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# SOCIAL AND ECONOMIC DIMENSIONS OF AN AGING POPULATION

**Age of Pension Eligibility, Gains in Life Expectancy, and Social Policy**

**Frank T. Denton**
**Byron G. Spencer**

**SEDAP Research Paper No. 276**

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**Age of Pension Eligibility, Gains in Life Expectancy, and Social Policy**

*Abstract*

Canadians are living longer and retiring younger. When combined with the aging of the baby boom generation, that means that the “inactive” portion of the population is increasing and there are concerns about possibly large increases in the burden of support on those who are younger. We model the impact of continued future gains in life expectancy on the size of the population that receives public pension benefits. We pay special attention to possible increases in the age of eligibility and the pension contribution rate that would maintain the publicly financed component of the retirement income security system.

Key Words: age of pension eligibility, pension burden

JEL Classification:  H55, J18, J26

*Résumé*

Les Canadiens vivent plus longtemps et prennent leur retraite de plus en plus jeunes. Ce phénomène associé au vieillissement de la génération du baby boom, implique que la part de la population inactive est en augmentation et il y a des inquiétudes concernant une hausse probable importante du fardeau financier sur les plus jeunes. Nous modélisons l'impact de gains continus de l'espérance de vie future sur la taille de la population qui perçoit des prestations de retraite provenant du secteur public. Nous portons une attention particulière à l’impact de l'augmentation possible de l'âge d'éligibilité et du taux de cotisation de retraite qui permettrait de maintenir en place la composante publique du financement  du système de sécurité du revenu de retraite.

## Age of Pension Eligibility, Gains in Life Expectancy, and Social Policy*

*Introduction*

Canadians today are living longer than ever before, and in apparent better health. Even so, the typical age of retirement is much lower than it was only a few decades ago. But Canada is not alone in that regard. As noted in a recent OECD report, “It is indeed remarkable that, despite increases in longevity, the effective age at which workers retire has tended to follow a downward trend in virtually all OECD countries, at least until recently.” (OECD, 2009, p 10)

Since 1966, when the Canada and Quebec Pension Plans came into being, life expectancy has increased by about ten years for men and eight for women. If such gains are not reflected in a lengthened period at work, the fraction of life spent in retirement must increase, and that is what has happened. More time in retirement, especially when combined with the aging of the baby boom generation and its imminent transition from work to retired status, means that the “inactive” portion of the population is increasing. That has given rise to concerns in policy discussions about possibly large increases in the burden of support that will fall on those who are younger, and significant inequities across generations if they have to pay substantially more than did their parents or grandparents to maintain the first two pillars of the public retirement income security system in Canada, namely Old Age Security (OAS), together with the Guaranteed Income Supplement (GIS), and the Canada and Quebec Pension Plans (CPP/QPP).

In what follows we explore (using a simplified but relevant model) the impact that continued future gains in life expectancy will have on the size of the population eligible for public pension benefits. In doing so we give special attention to possible increases in the age at which people are eligible to receive benefits and consider the impact on the size of the future labour force, the changing ratio of population of working age or labour force to retired population, and the pension contribution rate that would be required to maintain the publicly financed component of the retirement income security system.

*Life Expectancy and Age of Retirement: The Historical Record*

It is estimated that over the course of the 20th century life expectancy at birth in Canada increased by about 30 years for males and 32 for females (Statistics Canada, 1999, 2006). Similar gains have been experienced in other developed countries over the last 160 years, and Oeppen and Vaupel (2002) argue forcefully that social policy should be based on the assumption that such gains will continue into the future.[1] We agree.

Social policies affect the age at which people retire, partly by fixing the "normal age of retirement", and thereby affecting expectations and planning on the part of individuals and their employers. Economic theory suggests that rising income levels may be important also – that individuals may choose to spend a larger share of their lifetimes in leisure activities (including retirement) as incomes rise – but the institutional arrangements that they face, including the age at which they are eligible to receive pension benefits, are likely to be important also, and we focus on them.

Age 65 was legislated as the age of eligibility for full CPP/QPP benefits in 1966 and is often referred to as the normal age of retirement. However, that age has been the "normal" retirement age in the Canadian retirement income system since 1951.[2] A 1979 report observed that the choice of 65 as the normal age was greatly influenced by the decision made in 1934 in the US that 65 would be “the minimum retirement age in public and private pension plans” (Senate of Canada, 1979, p 21).

In 1966 less than 70 percent of males could have expected to reach age 65[3]; that increased to almost 87 percent by 2010 (estimate by the authors). Furthermore, those who retired at 65 in 1966 could have expected to live another 13.6 years, based on Statistics Canada life table calculations, while those who retired at the same age in 2010 could expect another 17.9 years (estimate by the authors). Thus later cohorts not only had a better chance of living to the normal age of retirement, but they could also expect more years of retirement. More specifically, comparing 2010 with 1966, 26 percent more males survived to 65 and a typical male who retired at that age would have 32 percent more years of (expected) retirement.

*The Population Outlook in Canada*

Table 1 reports estimated values for the population at mid-year 2010, when those born during the baby boom were (as a close approximation) in the age range 44 to 64.[4] Thus those at the leading edge of the baby boom generation were just about to reach their 65th birthdays. The table shows also the population 44 years earlier, in 1966, when the

baby boomers were in their youth. Between those two dates the 65 and older component more than tripled in size.

Two projections are shown for 2035, by which time all surviving members of the boom generation will be 69 or older, or well past 65.[5] Both projections make what we term standard assumptions with respect to fertility and immigration – namely, that the total fertility rate remains at its most recently recorded level of 1.66 births per woman, that gross immigration remains at 250 thousand per year, and that emigration remains at 0.12 percent of the population. The projections differ only in terms of the assumption made about future reductions in mortality, and hence gains in life expectancy.

The first projection assumes, unrealistically, that there will be no further declines in mortality rates after 2010. The second assumes that mortality rates will continue to decline in accordance with historical experience. In particular, it assumes that the age-specific annual rates of change of mortality observed over the 30-year period ending in 2001[6] will continue unabated until 2035. With that assumption, life expectancy rises from the 2010 level by 3.9 years for males, 3.3 for females.[7]

A comparison of the two projections for 2035 shows how important a role future gains in life expectancy will play in determining the size of the population, and especially its older component. With continued gains in life expectancy, the projected overall population increases by 7.5 million – almost 1 million more than if there were no such gains. Furthermore, the bulk of the gains occur at older ages: they add 4.6 people 65 and over for every additional person under that age. With continued gains in life expectancy the population 65 and over is projected to account for 24.0 percent of the

total population in 2035 (rather than 22.6 percent if life expectancy were constant), up from 14.1 percent in 2010. The population 65 and older will grow by 108 percent while the under-65 population will grow by only 8 percent.

