily for retirement. In general one would expect that greater certainty of retirement income would tend to lower labour force participation rates amongst older workers.[9]

There have been few studies of the retirement decision in New Zealand. The debate surrounding the economics of population ageing may be significantly enhanced by further research on this topic. In particular studies carried out at a microeconomic level or qualitative surveys would particularly enhance our understanding of the retirement decision, as they are more able to capture the heterogeneity of older workers than quantitative studies. The "Employment of the Older Worker Survey"(McGregor 2000) was

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[9] Despite increased life expectancy, retirement ages across many OECD countries have tended to fall. Disney (1996. Ch.7) explores the extent to which this is a response to more generous (and by implication, more certain) social security schemes.

a useful addition to the literature in this respect, and microeconometric analyses carried out by the OECD (Burkhauser, et al. 1998) also appear quite successful in explaining the factors that affect retirement decisions in a way that respects the heterogeneous nature of the elderly as a demographic group.

Another issue that deserves fuller investigation within the New Zealand context is whether or not worker productivity declines with age. Analysing changes to the size of the working age population represents a fairly simplistic view of labour supply when what is really in question is the future supply of labour inputs, not just the number of workers in the economy. The median age of people in New Zealand is expected to rise to 45.5 in 2051 from 34 in 1999 (Statistics New Zealand 2000). We can be fairly certain that there are some functions that decline with age, not least of which are cognitive functions such as the ability to learn new skills, but older workers often compensate for these things through, for example, lower rates of absenteeism. (Campbell 1993) (Auer and Fortuny 2000)[10]. If a negative relationship between age and productivity exists there is at least the potential for a decline in output per worker.

Any such decline could be expected to affect different sectors quite differently, depending on the age structure of their workforce. Service sectors employing largely young workers might for example experience little change. However, here as in many aspects of population ageing, there will probably be a series of dynamic responses and interactions. As the overall age structure changes, the relative supplies of labour of different ages and skill levels will change, potentially leading to changes in relative wage rates. Firms could be expected to adjust the age mix of their workforce in response to these price signals, so that the present age structures of employment in particular industries or sectors may well evolve.

In the future we may expect that a larger proportion of the workforce, particularly younger workers, will be Maori or Pacific Islanders and this may also affect productivity. Currently Maori and Pacific Islanders are proportionately under-represented in tertiary education. Were such trends to continue there is a strong likelihood of a decline in productivity from a lack of advanced skills in the economy.

Table 1 - Participation and unemployment rates for selected groups (2000 Q3)

	Participation Rate	Unemployment Rate
Male	73.2	6
Female	57.6	5.3
Pakeha	66.7	4.2
Maori	62.8	14.2
Pacific Islanders	60.8	11.3
Overall	65.1	5.7

Source: Organisation for Economic Co-operation and Development 2000, p.72

Furthermore Maori and Pacific Islanders are disproportionately represented in unemployment statistics and have lower rates of labour force participation than the general population (see Table 1). It is too difficult to say whether such outcomes will

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[10]   The question of age and productivity is further considered in the sections on labour supply and on long-run economic growth.

persist. However they do raise important questions about the future size of the labour force.

Given it is expected that there will be major regional differences in population age structure over the next fifty years, some regions will see their working age population decrease more rapidly than others. Although one would expect that the market would respond to this with migration out of regions with relatively high labour supply, there is potential for substantial labour shortages in those regions with ageing populations, at least in the medium term. This too is an area for further enquiry.[11]

3.2 Demand-side issues

The prospect of both a shrinking and an ageing work force poses interesting questions as to how employers will respond to these changing demographics. Is age discrimination a prevalent factor in the New Zealand labour market and if so will employers, faced with declining labour supplies, be proactive in training their older workers and seeking to retain their human capital?

Surveys of employment trends amongst old-age[12] workers suggest that age discrimination may be present in the New Zealand labour market. A recent survey of workers over the age of 55 suggests that older workers are passed over for training and promotion on the basis of their age (McGregor 2000)[13], indicating a bias against older employees.

Of course what may appear to be discrimination against workers on the basis of age may in fact be justifiable commercial practices. For instance, there is evidence that wage increase demands are an increasing function of age. The "Employment of the Older Worker" (McGregor 2000) survey showed 65.3 percent of respondents agreed that "Pay should increase automatically with length of service". In the same survey 48 percent of respondents agreed with the stereotype that "Older workers are more likely to have problems with technology". Thus it may be considered reasonable that training is focussed on younger workers, who do not receive, or at least demand, high wages by virtue of their length of service, subsequently making the marginal cost of their labour less than older workers whilst the marginal benefits of training younger workers are likely to be greater.

In the case of those older workers who are not currently employed there is evidence that they, increasingly, do not have the skills required by employers. Unemployment statistics show that people between the ages of 45 and 54 who become unemployed are more likely to be long term unemployed - unemployed for a period of twelve months or longer - than any other age group; between 1989 and 2000 the proportion of long term unemployed who were aged 45 to 54 increased from 30 percent to 46 percent (McGregor and Gray 2001).

These statistics could be seen as indicative of discrimination against older workers, however 38 percent of respondents in the "Mature Job Seekers in New Zealand" survey claim that "older workers [not having] the right skills" is a major barrier to employment for

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[11]   See for example Mare, et al (2001).

[12]   Precisely what time of life constitutes "old age" is debateable, but by convention we define older workers as those over 55.

[13]   This study provides some support for the presence of age discrimination but is limited due to the fact that it surveys the perceptions of workers rather than employers, and is restricted to members of a single union.

mature job seekers. Also 37 percent of respondents in the same survey say that, personally, they do not have sufficient computer skills to gain employment (McGregor and Gray 2001, p.19). These statements suggest that high levels of long term unemployment amongst older workers is not due to discrimination but due to a lack of marketable skills.

A lack of marketable skills amongst older workers is, strictly speaking, a supply side issue. However it is included in this section because of the evidence that older workers have difficulty accessing firm training programmes. It is probable that firms will have to adjust training programmes towards the needs of older employees if they are to cope with labour (and potentially skill) shortages in the future.

Finally, one may argue that while employment practices will eventually adjust in response to changes in the labour market, organisational cultures do not necessarily adapt in the same way that markets do and certainly when they do adapt, a response may only arise after a considerable lag[14].

4   Fiscal implications

The prospect of an ageing population has raised concerns about the future sustainability of government fiscal programmes. There is, however, a high degree of uncertainty surrounding the future path of demand for public resources. Some areas of expenditure will almost invariably expand as a result of population ageing, but at the same time other areas of expenditure may shrink.[15] Furthermore government revenues may also be affected by population ageing.

4.1   Health

The single largest fiscal issue relating to ageing populations is health care. Health comprises a large portion of the government's expenditure, 19 percent in 2001 (The Treasury 2001a), and the elderly consume disproportionate amounts of the country's healthcare resources (see *Table 2*). Other things equal, a rising old-age dependency ratio means that society's demand for healthcare will rise. This alone may mean a large increase in government expenditure. This could be exacerbated if the cost of health care were to increase with the increase in demand.