*Retirement Age Policies in Other OECD Countries*

Canada stands out among the OECD countries in not having in place explicit plans to increase the age of eligibility for public pension plan benefits, thereby encouraging more years of work and a later age of retirement. In part that might be explained by the success that Canada has had in reducing poverty at older ages while keeping costs relatively low (Myles, 2000). In any event, pension reform is high on the political agenda, with commissioned reports received in 2008 by the Governments of Alberta and British Columbia (jointly) and Ontario, and, in 2009, by the Governments of Canada and of Nova Scotia[8] and the federal government's public consultation on the retirement income system.[9] However the focus of those reports is on how to deal with apparent shortcomings in coverage and adequacy in relation to the privately financed (third pillar) component of the system, and most especially with employer pension plans. There has been very little discussion of the age of eligibility. (An exception is Hering and Klassen, 2010).

The US is the leader in giving attention to age of eligibility. Legislation that was enacted in 1983 but that took effect only 20 years later has gradually raised the age for full social security benefits. That age was increased by two months each year for five years, starting in 2003, and reached 66 in 2008. Starting in 2020 it will increase by a further

two months each year until it reaches 67, in 2025.[10] Changes have taken place also in other major OECD countries, and further changes are expected. Germany will increase the normal pension age from 65 to 67 between 2012 and 2029 and reduce the benefits associated with early retirement at age 63 (*ibid*, p 91). Under current legislation, by 2020 the age for full state pension benefits in the UK will increase to 65 for women, from its current 60, and the age for both men and women will increase from 65 to 68 over a 22 year period, starting in 2024. However, the legislation is under review, and the *Financial Times* reported "the likelihood that [the state pension age] would reach 70 by the middle of the century".[11] France has increased the number of contribution years for public sector workers from 37.5 to 40 by 2012; thereafter "the minimum contribution period to reach a full pension [is] to increase in line with gains in life expectancy, so that the ratio of period of pension payment to the working period remains constant" (OECD, 2009, p 194); it has also reduced early retirement benefits and it proposes to raise the early retirement age from 60 to 62 by 2018 and the age at which workers are entitled to full pension benefits from 65 to 67.[12] By 2008 the normal pension age in Italy was 65 for men and 60 for women (*ibid*, p 216), with those ages to evolve in line with gains in life expectancy (EC, 2010, p 30); furthermore, the age at which early retirement benefits (so-called "seniority pensions") can be claimed was increased from 57 to 58 in 2008 and is scheduled to increase further, to 61, by 2013 (OECD, 2009, pp 217-18). The age is gradually being increased also in Japan, from 60 to 65, for the earnings-related component of pension benefits, with the full adjustment to be complete by 2030 (*ibid*, p 280).

Reforms are underway in other countries as well.[13] Increases in the age of eligibility for *early* retirement or reductions in benefit amounts have been legislated or proposed in Belgium (from 58 to 60 by 2012), Denmark (from 60 to 62 between 2019 and 2022), and Finland (from 63 to 65 between 2011 and 2022). Increases in the age of eligibility for *full* pension benefits have been legislated or proposed in Australia (from 65 to 67 between 2017 and 2023), the Czech Republic (to 65 by 2030), Denmark (from 65 to 67 between 2024 and 2027, linked to life expectancy thereafter), Hungary (from 62 to 65, starting in 2012), the Netherlands (from 65 to 67 in 24 monthly steps), Switzerland (for women, from 63 to 64; men stay at 65), and Turkey (from 58 for women and 60 for men to 65 for both by 2048). Still others -- Finland, Portugal, and Sweden -- have linked benefits to gains in life expectancy. In contrast, in Canada no change in the age of pension eligibility is in prospect at this time.

*Age-Eligibility for Public Pension Benefits: A Simple Model with Relevance to Canada*

We employ the following simple model to explore (in broad terms) the effects of changes in the eligibility for benefits in the Canadian pension system. Let $n(x,t)$ be the population of age $x$ in year $t$ and assume a public pension system in which the age of eligibility for benefits in year $t$ is $q(t)$. The number of age-eligible beneficiaries in year $t$ is then $\sum_{x \geq q(t)} n(x,t)$. If the age of eligibility is constant, such that $q(t) = q$, then the number of eligible beneficiaries is simply the total population of age $q$ or older. In the present Canadian context $q$ might be taken (as an approximation) to be 65.

Suppose though that as a matter of public policy the age of eligibility is allowed to increase, subject to the restriction $q(t+1) - q(t) \leq 1$, for all $t$. (The restriction implies that all persons who were eligible in year *t* will still be eligible in year *t+1*.) The age of eligibility thus becomes a policy tool for partially controlling the number eligible, and hence the cost of operating the system.

The model with age of eligibility set at 65 is an oversimplification of the Canadian system, but captures its main features in respect of the effects of population aging on pension costs, and the possibilities for influencing those costs by choice of the age of eligibility. We explore these possibilities in a series of calculations below. First, though, some observations on the nature of the approximation – on aspects of the Canadian pensions system that are ignored by the model.

The approximation is close for OAS. To be eligible for the OAS pension an individual living in Canada must be 65 or older, must be a Canadian citizen or legal resident at the time the application is approved, and must have lived in Canada for at least ten years after turning 18. Someone living outside Canada may also be eligible if he/she was a Canadian citizen or a legal resident of Canada on the day before leaving the country and had lived in Canada for at least 20 years after turning 18. These restrictions mean that some members of the population of Canada (defined on a census basis) who are 65 or older will not qualify for OAS and some people who do not belong to the Canadian population (again, on a census basis) will qualify. As a practical matter, though, these exceptions are of minor importance, and the population 65 and over is a close approximation to the population eligible, under present legislation.[14]

The approximation is not quite as close for the other major component of the Canadian system, the CPP/QPP. The CPP/QPP is contributory, and to qualify for benefits one must have worked for some or all of the time since the age of 18. Contributions are paid in part by employers and in part by employees, and subsequent benefits are related to the history of earnings levels and years of employment. A benefit recipient must make application, must be 65 or older or, subject to certain restrictions, between 60 and 64. There is no upper age limit on when benefits may begin but after age 70 the pension is frozen at the age-70 level so there is no financial incentive to delay receipt beyond that age. There is provision for survivor benefits to continue after the death of a pensioner. Some other conditions apply as well. Thus the age range and scope for CPP/QPP pension recipients is not as closely approximated by the model as it is for OAS recipients. In practice some CPP/QPP recipients will be younger and some older than 65, and (as with the OAS), some will be outside the country. But again we view the population 65 and older as a reasonable approximation for the eligible population under the present Canadian system, and hence a reasonable starting point for the exploratory projections that follow.