Increased demand for health resources will come through two channels. Firstly, given there will be more people over the age of sixty-five, there will be more individuals in the age groups which consume a disproportionate share of health resources. Secondly, if trends in longevity continue this is apt to affect the average amount of resources demanded by individuals over the age of sixty-five. Quite how this average will be affected is not clear; three distinct scenarios present themselves.

The first we refer to as "prolonged demand". This scenario assumes that demand for health care is a constant linear function of age. Thus average demand will rise for those

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[14]   The speed and efficacy of organisational change is a matter for debate. As a starting point for insights into the nature of organisational culture, change, and organisational learning see Dodgson, M (1993).
[15]   For an assessment across major industrial countries see Helller et al. (1986), and for an Australian perspective see Creedy (1998, especially Chs. 2 and 3), and Guest and McDonald (2000).

over the age of sixty as a result of sustained levels of demand over increasingly longer periods of time.

The second scenario is that individuals will require the same levels of care that they do now, but that there will be a shift in the ages when higher levels of demand present themselves. This seems reasonable based on the grounds that individuals consume the most health resources close to their death – that is, demand will be "postponed", not prolonged.

The third is that technological developments in health care will create more efficient and more effective treatments. This may result in a relative reduction in demand for healthcare resources as unit costs fall.

Assessing which of these demand scenarios is most likely is a key question for analysts and policy makers.

The first scenario portends the greatest increase in health care expenditure, although it is probably the least likely of all three scenarios. The idea that high levels of demand will be prolonged fails to take into account the dynamics behind demand for health care. It assumes that the present day proportion of health care resources demanded by those over sixty four will necessarily expand as people live longer and in doing so neglects the fact that if people are living longer they will generally be healthier, and so will demand less health care at certain "intermediate" ages, such as between 65 and 74.

Although our first scenario appears the most unlikely, it is the scenario that underpins most all long-term projections of health care expenditure in New Zealand. For example, in the Treasury's Long-term Fiscal Model (LTFM) expenditure on health is adjusted for demographic change by allocating cost weights to age groups that broadly reflect each group's consumption of total health expenditure.

> These cost weights are assumed to remain constant in real terms over time, implying
> that the Government commits a constant average level of resources to purchases of
> health per person in a population group

> Woods 2000, p.41

Consequently the Treasury's long-term forecasts are apt to overestimate future fiscal demands with respect to health care[16].

The second scenario (postponed demand) is supported by much of the ageing literature. It is based on the argument that, contrary to the first scenario, demand will decline at ages where it is now relatively high, due to people being healthier and living longer. This is underscored by the claim that age does not necessarily cause ill health. The reasoning behind this is that many degenerative diseases that demand a great deal of resources are generally due to environmental factors or unnecessarily sedentary behaviour in old-age (Campbell 1993). Essentially, the implication is that we can prevent high health costs associated with ageing by promoting healthy living and active lifestyles.

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[16] This equally applies to other forecasts that use similar techniques – such as the Ministry of Health's long-term expenditure forecasts. See for example Woods (2000). However, in the case of the long term fiscal model, it as assumed that unit health costs rise in proportion to real wages (ie a unitary elasticity). There is overseas evidence that in fact this elasticity may be exceed one, in which case the model would tens to underestimate future costs.

This raises the question of future demand for long-term care as people live longer. Over the past thirty years the proportion of people in long-term care has remained fairly stable (Ashton 2000), however this may change as the proportion people in the population over the age of 85 increases. At the present time the proportion of people in long-term residential care increases sharply for those over 85 (Ministry of Health 2001) and this increase can be attributed to the greater rates of disability that occur at older ages. At the same time, although longevity is increasing in most developed countries, the health of people over the age of 85 is characterised by illness and disability (European Commission Economic Policy Committee 2001). If rates of disability amongst the "very old" do not abate it is probable that demand for long-term care will rise at greater rates in the future than at present.

Table 2- Age gender weights for personal health care per head, per year $93/94

Age	Males	Females
<1	2,661	2,109
1 to 4	650	515
5 to 14	344	308
15 to 24	421	956
25 to 44	463	1,121
45 to 64	946	1,016
65 to 74	3,135	1,860
75 to 84	3,338	2,860
85+	3,911	3,478

Source: Ministry of Health, Personal Health Funding Formula 1996/97 cited in Bagrie 1997 p. 9.

The third demand scenario is difficult to assess because it is susceptible to the largely immeasurable effects of price and income elasticities in the demand for health care. If demand for health care is highly inelastic then efficiency gains that result in lower prices will have the effect of lowering overall demand for resources. Conversely if demand for health care is highly elastic then this raises the possibility of reductions in unit cost being offset by increases in quantities demanded, resulting in an increase in aggregate dollar amount of resources demanded.

There are inherent problems in measuring the elasticity of demand for health care. In deciding to visit a doctor or GP, individuals may initially consider the costs of a visit against perceived benefits. However, decisions to have further treatments usually arise out of physician's recommendations. As a result it is difficult to determine if individuals respond to changes in price or income or if they simply decide to consume health services on advice from health professionals. However, it is important that we seek to better appreciate elasticity in the demand for health care because of potential future fiscal implications.

Irrespective of which scenario for demand proves most valid, changes to the cost of healthcare may be just as profound as changes in demand. Thus we need to consider supply side factors and to develop a robust framework within which to analyse the various factors that drive the cost of health care, both at the micro and the macro levels.

Potentially the most important supply side issue for the future cost of healthcare is the cost of new technologies and treatments. New technologies and treatments are generally more expensive than those that they replace (Lee and Miller 2001) but they offer the potential benefits of efficiency gains such as reductions in the number of nights that a

patient is required to be in a hospital. However, whether the increased unit cost is larger or smaller than the efficiency gain is not always clear, and is treatment specific (Cutler and McClellan 2001;McClellan 1996;Newhouse 1994). Subsequently the role of policy in determining the speed at which new treatments and technologies are adopted will become increasingly important. That is, given expected increases in the demand for health care, a rise in unit costs may result in particularly large increases in overall expenditure.

If we assume that technological progress increases the rate at which health care costs rise, then, in the case of the first two demand scenarios, rising costs would mean an even greater rise in health care expenditure over the next fifty years. In our third scenario (which implies greater efficiency and therefore lower demand) an increase in the cost of health care may offset any fiscal benefits of a reduction in demand.

4.2　Retirement income

Public provision of retirement income has been perhaps one of the most widely discussed issues relating to ageing populations. This is particularly true for New Zealand where, if our current commitment to universal provision of retirement income continues, the effects of an ageing population will be considerable.

The cost of publicly providing retirement income, at the current level of 65 percent of the average wage for a married couple, has been projected to exceed 8 percent of GDP over the next fifty years, up from 4 percent in 2001 (McCulloch and Frances 2001). This represents a significant increase in the claim on public funds in the future.