*Alternative Policy Measures for Canada*

Using the model described above, we consider nine projections that differ in terms of the assumptions about the age at which people are entitled to receive public pension benefits. That is, we project the size of the *age-eligible population* in Canada under each of these assumptions. All projections assume continued gains in life expectancy.

In all projections it is assumed, consistent with the practice in Canada, that the same age of eligibility (AE) applies to both men and women. (As noted earlier, that is not true in some countries.) In the first projection, AE0, the legislated age of eligibility remains unchanged at 65. AE1 assumes instead that that age increases by one month each year, starting in 2011, and continues until 2035, by which year it reaches 67. AE2 assumes that the age of eligibility is increased in the same way, but starting five years later, in 2016; in consequence, by 2035 it reaches 66.5 years. The next two projections, AE3 and AE4, assume that the transition occurs more rapidly – by three months each year instead of one – but that the increase ceases when age 70 is reached. AE1 through AE4 are modelled loosely on the changes that occurred in the United States, starting in 2003. AE5 assumes that increases adjust to reflect fully any gains in life expectancy at birth, starting in 2011. The final three projections, AE6 through AE8, assume that the increase takes place more rapidly still – by one year of age for each year of time – starting in 2011 for AE6, in 2016 for AE7, and in 2021 for AE8. Again, increases cease at age 70. For convenience of reference the age-of-eligibility assumptions in the projections are summarized as follows:

- AE0 -- remains at 65
- AE1 -- increases by one month each year from 2011 to 2035
- AE2 -- increases by one month each year from 2016 to 2035
- AE3 -- increases by three months each year from 2011 to 2030
- AE4 -- increases by three months each year from 2016 to 2035
- AE5 -- increases adjust fully to gains in life expectancy at birth, from 2011
- AE6 -- increases by one year each year from 2011 to 2015

- AE7 -- increases by one year each year from 2016 to 2020
- AE8 -- increases by one year each year from 2021 to 2025

The first results of the projections are reported in Table 2. The upper panel shows the size of the age-eligible population in 2035 under each of the alternative assumptions, and also in 1966 and 2010, for comparison. It is evident that allowing age to adjust can make a large difference. By 2035 the number projected to be eligible increases by as little as 59 percent (in projections AE3, AE4, and AE6 through AE8, when only those age 70 and older are eligible) or by as much as 108 percent (in AE0, when those 65 and over are eligible).

The lower panel shows the age-eligible population as a percent of the overall population. How much the proportion age-eligible to receive benefits will increase is quite sensitive to changes in the age of eligibility. If the current age requirement were to remain in place (AE0) the eligible population is projected to account for 24.0 percent of the total population by 2035. However, if the age were to adjust by one month per year, starting in 2011 (AE1), the eligible population would account for only 21.6 percent of the total, and somewhat more if the change were to take effect five years later, in 2016 (AE2).

The impact is greater in AE3 and AE4, in both of which the age of eligibility increases to 70; the age-eligible population in each of those cases increases less than half as much by 2035 – from 14.1 to only 18.3, as compared to 24.0 if the eligible age were to remain at 65. The same is true of AE6, AE7, and AE8, in all of which the age of eligibility is 70 in 2035. Finally, when the adjustment reflects gains in life expectancy, in AE5, the

increase in the age of eligibility is less, and hence the increase in the eligible proportion, to 19.9, is somewhat greater.

While five of the projections show the same results for 2035, the time paths of the adjustments differ considerably one from another, and from the other four projections. That is shown in Figure 1. As would be expected, the sooner an increase in the age of eligibility takes effect, and the larger that increase, the greater the impact on the number eligible. Thus, as shown in the upper panel of the figure, the entire time path of AE1 lies below that of AE2, and the path of AE3 lies below that of AE4 until age 70 is reached. The increase is somewhat greater if the adjustments reflect gains in life expectancy, as in AE5. Projection AE3 is especially noteworthy: the relatively rapid increase in the age of eligibility that continues until 2030 results in only a modest increase in the age-eligible proportion until after that date.

In all these cases the fraction of the population that is age-eligible increases year by year. The increase itself is an inevitable consequence of the sheer size of the baby boom but it is evident that the extent of the increase can be attenuated, in greater or lesser degree, by on-going age adjustments.

The paths of adjustment are rather different for the last three projections in the set of nine, as shown in the lower panel of Figure 1. AE6, AE7, and AE8 each involve a much more rapid adjustment in the size of the age-eligible population. If the age of eligibility were to increase from 65 to 70 in one-year increments each year, starting in 2011 (AE6), the age-eligible proportion would decline sharply, from 14.1 percent in 2010 to 10.6 percent in 2015, at which time it would be almost 6 percentage points below the

no-adjustment case. The proportion would then increase steadily thereafter, running roughly parallel to the no-adjustment case. The adjustment would be delayed by five years (AE7) or ten (AE8) in the other two cases, but all three projections end up with 18.3 percent of the population age-eligible. Policy makers are not likely to find such rapid early adjustment to be appealing, and so we drop AE6, AE7, and AE8 from further consideration.

Focusing then on projections AE0 to AE5, Table 3 reports the implications for the expected amount of time spent in retirement for someone who retires at the age of pension eligibility. Two measures are provided. One is the expected proportion of adult life (i.e., after age 20) spent in retirement; the other is the expected number of years of working age for each year in retirement.

Life expectancy at age 65 in 2010 is estimated at 17.9 years for males and 21.4 for females. Retirement at age 65 after 45 years in the working age range would mean that a man would expect to have 28.5 percent of his adult life in retirement while a woman would expect to have 32.2 percent. Also shown in Table 3 is what those proportions would be in 2035 under each of the projections. If 65 were to remain the age of eligibility (AE0), both men and women retiring at that age would expect to spend an increased share of their lives in retirement in 2035 – up by 2.4 percentage points since 2010 for men, 2.3 for women. Increasing the age of eligibility would imply a smaller fraction in retirement in 2035; it could still be somewhat greater than it was in 2010 (AE2) or it could be less (all other projections). In any event, we observe that all of the increases in the age of pension eligibility considered here would result (for people retiring at that

age) in a larger fraction of life spent in retirement in 2035 than was the case in 1966, when the CPP and QPP were introduced.

The alternative measure in Table 3, in the bottom panel, is the number of years of working age for each year of retirement. As compared to 2010, there would be a reduction of about one-quarter of a year by 2035 for men if age 65 were retained (AE0), or an increase of up to five-eighths of a year otherwise (AE3-4). The impact for women would be somewhat less. As compared to 1966, on the other hand, there would be fewer years of work for each expected year in retirement in all cases.

Population aging implies an increase in the proportion of older people and one might expect the actual labour force (not just the “working age” population) to become smaller in relation to the size of the older population. That is, one would expect there to be fewer people in the labour force “to provide support” for those in old age. Table 4 shows the size of the labour force in 1966, 2010 (estimated), and projected to 2035 (upper panel), and the corresponding ratios of labour force to the age-eligible population (lower panel). The 2035 labour force projections are based on one of two assumptions – either the participation rates remain constant (at 2009 levels, the latest ones observed at the time of writing) or else they adjust to reflect increases in the age of eligibility for benefits. In the latter case the assumption is a shift of the age pattern of participation for those aged 55 and older: a one-year increase in the age of eligibility results in those aged 56 having participation rates previously associated with those 55, in those 57 having rates previously associated with those 56, and so on. (This shift in age profile is assumed to apply at every age 55 and over, including both ages below the age of eligibility and ages above.)

With 2009 participation rates maintained, the labour force is projected to grow by only 8 percent between 2010 and 2035, as compared to 108 percent growth in the population 65 and over. However, when participation rates adjust, the labour force grows by as much as 22 percent over the same period (it does that in projections AE3 and AE4). A larger labour force means a higher ratio to the population eligible to receive benefits. That ratio, which can be thought of as a type of “support ratio” for pension recipients, was 3.9 in 2010, down from 4.9 in 1966. If the age of eligibility does not change and labour force participation rates are unchanged also, the ratio is only 2.0 by 2035. If the eligibility age adjusts and participation rates do not, the support ratio declines by less. (The smallest reduction is from 3.9 to 2.7.) If participation rates adjust as well, the decline is smaller still.

Figure 2 shows how the support ratios change year by year throughout the projection period. In the upper panel the assumption again is that participation rates remain constant; in the lower panel the rates are assumed to adjust. Both panels show sustained declines in all projections. The decline is greatest when the age of eligibility remains at 65 and participation rates do not adjust (the ratio falls steadily, from 3.9 to 2.0). The decline is reduced when the age of eligibility adjusts and, to a lesser extent, when participation rates adjust. AE3 is noteworthy in that the support ratio is highest throughout the projection period, the result of a rapid and early starting increase in the age of eligibility. By 2030, when the age of eligibility reaches 70, the ratio in that projection falls to 3.0 if participation rates do not adjust, and to only 3.4 if they do.

*Implications for Pension Contribution Rates*

We think of our model of public pension eligibility as pertaining (as an approximation) to the OAS and CPP/QPP in the Canadian context. OAS benefit payments are made entirely from general revenues of the federal government. The CPP and QPP operate separately, but in parallel, and are financed by employer and employee contributions. (They have maintained the same contribution rates and similar benefit structures from the inception of the two plans.) The contribution rates have been adjusted over time, but have always been set high enough to generate an inflow of contributions in excess of the outflow of benefits and, in consequence, both have accumulated assets in separate funds. However, neither plan comes close to being "fully funded".[15] As an exercise, we calculate the overall contribution rate that would be needed each year in order to pay the combined total OAS and CPP/QPP benefits that would be claimed in that year. That is equivalent to financing the public pension system on a strictly pay-as-you-go basis, although in fact the actual financing of the Canadian system is only partly pay-as-you-go. Although differing from the actual financing, the pay-as-you-go calculation gives an indication of the economic burden of the model pension plan (and by implication, the OAS and CPP/QPP), and the effects of changes in demographic structure.

In our stylized pay-as-you-go system the total of public pension benefits paid each year is equal to the product of $b$, the average benefit payment, and $R$, the number receiving benefits. As a convenience in the calculations that follow, we relate the contributions to finance the system to the total earnings in the economy, the product of the average annual wage per member of the labour force, $w$ (assuming a positive wage for the

employed or self-employed, zero for the unemployed), and the number in the labour force, $L$. The contribution rate can then be calculated for each year $t$ as $c_t = (b_t R_t)/(w_t L_t)$. If, as we assume, the ratio of average benefit to average wage is maintained (implying that future benefits are fully wage-indexed), and the rate of unemployment is fixed, the equation can be rewritten as $c_t = k(R_t/L_t)$, where $k = b_t/w_t$ , a constant for every year $t$. With the benefit-wage ratio fixed, the required contribution rate varies directly with the ratio of the number of beneficiaries to the number in the labour force.

In what follows we approximate the benefit-wage ratio at 0.25[16] and take account of changes in the ratio of pension-eligible population to labour force to calculate the contribution rate. The results are shown in Figure 3. The upper panel once more is based on the assumption that labour force participation rates do not change; the lower panel assumes that they adjust to gains in life expectancy, as in the earlier calculations.

It is evident from the figure that changing the age of eligibility would have a significant impact on the contribution rate, under pay-as-you-go financing. If the age were to remain at 65 the rate would have to double, from 6.4 percent in 2010 to about 12.3 by 2035. The increase would be about 1.2 percentage points less if there were a one-month-per-year increase in the age of eligibility, starting in 2011 (AE1), and 2.1 percentage points less if the age adjusted to the projected gains in life expectancy (AE5). The increase would be smaller still – about 2.9 percentage points less – if the age of eligibility were increased to 70 (AE3, AE4). If, in addition, participation rates were to adjust to reflect policy changes in the age of pension eligibility, the contribution rate

needed by 2035 would be reduced by as much as an additional one percentage point. Put differently, if the age of eligibility were increased by three months each year until it reached age 70 in 2030, as in AE3, and participation rates adjusted, the contribution rate that would be needed to sustain the pension system would increase from 6.4 percent in 2010 to only 7.3 percent in 2030. By comparison, with no change in the age of eligibility the contribution rate would be 11.6 percent in that year.