Prior to October 2001 New Zealand Superannuation was paid solely out of general taxation on a "pay-as-you-go" (PAYG) basis. In October 2001 the government introduced the New Zealand Superannuation fund, a partial pre-funding approach to superannuation. The fund has been created to smooth the cost of New Zealand Superannuation given the large increase in government expenditure that is expected in the future under the PAYG approach. Contribution levels for the fund have been calculated under the assumption that the current level of payment and age of entitlement will remain at their 2001 levels. It is expected that the fund will be drawn upon after the year 2025 and used to meet up to 14 percent of the cost of universal superannuation (Finance and Expenditure Select Committee 2001).

Policy in recent times has focussed on 65 as the entitlement age for publicly funded superannuation. However, better health and increasing longevity for people over the age of 65, indicates that an increase in the potential working life of individuals in New Zealand will occur. It is possible that policy focussed on a retirement age of 65 will act to offset a potential reduction in the old-age dependency ratio (given evidence indicating that universal pensions reduce labour force participation and induce early retirement) that could otherwise arise out of increases in the potential working lives of New Zealanders. This suggests that if the entitlement age for New Zealand superannuation were to be lifted over time the fiscal 'burden' for the government of funding retirement income could be lessened considerably.

Assuming that the age of eligibility and pension benefits in real terms remain the same over time, an increasing old-age dependency ratio implies the tax rate would need to increase were the superannuation scheme to be continued to be funded purely as a pay-as-you-go system. In fact it is precisely with the aim of tax smoothing that a partial pre-funding of future liabilities has been introduced in New Zealand (Treasury, 2001b). Finding

the appropriate settings for public policy for retirement income will likely remain one of the key areas for research on the impacts of population ageing.

4.3 Other age-related expenditure issues

The literature surrounding the fiscal implications of an ageing population has largely focussed on health and pensions. There are, however, other areas of government spending, such as education, policing and major capital works, which may be also affected significantly by changes in the population's age structure.

There are areas of government expenditure that may shrink as a result of ageing populations, the most notable of which are spending on law and order and on education. Consider the case for spending on policing and prisons. There is a negative correlation between crime and age, with people between the ages of fifteen and thirty committing the majority of crime (Statistics New Zealand 2001a). If crime continues to be a phenomenon associated with younger people, then government may find itself able to reduce funding to the police and prisons as the number of young people in New Zealand declines.

Equally in education, declining relative numbers of young, through falling fertility rates, may act to lower the amount of funding needed in that sector, particularly in primary and secondary education. Reductions in these areas of expenditure may partially offset future increases in the cost of expenditures such as health.

At the same time, however, demands on government resources to provide public infrastructure may act to offset any "gains" from the reduction in demand for policing or education. Government funded infrastructure is centred in areas in New Zealand where demand for their benefits is greatest. As the distribution of New Zealand's population changes there are likely to be changes to the needs of the population with regard to the distribution of said infrastructure. Perhaps the most notable example of this is the movement of elderly to areas such as the Bay of Plenty region (Tauranga in particular). It is entirely probable that the demand for health services will climb rapidly in this region as elderly people migrate there to retire. As a result the government may find that whilst expenditure is keeping pace with per capita demand nationally, it may be falling well short of demand in given regions. This issue appears to have received little or no attention, to date, but may have significant ramifications for government expenditure.

4.4 Revenue

As the population ages and the number in the workforce declines first relatively and then possibly absolutely, it is plausible to foresee changes in the tax base for income taxes. In the face of rising fiscal costs governments will be faced with decisions about how to manage the balance and whether increasing tax rates on a declining working population to support an ageing population is a feasible and acceptable strategy. Any assessment of the implications for revenue must consider the effect of an ageing population on labour force participation rates, the patterns of consumption and investment and the forms and levels of wealth accumulation. Most of the focus to date has been on the fiscal costs associated with ageing – there is relatively little guidance on how revenues might be expected to behave.

4.5   Income distribution[17]

Recent changes to the pattern of income distribution in New Zealand have implications for fiscal programmes in the years ahead. Population ageing raises questions as to the relative income levels and wealth[18] of the elderly. As the population ages, will the elderly become relatively poorer, and would that create increased demand on government resources to preserve their incomes relative to the working age population?

It is evident that the consumption and saving patterns of different age cohorts of the population differ markedly. As O'Dea (2000. p45) notes:

> If incomes across the age-range all increase over time at the same real rate, each successive cohort should trace out [an income] profile lying above the previous cohort… In 1986 there is a sharp break. The income for each cohort falls well below that of the cohort 5 years older, instead of continuing above it.

This pattern may imply changes in the income distribution as these cohorts reach retirement. People on low incomes during their working life are likely to be solely reliant on government superannuation for retirement income[19]. As such they are also more likely to qualify for benefits and less likely to use privately provided health and long term care services. Subsequently, if the numbers of individuals with low incomes during their working life increases, we may expect an increase in the number of individuals eligible for government assistance and demanding government services.

It is of interest to note however, that those over the age of 60 increased their income share between the years of 1983 and 1998 (Hyslop and Mare 2001;O'Dea 2000). Again, this increase in income share is probably indicative of cohort effects. Those cohorts that retired during the 1990s have, by in large, benefited from the welfare state more than any other group in New Zealand's history (Thomson 1996) and as such one may expect that they are, in the aggregate, a relatively wealthy demographic group This serves to underscore the importance of the economic and social policies that prevail during the life cycle of a particular age cohort. Mounting evidence suggests that their saving and consumption behaviour and hence accumulated retirement wealth is shaped by the public policies in areas such as superannuation, health, housing, welfare and education.[20] It is to be expected that as the population ages, the distribution of income that will be observed at a point in time will reflect the life time experiences of particular cohorts.[21]

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[17] For studies in this area see for example Guest and McDonald (1999b and 2002).

[18] Currently there is a paucity of data at the individual household level on assets and liabilities. This may be partially overcome by the forthcoming results of a Household Saving Survey.

[19] This is predicated on the assumption that those individuals who are in the lower percentiles of income in retirement are also those who were in the lower percentiles of income during their working life. Conversely, the assertion that those retirees in the lower percentiles of income are likely to be solely reliant on government superannuation and benefit programmes is evidenced by statistics on retirement income sources – see Preston (1999).

[20] For a fuller discussion of the impact of economic and social conditions and policies on the saving behaviour of different cohorts see Gibson and Scobie 2001.

[21] For a series of studies based on cohort flows see Stone (1999).

4.6   Political economy

Elderly voters will represent an increasing part of the total electorate as the population continues to age. This raises the question of whether elderly constituents will use their increased political influence to command a greater proportion of public resources than would have been expected based solely on the increase in their absolute numbers.

New Zealand's political history provides precedents of situations where agendas that favour the elderly have been pursued successfully by interest groups. The Liberal government of the 1890s, Labour government in the 1930s, and National in the 1970s all instituted public welfare programmes (predominantly retirement income policies) in response to the demands of elderly constituents (Levine and Roberts 1993). In particular the National government's superannuation scheme of the mid 1970s increased superannuation payment both in absolute terms and relative to other benefits.