*Concluding Remarks*

As the baby boom generation retires over roughly the next two decades the fraction of the population eligible to receive public pension benefits will increase sharply. That would happen even without on-going reductions in mortality rates and the resultant increases in life expectancy. However, reductions in mortality mean that the impact will be even greater, especially if no offsetting adjustment is made to the age at which people are eligible to receive benefits.

The age at which people are eligible for public pension benefits, and the age at which they retire, have figured prominently in recent discussions of pension reform in other countries, but in Canada they have been given little attention. And yet, as we have demonstrated, continued gains in life expectancy, when not accompanied by an extension of working life, result in increasingly large fractions of the human life span being spent in retirement. While from an economic theoretical point of view that might be regarded as simply a voluntary leisure/work substitution it gives rise to concerns

about prospective increases in public pension costs and the level of support expected of the post-baby-boom generations.

We have illustrated the quantitative importance of continued gains in life expectancy for the relative size of the future population. We have suggested that gradual and modest increases in the age of eligibility for the benefits that are available from public pension plans would serve two important purposes. First, they would moderate the inevitable decline in the size of the labour force relative to the size of the retired population. Secondly, they would make possible a reduction in the contribution rate (more generally, the rate of taxation, broadly defined) that would be needed to maintain the public component of the retirement income system. Most other developed countries have acted already but it is not too late for Canada to benefit from a review of its policies in respect of public pension age-eligibility.

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*Endnotes*

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[1] In related work, Denton and Spencer (1999, 2002) consider the demographic impact of keeping the marker of "old age" fixed over extended periods when life expectancy is increasing.

[2] That claim is made on the website of Human Resources and Skills Development Canada, http://www.hrsdc.gc.ca/eng/lp/spila/wlb/aw/26retirement_legislative.shtml, accessed May 14, 2010.

[3] The 1966 estimates reported in this paragraph are the average values in 1961 and 1971 as reported in the standard (period) life tables for Canada for 1960-62 and 1970-72; see Dominion Bureau of Statistics (1963, 1974).

[4] A conventional, though somewhat arbitrary, dating of the baby boom period is from 1946 to 1966.

[5] The projections are based on the use of MEDS; see Denton, Feaver, and Spencer (2005).

[6] The year 2001 is the latest year for which official life tables are available from Statistics Canada.

[7] We observe that the projected gains in life expectancies would be greater, and more in line with what Oeppen and Vaupel (2002) would expect, if they were based on observed reductions in mortality over a longer historical period.

[8] Alberta and British Columbia – Joint Expert Panel on Pension Standards (2008)
Ontario – Expert Commission on Pensions (2008)
Canada – Mintz (2009)
Nova Scotia – Pension Review Panel (2009)

[9] The consultation documents are available at http://www.fin.gc.ca/activty/consult/retirement-eng.asp, accessed September 21, 2010.

[10] http://www.ssa.gov/retire2/retirechart.htm, accessed May 10, 2010.

[11] http://www.ft.com/cms/s/0/cdcae644-7f72-11df-9973-00144feabdc0.html, accessed August 9, 2010.

[12] http://www.ft.com/cms/s/0/6199c1aa-79a7-11df-85be-00144feabdc0.html, accessed Sept 9, 2010.

[13] The changes described in this paragraph and the one following are drawn from OECD (2009).

[14] We note that originally only those 70 and over received benefits under the Old Age Security Act, which took force in 1952. Through later legislation a reduction in the age of eligibility from 70 to 65 was phased in between 1965 and 1969; see http://www.servicecanada.gc.ca/eng/isp/oas/oasoverview.shtml accessed August 24, 2010. We note also that more than one-third of OAS beneficiaries, those with sufficiently low incomes, also receive GIS benefits, but we are not concerned here with GIS eligibility, as distinct from OAS eligibility.

[15] Given the benefit structure, the intention is that the current employer plus employee contribution rate (now set at 9.9 percent of contributory earnings) will allow a sufficient accumulation of assets in the near term such that the rate will not have to be increased in the longer term. This so called *steady-state financing* is designed "to build a reserve of assets equivalent over time to about five and a half years of benefit expenditures or about 25 percent of Plan liabilities" (Office of the Chief Actuary, 2007, p 9).

[16] That value closely approximates the recent average OAS plus CPP/QPP annual benefit payment relative to the average industrial wage.

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Figure 1: Percent of Population Age-Eligible for Pension Benefits, Alternative Projections

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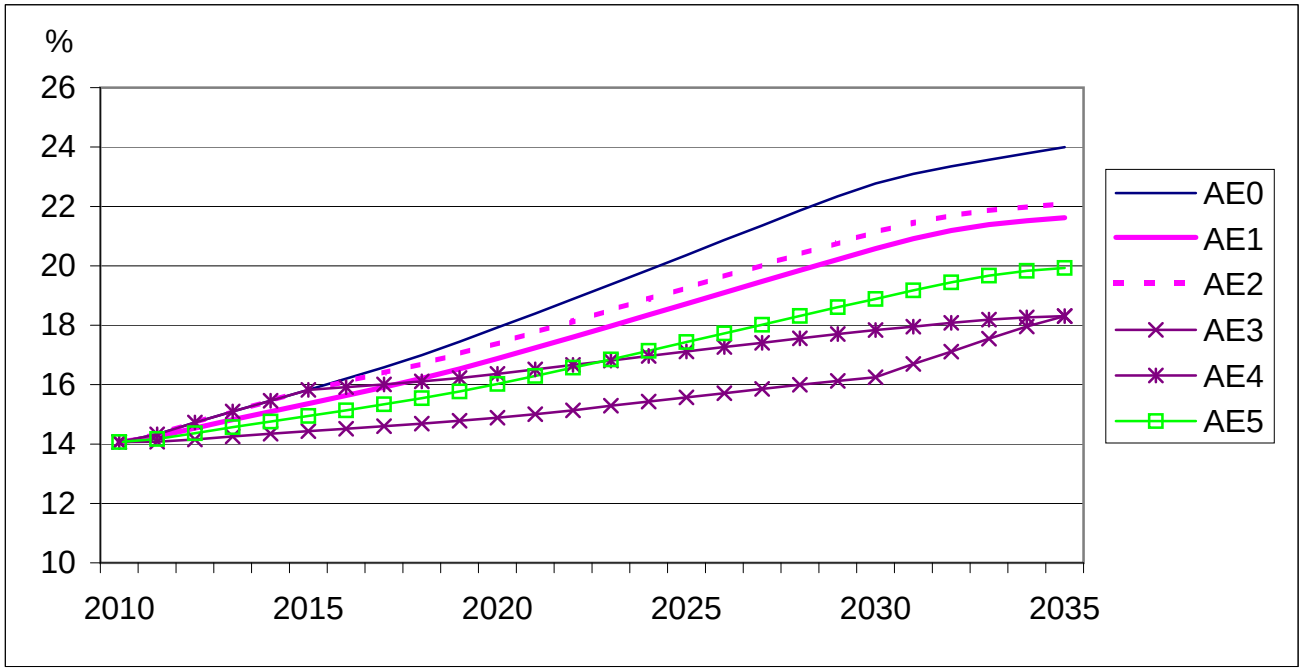