It is intuitively appealing to argue that elderly voters will be able to exert sufficient political pressure in the future to bias the allocation of public resources towards services and goods that they favour; such as health services and income transfers in the form of retirement income. This presumption is far too simplistic. It ignores the fact that the elderly are a heterogeneous group who, by in large, have very divergent views on the role of government and on government expenditure. The notion that "the elderly" are a coherent constituency with a unified agenda, although often used by political commentators, is a misnomer.

In fact, contrary to commonly held presumptions, there is evidence that increasing dependency ratios may lead to a reduction in the size of the welfare state. An analysis of data for the United States and twelve Western European countries (1965 – 1992) has yielded a negative correlation between dependency ratios and labour taxes and the size of social transfers (Razin, et al. 2001). Such analysis is fraught with specification problems, the most obvious being the widespread dismantling of government welfare programmes in the 1980s, due largely to political and economic changes which cannot be effectively controlled for. Nevertheless, the results can be shown to be consistent with theoretical models of the political economy and they suggest that simplistic views of the political economy of population ageing are flawed.

Thus, while intuitively appealing, there is no strong evidence to suggest that public resources will be "captured" by vocal elderly interest groups as the population ages.

5   Capital markets

Throughout the developed world, as the baby-boomer cohorts reach retirement they will begin to draw down on investments made over their lifetime to support themselves. At the same time reductions in the size of the labour force may result in lower levels of savings[22]. Changes in the flows of saving and investment translate into changes in the current account balance. As a result we may expect changes to both domestic and international

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[22]   Changes in the level of savings are analysed by Guest and McDonald (2001a,b and c).

capital markets that could be reflected in fundamental changes to asset prices, interest rates, and capital flows between countries and regions[23].

5.1   Domestic markets

In considering the effects of population ageing on domestic capital markets we must bear in mind that in a small open economy such as New Zealand's, it is difficult to sustain a distinction between domestic capital markets and international markets. The distinctions drawn on here pertain to investment in relatively immobile forms of capital, such as housing; effects ageing populations may have on domestic investment demand; and the effects that population ageing may have on New Zealand's risk premium through changes to domestic savings rates.

Firstly, consider the possibility of changes in New Zealand's country risk premium. This premium is dependent on a perceived level of risk that is a function, in part, of domestic savings levels and the balance in our current account. That is there is a positive relationship between a country's current account deficit and the risk premium that it attracts: the lower national savings is, the higher the current account deficit, the higher the risk premium (Cantor and Packer 1996;O'Donovan, et al. 1996). This suggests that the future level of national savings may have an affect on the future cost of capital in New Zealand.

It is not clear whether savings will fall or increase as a result of population ageing. One argument is that, all other things being equal, a reduction in the working age population will lead to lower individual saving and thus less aggregate saving. On the other hand, increasing longevity may raise the rate at which individuals save during their lifetime (Zhang 2001), with the potential to offset a reduction in the number of savers in the economy. The former argument receives the most support in the literature but it is founded on contentious assumptions about the rate at which the elderly consume their wealth during retirement.

Bloom, Canning and Graham (2002) add both health and longevity to a standard model of life cycle savings. They find that increased longevity tends to lead to higher savings at all ages. In a stable population these extra savings are offset by the higher old age dependency ratio – there are simply relatively fewer workers to retirees. However, their model explains the high saving rates observed in Asia, where increased life expectancy has been combined with declining youth dependency to lead to abnormally high rates of saving which are expected to be reversed in future.

If individuals attempt to consume all of their wealth during their lifetime, with bequests arising only because of their inability to predict their health status and length of life, then the effect of an ageing population on savings may be large. If, on the other hand, the elderly have a strong bequest motive we may expect that this effect will be mitigated. Studies have sought to explore such retirement behaviour using neoclassical overlapping-generations models, however they have used US data and their findings are not particularly robust (Yoo 1997) (Abel 2001). For New Zealand, data from the Household Savings Survey, currently being completed, could prove very useful in helping us to gain a better picture of the behavioural dynamics at the household level.

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[23]   Higgins and Williamson (1996) and Higgins (1998) provide models of changes in international capital flows as a result of demographic changes. Guest and McDonald (1999a) examine the case of five ASEAN countries, while Besanger, Guest and McDonald (2000) review the case of Asia.

How the elderly consume their wealth in retirement may also have interesting effects on investment demand and hence asset prices in New Zealand. There is a possibility that as the number of elderly in the New Zealand economy grows we will see more individuals drawing down on their asset wealth to obtain retirement income. If this were to be the case we may expect the supply of investment goods to increase with the potential to lower prices as a result (Siegel 1994).

Not all assets are equal and so asset prices and their determinants differ across classes of asset. Bearing this in mind, the dynamics of falling asset prices may depend on how individuals choose to store their wealth in old age. One school of thought says that as people get older they favour fixed income returns. As such, population ageing could create high demand for government bonds while the demand for equities could fall. Furthermore, an increase in demand for fixed return assets would reduce the real returns from those assets (England 2000) with net result being a dilution of the retirement stock of wealth.

In New Zealand where the lion's share of household wealth is held in housing[24] (Claus and Scobie 2001) there is a very real prospect of wealth dilution. Over time one might expect that, as the population ages and the number of people owning their own home increases, house prices will fall[25]. In the case of other classes of assets the capital may be moved offshore or into other sectors to seek out more favourable returns. For housing assets this is not the case. Supply may well outstrip demand, with downward pressure on prices and consequently the wealth of New Zealand retirees[26].

A simplistic view of capital markets says that the prices of most all assets will fall around 2020 as the baby boomer cohorts retire en mass (Siegel 1994), but there is evidence contradicting this view. Poterba has conducted a survey of asset prices in the United States and finds that there is only a weak link between demographics and asset prices (1998 and 2000). No similar study has been conducted in New Zealand but such a study could prove very useful in understanding the implications of ageing for capital markets.

5.2   International markets

As a small open economy the movement of international interest rates and capital flows will dominate what happens in New Zealand capital markets. To obtain a clear picture of what will occur in the global economy we must consider the effects of ageing on economies throughout the world, and the different rates at which countries are ageing.

As populations age their capital to labour ratios will rise and returns to capital will fall. Assuming capital becomes relatively more abundant (relative to labour) in developed economies then there would most likely be greater capital flows into developing economies with younger populations, lower capital to labour ratios, and higher returns to capital (Borsch-Supan, et al. 2001).

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[24]   Home ownership makes up an average 85 percent of household assets in New Zealand.

[25]   Siegel (1994) summarises the problem facing baby boomers who want to liquidate assets to fund retirement by saying: "Sell? Sell to whom?" p. 41 .

[26]   For an argument to the contrary see Venti et al. (2001) who argue that people do not draw down on housing wealth to obtain retirement income. This is a study of US data and thus not necessarily applicable to New Zealand.

The potential for movement of capital out of developed economies is also dependent on domestic savings and investment demand differentials. Other things equal we can expect that, over the next twenty years, per capita savings in New Zealand will increase due to a rise in the relative number of people in the economy between the ages of forty and sixty-four (during which time the majority of life time savings occurs (Gibson and Scobie 2001)). If this increase in domestic savings is greater than investment demand capital will move offshore with the potentially positive effect of pushing New Zealand's current account into surplus (England 2000) (Organisation for Economic Co-operation and Development 1988). Of course this is dependent on an excess of investment demand from other countries with relatively younger populations.

Whether or not developing economies can in fact absorb large capital flows out of ageing developed countries, at existing interest rates, is unclear. If they cannot then we may expect an oversupply of capital in the global economy, driving down world interest rates. If they can readily absorb large amounts of capital then the world interest rate may even rise (Borsch Supan 1996) (Turner and Richardson 1998).

These things we may expect in the medium term (circa 2020) whilst in the long run there is a possibility of a global decline in savings rates (Heller and Symansky 1997) and a subsequent decline in world growth rates. For developed countries such as New Zealand this presages a return to high current account deficits and a reduction in our share of global output.

6   Long run economic growth

Economic growth depends on range of factors, including economic policies, investment in human capital, and innovation; these fall largely outside the scope of this paper. However population ageing may affect economic growth through its potential effects on saving, investment, the stock of capital, and on labour.

6.1   Investment and capital

Most economists agree that capital accumulation affects long-run economic growth. There is considerable disagreement, however, over what kinds of capital investment are most desirable for enhancing economic growth and over what the determinants of capital accumulation are.

One determinant of capital accumulation that is closely associated with population ageing is domestic savings. One school of thought suggests that low domestic savings levels induce high real interest rates[27] and crowd out private investment in physical capital, hence constraining economic growth (Crocombe, et al. 1991). However, this sort of argument does not give full consideration to New Zealand's position in the world as a small open economy. At the present time, studies of economic growth in small open economies have failed to provide evidence of a link between domestic savings, capital accumulation, and economic growth[28].

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[27]   See the argument regarding risk premiums and current account deficits in Section 5.1.
[28]   See for example, Claus, et al. (2001).

The types of investment favoured by ageing populations may adversely affect economic growth. In the previous section we noted the argument that people in old age prefer to invest in fixed return assets such as government debt. This has important implications for growth because it is variable return investments such as investment in equipment that yields the greatest benefit in terms of economic growth (Ahn and Hemmings 2000) (De Long and Summers 1991).

Future investment will also be affected by consumption demand from within the domestic economy and as such growth may be adversely affected by changing consumption patterns in an ageing economy. Arguably the elderly demand fewer manufactured goods than those in the working age population and as such we may see an increase in the proportion of GDP stemming from services. Productivity growth in the service sector is typically lower than that for say manufacturing, which benefits more readily from advances in technology. Thus we may find that growth rates will decline from a decline in total factor productivity stemming from changes in the sectoral output mix induced by population ageing.

Conversely, there is potential for elderly consumption patterns in ageing countries to enhance long-run growth in New Zealand. An increase in demand from developed countries for consumables such as commodities could increase trade volumes or prices and hence increase per capita incomes.

Also, population ageing may increase long-run growth in per capita incomes through a capital-concentration effect. In countries such as New Zealand, where we expect a reduction in the working age population, the level of capital per worker should rise. It is not clear precisely what the implications of this will be, but it may result in increased labour productivity (Ahn and Hemmings 2000)[29].

6.2   Labour

Future changes to labour supply and to labour productivity could have a large impact on New Zealand's growth path. The projected reduction in the labour force means that there will be a reduction in labour inputs such that, all other things equal, there will be a reduction in per capita GDP.

Using a theoretical growth accounting model we can analyse, albeit rudimentarily, the effects on potential GDP growth rates of a reduction in the labour force. One such model, based on an aggregate production function for the economy, is:

GDP growth rate = $(1-\alpha)$(labour growth rate)+α(capital growth rate) + total factor productivity

where α is the proportion of GDP that constitutes returns to capital.

In 1996 the Treasury estimated a potential growth rate of 3.3 percent for the New Zealand economy using this simple formula (The Treasury 1996). This was based on estimated annual growth in the capital stock of 2.4 percent, growth in labour supply of 1.4 percent, returns to capital of 0.4, and total factor productivity of 1.5 percent.[30] All other things

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[29]   This is essentially the reverse of an increase in the population which would be expected to reduce productivity through diminishing marginal productivity.

[30]   It is, however, the dynamics of the illustration that is important rather than the value of the estimates.

equal, a reduction in the labour force growth rate of 25 percent would reduce the potential GDP growth rate to 3.1 percent. If the labour force were to actually shrink in the longer term, the potential growth rate would, according to this approach, reduce further. Any such reduction in GDP growth rates, with its commensurate impact on living standards could be offset, however, by an increase in productivity.

Historically, labour productivity has grown at a fairly conservative annual average rate of 1.35 percent between 1960 and 1998 (see *Figure 3).* In order to sustain future rates of economic growth at levels which offset the effect of rising old-age dependency, productivity growth would need to accelerate.

The creation of a highly skilled workforce through education is one area that may enable labour productivity to keep pace with the declining labour force. Indeed Lucas's model of endogenous growth suggests that investment in human capital through effective education is fundamental to long run economic growth. If this is the case then it poses very important questions as to how our education system will perform over the next fifty years.

Figure 3. **Labour Productivity Growth: Actual and Trend**
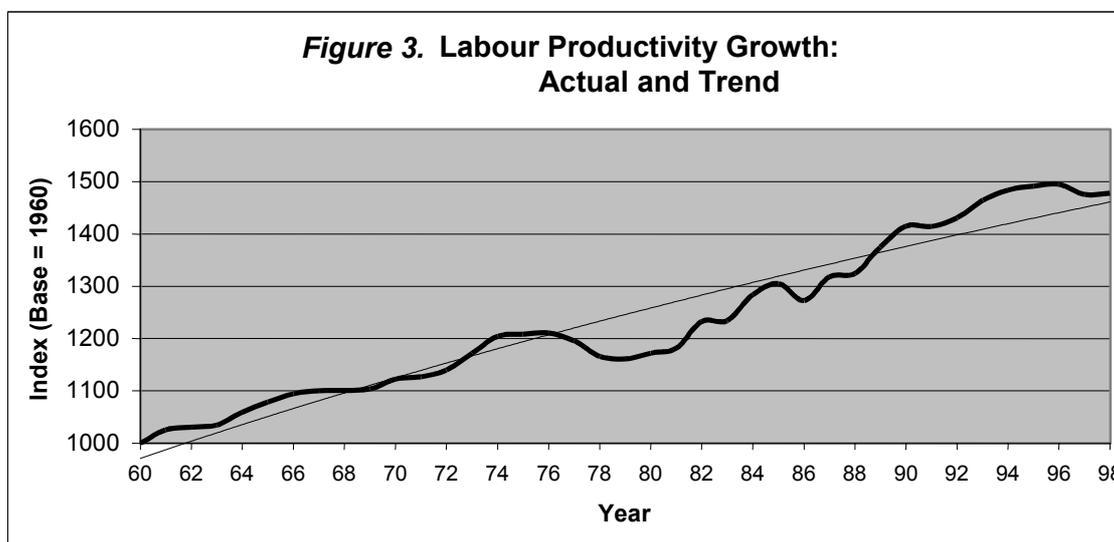
Source: Dalziel and Lattimore 1999 p. 65

The market for education may be affected by population age structural change. An increasing capital to labour ratio indicates that wages will rise in future relative to returns to capital. This has the propensity to affect individual choices to invest in higher education depending on changes to the returns to unskilled labour relative to the returns to skilled labour.