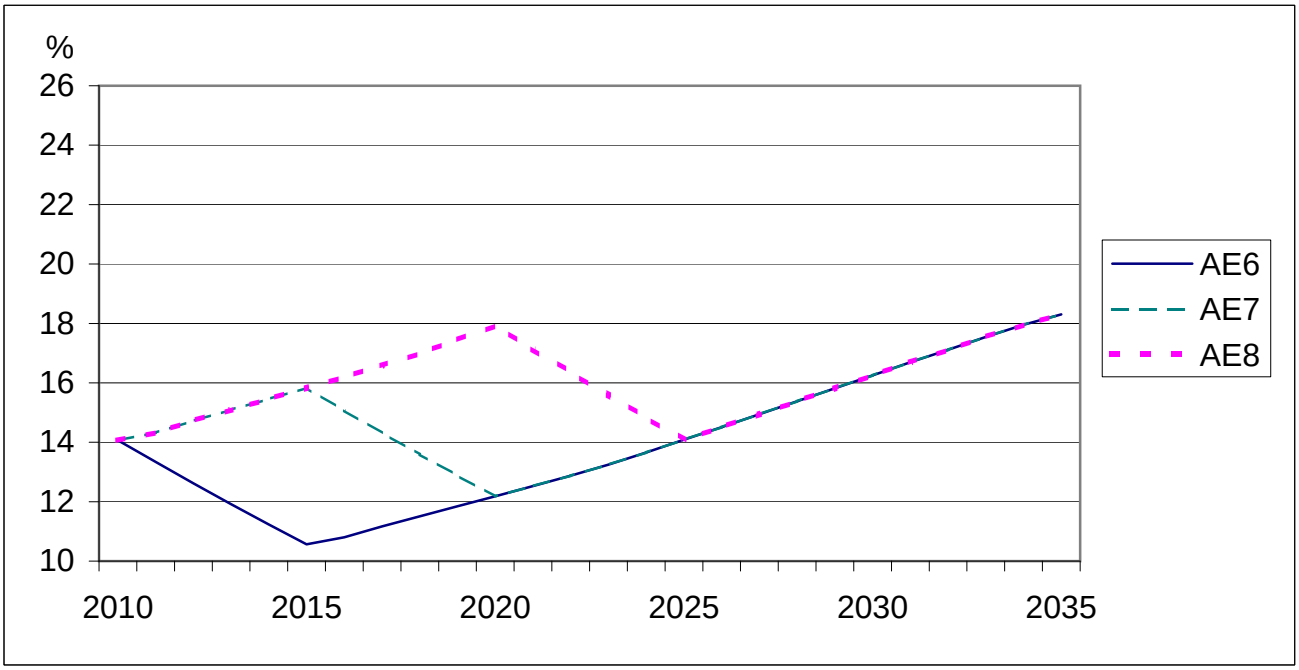
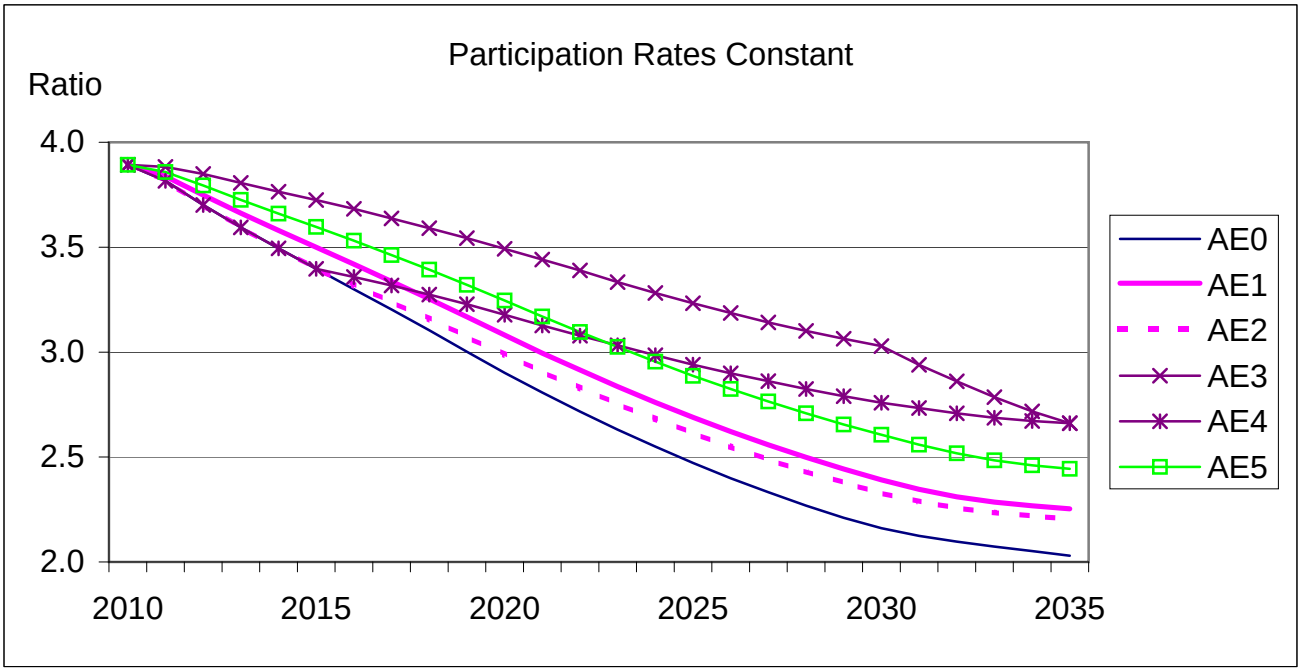



Figure 2: Ratio of Labour Force to Age-Eligible Population, Alternative Projections