The cost of education may be seen as both the cost of fees, including the cost of capital associated with either debt or equity financed fee payment, and income foregone whilst studying. Thus an increase in the returns to unskilled labour implies an increase in the cost of education whilst a reduction in the cost of capital implies a reduction in the cost of education. Conversely the return on education, seen as the extra income an individual can expect to receive over their lifetime, is dependent on the returns to skilled labour[31]. Therefore if the returns to skilled labour rise relative to the returns to unskilled labour, then we may expect increased investment in education in the economy.

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[31] Returns to skilled labour are also affected by progressive tax rate schedules and the ability of individuals. For further discussion see Creedy (1995).

Welch (1979), in a study of the earnings of baby boomers in the United States, finds evidence that an increase in a cohort's size reduces a cohort's earnings. Furthermore the study found that as cohort size increased, the differential in earnings between educated and non-educated workers reduced. This suggests that there may indeed be an increase in the returns to skilled labour relative to unskilled, as the working age population shrinks. The corollary of this is that there may be greater investment in education contributing to higher levels of human capital and potentially higher productivity and output growth in the economy.

7   Concluding remarks

Population ageing has the potential to become the single biggest economic and policy issue of the next fifty years. As such future policy needs to be developed within a framework that recognises the potential ramifications of population ageing. This paper highlights some of the key issues that need to be addressed within such a framework, but it is by no means comprehensive. It is evident that the economics of population ageing is an area still replete with conjecture that requires further investigation.

The economic analysis of population ageing has two branches: one macroeconomic where we seek to elucidate the impact on the growth and productivity of the economy stemming from changing patterns of saving and investment, capital flows and changes in the labour market. The second or microeconomic branch, considers the income, consumption and saving of individuals over their lifecycle in the face of reduced fertility and greater longevity.

In seeking to better understand the economics of population ageing we must set the boundaries of our analysis within a demographic framework. This requires first identifying the range of demographic issues that make up population ageing. In section three spatial and behavioural aspects of labour force participation were raised, and these require further analysis. In particular the declining retirement age is of concern and it highlights the importance of examining the behavioural effects of policy within the contexts of population ageing.

Of course predicting and assessing the effects of population ageing on policy is problematic and carries with it a great degree of uncertainty. This is particularly true for assessing the fiscal implications of population ageing. The impact of population ageing on government spending such as expenditure on health care is largely an unknown and all that we can do is to focus our enquiry on the factors that drive demand for public resources.

In some instances however there is scope to evaluate fiscal impacts within fairly robust frameworks. One such case is the effects of population ageing on government revenue. In particular robust methodologies, such as microsimulation models, exist within which to examine whether or not the tax base will be eroded in the absence of a capital gains tax[32]. Furthermore, the prediction of future fiscal impacts will be enhanced if the analytical framework used includes stochastic elements.

In particular the use of stochastic budget forecasts could offer the benefit of being able to take account of the inherent uncertainty in our forecasts and explore the implications for

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[32]   See for example Harding, (2002).

fiscal outcomes. This can add to the current scenario based approach because it allows us to estimate and interpret the size of errors surrounding our forecasts and to quantify the uncertainty that surrounds future economic impacts of population ageing[33].

Assessing long run impacts requires understanding the broader environment within which economic and political activity takes place. This paper has raised the role that political economy might have on future government expenditure, but has not explained other potential political economy or social aspects of population ageing. Nevertheless one should not underestimate their importance.

The potential effects of population ageing on capital markets is an area which will require close monitoring. As populations in different regions age at differential rates, it is to be expected that imbalances in national or regional savings and investment will generate capital flows and changes in international asset prices. New, because of its small size, will not have any significant effect on these flows but will be subject to the influence of changes in process in international markets.

In the case of domestic capital markets the issue requiring the most attention is that of asset prices. The potential for retirement wealth dilution if asset prices fall carries significant implications for many areas of policy and as such deserves fuller investigation.

The effect that population ageing has on capital markets will almost certainly feed through to long run economic; this is indicative of the pervasiveness of the economic consequences of population ageing. Although focussing research upon a single economic issue is helpful if only for brevity's sake, any future research should necessarily respect that fact that the issues surrounding the economics of population ageing are broadly related. This includes recognising that although macro-level data conveniently summarises general trends, it does not allow us to understand behavioural responses to demographic changes. Indeed expanding our understanding of behavioural responses to demographic change should be a priority in further research.

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[33]   See for example Lee, et al. (2001) and Creedy and Alvarado (1998).

References

Abel, A. (2001) "Will bequests attenuate the predicted meltdown in stock prices when baby boomers retire." Cambridge, MA, Wharton School of the University of Pennsylvania and the National Bureau of Economic Research. Federal Reserve Bank of Philadelphia Working Paper No. 01-2. January.

Ahn, S. and P. Hemmings (2000) "Policy influences on economic growth in oecd countries." Paris, OECD. Economics Department Working Paper ECO/WKP(2000) June.

Ashton, T. (2000) "New Zealand: Long-term care in a decade of change." *Health Affairs* 19(3): 72-85.

Auer, P. and M. Fortuny (2000) "Ageing of the labour force in OECD countries: Economic and social consequences." Geneva, International Labour Office. Employment Paper 2000/2. 2000.

Bagrie, C. (1997) "The long term fiscal impact of an aging population in New Zealand." Wellington, The Treasury. Draft Paper. 1997.

Becker, G. and R. Barro (1988) "A reformulation of the economic theory of fertility." *Quarterly Journal of Economics* 103(1): 1-25.

Besanger, S., Guest, R. and McDonald, I.M. (2000) "Demographic Change in Asia: the Impact on Optimal National Saving, Investment and the Current Account", International Monetary Fund Working Paper, June.

Blondal, S. and S. Scarpetta (1998) "The retirement decision in OECD countries." Paris, OECD. Economics Department Working Paper No. 202. February.

Bloom, David E., David Canning and Bryan Graham (2002) "Longevity and life cycle savings." Cambridge MA, National Bureau of Economic Research Working Paper. Working Paper 8802. March. <http://www.nber.org/papers/w8808>

Borsch Supan, A. (1996) "The impact of population ageing on savings, investment and growth in the OECD area." in Organisation-for-Economic-Co-operation ed *Future global capital shortages: Real threat or pure fiction?* (Paris: OECD): 103-141.

Borsch-Supan, A., A. Ludwig, and J. Winter (2001) "Aging, pension reform, and capital flows: A multi-country simulation model." Mannheim, Mannheim Research Institute for the Economics of Aging. Working Paper. November.

Burkhauser, R., K. Cahill, J. Quinn, and R. Weathers (1998) "Microeconomic analysis of the retirement decision: United States." Paris, OECD. Economics Department Working Paper No. 203. July.

Campbell, J. (1993) "Physiology and health status of the elderly." in P. Koopman-Boyden ed *New Zealand's ageing population: The implications* (Wellington: Daphne Brasell Associates Press).

Cantor, R. and F. Packer (1996) "Determinants and impact of sovereign credit ratings." *Federal Reserve Bank of New York Economic Policy Review (formerly Federal Reserve Bank of New York Quarterly Review)* (October).

Claus, I., D. Haugh, G. Scobie, and J. Tornquist (2001) "Saving and growth in an open economy." Wellington, The Treasury. Working Paper 01/32. <http://www.treasury.govt.nz/workingpapers/2001/01-32.asp>

Claus, I. and G. Scobie (2001) "Household net wealth: An international comparison." Wellington, The Treasury. Treasury Working Paper 01/19. 2001. <http://www.treasury.govt.nz/workingpapers/2001/01-19.asp>

Creedy, J. (1995) *The Economics of Higher Education: An Analysis of Taxes Versus Fees.* (Aldershot, Edward Elgar Publishing).

Creedy, J., ed. (1995) *The Economics of Aging*. (Aldershot, Edward Elgar Publishing).

Creedy, J. (1998) *Pensions and Population Ageing: An Economic Analysis*. (Aldershot, Edward Elgar Publishing).

Creedy, J. and R. Disney (1992) "Financing state pensions in alternative pay-as-you-go schemes." in J. Creedy ed *The Economics of Ageing* (Aldershot, Edward Elgar)

Creedy, J. and J. Alvarado (1998)"Social expenditure projections: a stochastic approach. *Australian Economic Papers* 37(3):203-212.

Crocombe, G., M. Enright and M. Porter (1991) *Upgrading New Zealand's competitive advantage*. (Auckland: Oxford University Press).

Cutler, D. and M. McClellan (2001) "Is technological change in medicine worth it?" *Health Affairs* 20(5):11-29.

Dalziel, P. and R. Lattimore (1999) *The New Zealand macroeconomy: A briefing on the reforms*. (Auckland: Oxford University Press).

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

Disney, R. (1996) *Can we afford to grow older?* (Cambridge MA: The MIT Press).

Dixon, S. (1996) "Labour force participation over the last ten years." *Labour Market Bulletin* 1996(2): 71-88.

Dodgson, M (1993) "Organizational learning: A review of some literatures." *Organization Studies* 14(3): 375-394.

England, R. (2000) "Hard landings - a white paper on the financial markets impact of population ageing." Washington DC, Center for Strategic and International Studies. December 21.

European Commission Economic Policy Committee (2001) "Budgetary challenges posed by ageing populations: The impact on public spending on pensions, health and long-term care for the elderly and possible indicators of the long-term sustainability of public finances." Brussels, European Commission. EPC/ECFIN/655/01-EN. 24 October. <http://europa.eu.int/comm/economy_finance/publications/european_economy/reportsandstudies0401_en.htm>

Faruqee, Hamid (2002) "Population aging and its macroeconomic implications:a framework for analysis". Washington DC: International Monetary Fund. Working Paper No. 02/16, February. <http://www.imf.org/external/pubs/cat/longres.cfm?sk=15590.0>

Finance and Expenditure Select Committee (2001) "New Zealand superannuation bill." Wellington, NZ Government. Government Bill Commentary and Recommendations. 2001.

Gibson, J. and G. Scobie (2001) "Household saving behaviour in New Zealand: A cohort analysis." Wellington, The Treasury. Treasury Working Paper 01/18. <http://www.treasury.govt.nz/workingpapers/2001/01-18.asp>

Goss, P. and A. Duncan (1999) "Taxation and saving in New Zealand: A review of tax-related aspects of savings and retirement income policy." Wellington, Arthur Andersen - Prepared for the Super 2000 Taskforce. November.

Grimmond, D. (2000) "Age dependency." Wellington, Infometrics. Report prepared for the Office of the Retirement Commissioner. August

Guest, R. and I.M. McDonald (1999a), "An Evaluation of the Saving, Investment and Current Account Balances of Five ASEAN Economies ?" *Journal of Asian Economics.*10:445-464.

Guest, R. and I.M. McDonald (1999b) "The effect of population ageing on the distribution of taxable incomes in Australia." *Economic Papers* 18(3):34-38.

Guest, R. and I. M. McDonald (2000) "Population ageing and projections of government social outlays in Australia." *Australian Economic Review*. 33:49-64.

Guest, R. and I.M McDonald. (2001a) "National Saving and Population Ageing". *Agenda* 8(3):235-246.

Guest, R. and I.M.McDonald (2001b) "Ageing, Immigration and Optimal National Saving in Australia". *Economic Record* 77(237):117-134.

Guest, R. and I.M McDonald (2001c) "The Impact of Population Ageing on the Socially Optimal level of National Saving: An Application to Japan and Australia." *Review of Development Economics* 5(2):312-327.

Guest, R. and I.M. McDonald (2002) "Superannuation, population ageing and living standards in Australia". *Economic Analysis and Policy (forthcoming).*

Haider, S. and D. Loughran (2001) "Elderly labour supply: Work or play?" Boston, Center for Retirement Research at Boston College. CRR Working Paper 2001-04. September.

Harding, A. (2002) "Using microsimulation models in the policy process in an ageing society." Canberra, National Centre for Social and Economic Modelling, University of Canberra. Paper presented to the Conference on Modelling Policy in an Ageing Europe, London, 11 January .

Heckman, J. and R. Willis (1974) "Estimation of a stochastic model of reproduction: An econometric approach." New York, National Bureau of Economic Research. Working Paper No. 34. February.

Heller, P.J. , R. Hemming and P.W. Kohnert (1986) "Ageing and Social expenditure in the major industrial countries: 1980-2025". Washington DC, IMF Occasional Paper No 47.

Heller, P. and S. Symansky (1997) "Implications for savings of aging in the Asian "tigers"." Washington DC, IMF. WP/97/136. October.

Higgins, M. (1998) "Demography, national savings and international capital flows". International Economic Review. 39(2):343-369.

Higgins, M. and J.G. Williamson (1996) "Asian Demography and Foreign Capital Dependence" National Bureau of Economic Research Working Paper 5560, May.

Hyslop, D. and D. Mare (2001) "Understanding changes in the distribution of household incomes in New Zealand between 1983-86 and 1995-98." Wellington, The Treasury. Treasury Working Paper 01/21. <http://www.treasury.govt.nz/workingpapers/2001/01-21.asp>

Khawaja, M. (2001) "Population ageing: Myth or reality?" Wellington, Statistics New Zealand. <www.stats.govt.nz>

Koopman-Boyden, P. ed (1993) *New Zealand's ageing society and its implications*. (Wellington: Daphne Brasell Associates Press).