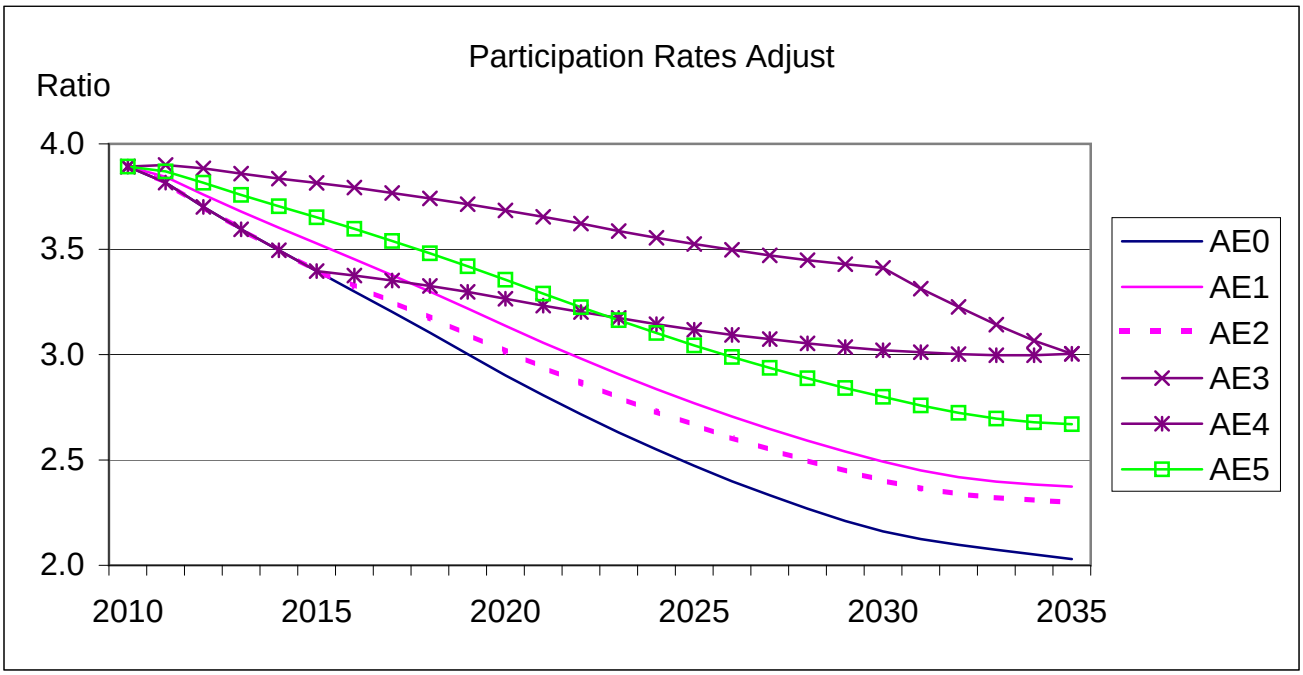
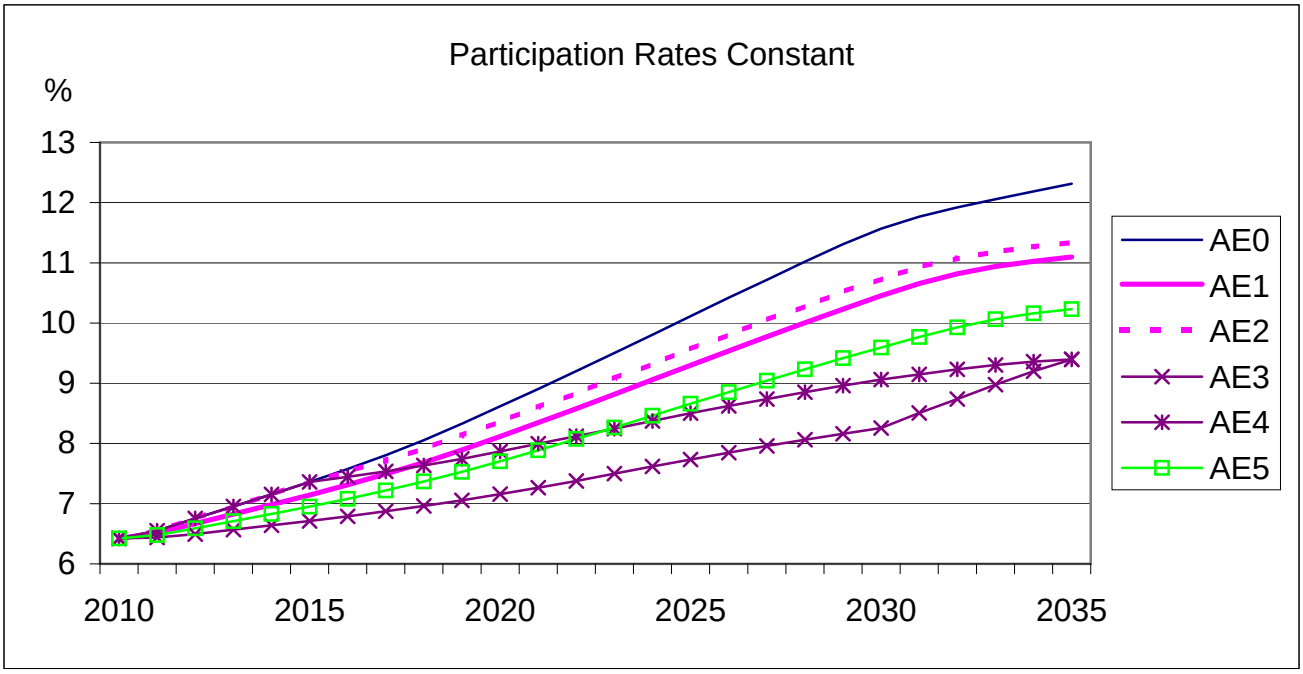



Figure 3: Pension Contribution Rate (Percent of Wage Bill) Under Pay-as-You-Go Financing, Alternative Projections