Lee, R. and R. Edwards (2001) "The fiscal impact of aging in the US: Assessing the uncertainties." Washington DC, National Bureau of Economic Research. Working Paper prepared for the NBER Tax Policy and the Economy Meeting, November 5.

Lee, R. and T. Miller (2001) "An approach to forecasting health expenditures, with application to the US medicare system." Berkeley, CA, University of California. A paper prepared for the workshop on Population Ageing and Health. January. <http://www.demog.berkeley.edu/~tmiller>

Lepina, M. and I. Pool (2000) "Social and spatial differentials in age structural transitions. Implications for policies on ageing." *Espace Populations and Societies* 2000-3: 399-410.

Levine, S. and N. Roberts (1993) "Elderly people and the political process." in P. Koopman-Boyden ed *New Zealand's ageing society: The implications* (Wellington: Daphne Brasell Associates Press): 230-253.

Lumsdaine, R. (1995) "Factors affecting labor supply decisions and retirement income." Cambridge MA, National Bureau of Economic Research Working Paper. 5223. August 1995.

Mare, D., W. Choy, and P. Mawson (2001) "Modelling regional labour market adjustment in NZ." Wellington, The Treasury. Forthcoming Working Paper.

McClellan, M. (1996) "Medicare reimbursement and hospital growth." in D. Wise ed *Advances in the economics of aging* (Chicago: University of Chicago Press).

McCulloch, B. and J. Frances (2001) "Financing New Zealand superannuation." Wellington, The Treasury. Working Paper 01/20.
<http://www.treasury.govt.nz/workingpapers/2001/01-20.asp>

McGregor, J. (2000) "Employment of the older worker survey." Palmerston North, Massey University. August.
<http://masseynews.massey.ac.nz/2000/publications/massey_news/august/aug_14/stories/discrimination_against.htm>

McGregor, J. and L. Gray (2001) "Mature job-seekers in New Zealand." Palmerston North, Massey University. October
<http://masseynews.massey.ac.nz/_2001/news_releases/17_12_01.html>

Ministry of Health (2001) "Health of older people strategy." Wellington, Draft Paper for Consultation.

Newhouse, J. (1994) "An iconoclastic view of health cost containment." *Health Affairs* 12(1):152-171.

O'Dea, D. (2000) "The changes in New Zealand's income distribution." Wellington, The Treasury. Treasury Working Paper 00/13.
<http://www.treasury.govt.nz/workingpapers/2000/00-13.asp>

O'Donovan, B., A. Orr, and D. Rae (1996) "A world interest rate model." Wellington, The National Bank of New Zealand Limited. Financial Research Paper No.7, November.

Organisation for Economic Co-operation and Development (1988) *Ageing populations - the social policy implications*. (Paris: OECD).

Organisation for Economic Co-operation and Development (2000) "OECD economic surveys: New Zealand." Paris, OECD. Economics Directorate Report. 2000.

Poot, J. and J. Siegers (1998) "The macroeconomics of fertility in small open economies: A test of the Becker-Barro model for the Netherlands and New Zealand." Wellington, Victoria University of Wellington. GSBGM Working Paper 5/98. June.

Poterba, J. (1998) "Demographic structure and asset returns: an empirical investigation." Cambridge MA. National Bureau of Economic Research. Working Paper W6774. October. <http://www.nber.org/papers/w6774>.

Poterba, J. (2000) "Population age structure and asset returns." Boston, MA, Harvard University. Review of Economics and Statistics Lecture. December.

Preston, D. (1999) "Retirement income in New Zealand: The historical context." Wellington, Office of the Retirement Commissioner. Updated January 2001. May.

Quinn, J. (1998) "The labour market, retirement and disability." Chestnut Hill, MA 02467, Department of Economics Boston College. Conference Paper. November 6

Razin, A., E. Sadka, and P. Swagel (2001) "The aging population and the size of the welfare state." Cambridge MA, National Bureau of Economic Research. Working Paper 8405. July.

Scobie, G. (2000) "Ageing: A synoptic view of some economic implications." Wellington, Treasury. 23/11/00.

Siegel, J. (1994) *Stocks for the long run: A guide to selecting markets for long-term growth*. (New York: McGraw Hill).

Statistics New Zealand (2000) "New Zealand population projections." Wellington, Statistics New Zealand. 30 June 2000.

Statistics New Zealand (2001a) "Crime in New Zealand (1994-2000) - analytical reports." Wellington, Statistics New Zealand. 31 July 2001.

Statistics New Zealand (2001b) "Information about demographic projections." Wellington, Statistics New Zealand. Online Reference Document. 2001. <http://www.stats.govt.nz>

Statistics New Zealand (2001c) *Key statistics - September 2001*. (Wellington: Statistics New Zealand).

Stone, Leroy O. ed. (1999) *Cohort flow and the consequences of population ageing, an international analysis and review*. Ottawa. Statistics Canada.

Tax Review Panel (2001) "Tax review 2001." Wellington, New Zealand Government. Final Report. 2001.

The Treasury (1996) "Growth accounting: What is New Zealand's potential growth rate." Wellington, The Treasury. Treasury Internal Paper. 28 March.

The Treasury (2001a) "December economic and fiscal update." Wellington, The Treasury.

The Treasury (2001b) Government policy on pre-funding superannuation. Wellington. The Treasury. <http://www.treasury.govt.nz/release/super/>

Thomson, D. (1996) *Selfish generations? How welfare states grow old*. (Cambridge: White Horse Press).

Turner, D., C. Giorno, A. De Serres, A. Vourc'h and P. Richardson (1998) "The macroeconomic implications of ageing in a global context." Paris, OECD. Ageing Working Paper 1.2. <http://www.oecd.org/subject/ageing>

Venti, S. and D. Wise (2000) "Aging and housing equity." Cambridge MA, National Bureau of Economic Research 7882. September. <www.nber.org/papers/w7882>

Venti, S. and D. Wise (2001) "Aging and housing equity: Another look." Cambridge MA, National Bureau of Economic Research. NBER Working Paper 8608. November.

Woods, J. (2000) "Manual for the long term fiscal model." Wellington, The Treasury. Treasury Working Paper 00/2. 2000. <http://www.treasury.govt.nz/workingpapers/2000/00-2.asp>

Welch, F. (1979) "Effects of Cohort Size on Earnings: The Baby Boom Babies' Financial Bust" in J. Creedy ed. *The Economics of Ageing* (Aldershot, Edward Elgar, 1995).

Yoo, P. (1997) "Population growth and asset prices." Federal Reserve Bank of St Louis. Working Paper 97-016A.

Zhang, J. and J. Zhang (2001) "Effects of longevity and dependency rates on saving and growth: Evidence from a panel of cross countries." Wellington, Chinese University of Hong Kong and Victoria University of Wellington, April.