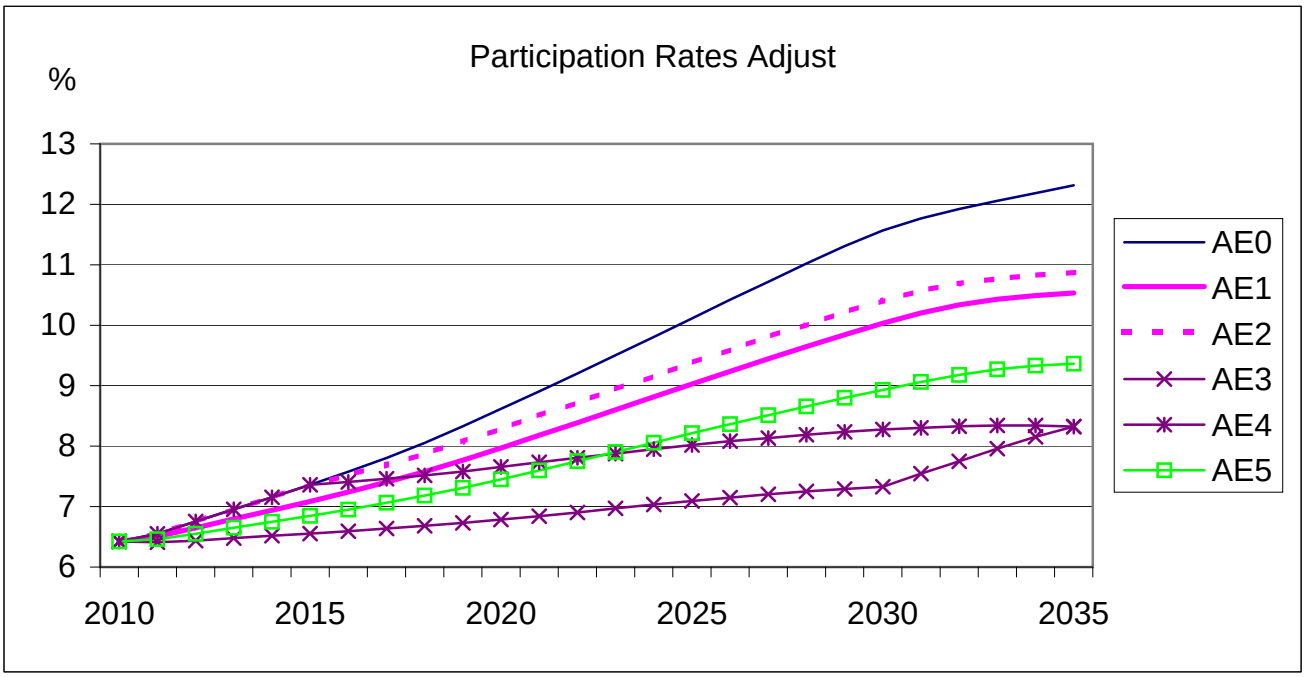



Table 1: Impact of Continued Gains in Life Expectancy on the Size and Age Distribution of the Canadian Population

| | Population size ('000) | | | Percent distribution | | |
|---|---|---|---|---|---|---|
| | <65 | 65+ | All ages | <65 | 65+ | All ages |
| 1966 | 18,475 | 1,540 | 20,015 | 92.3 | 7.7 | 100.0 |
| 2010 | 29,313 | 4,799 | 34,112 | 85.9 | 14.1 | 100.0 |
| 2035 | | | | | | |
| -- No gains in life expectancy | 31,439 | 9,199 | 40,638 | 77.4 | 22.6 | 100.0 |
| -- Continued gains | 31,607 | 9,978 | 41,584 | 76.0 | 24.0 | 100.0 |

Note: The values for 2010 and 2035 are projected using MEDS; see Denton, Feaver and Spencer (2005). With "no gains" in life expectancy, the mortality rates at all ages remain at their estimated 2010 levels; for males that means life expectancy at birth of 78.6 years, for females 83.4 years. With "continued gains", mortality rates continue to decline throughout the projection period at the same average annual percentage rates as those observed over the 30-year period ending in 2001.

Table 2: Population Age-Eligible for Pension Benefits, Alternative Projections

| | AE0 | AE1 | AE2 | AE3 | AE4 | AE5 | AE6 | AE7 | AE8 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | *Age-Eligible Population ('000s)* | | | | | |
| 1966 | 1,540 | 1,540 | 1,540 | 1,540 | 1,540 | 1,540 | 1,540 | 1,540 | 1,540 |
| 2010 | 4,799 | 4,799 | 4,799 | 4,799 | 4,799 | 4,799 | 4,799 | 4,799 | 4,799 |
| 2035 | 9,978 | 8,991 | 9,186 | 7,612 | 7,612 | 8,288 | 7,612 | 7,612 | 7,612 |
| | | | | *Age-Eligible Population / Total Population (%)* | | | | | |
| 1966 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 |
| 2010 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 | 14.1 |
| 2035 | 24.0 | 21.6 | 22.1 | 18.3 | 18.3 | 19.9 | 18.3 | 18.3 | 18.3 |

Note: See text for description of alternative projections.

Table 3: Life Expectancy, Age of Pension Eligibility, and the Proportion of Adult Life in Retirement for People Retiring at the Age of Eligibility, Alternative Projections

| | | | 2035 | | | | |
|---|---|---|---|---|---|---|---|
| | 1966 | 2010 | AE0 | AE1 | AE2 | AE3-4 | AE5 |
| Life expectancy at birth | | | | | | | |
| Males | 68.8 | 78.6 | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 |
| Females | 75.2 | 83.4 | 86.7 | 86.7 | 86.7 | 86.7 | 86.7 |
| Age of eligibility | 65.0 | 65.0 | 65.0 | 67.1 | 66.7 | 70.0 | 68.6 |
| Percent of adult life spent in retirement | | | | | | | |
| Males | 23.2 | 28.5 | 30.9 | 27.3 | 28.9 | 24.2 | 26.3 |
| Females | 27.1 | 32.2 | 34.5 | 31.0 | 32.5 | 28.0 | 30.0 |
| Expected years of working age relative to years of retirement | | | | | | | |
| Males | 3.31 | 2.51 | 2.24 | 2.66 | 2.46 | 3.13 | 2.81 |
| Females | 2.69 | 2.10 | 1.90 | 2.22 | 2.08 | 2.58 | 2.34 |

Note: See text for description of alternative projections.

Table 4: Labour Force, Total and Relative to Age-Eligible Pension Population, Alternative Projections

| | AE0 | AE1 | AE2 | AE3-4 | AE5 |
|---|---|---|---|---|---|
| *Labour Force ('000s)* | | | | | |
| 1966 | 7,609 | 7,609 | 7,609 | 7,609 | 7,609 |
| 2010 | 18,679 | 18,679 | 18,679 | 18,679 | 18,679 |
| 2035 | | | | | |
| -- Participation rates constant | 20,255 | 20,255 | 20,255 | 20,255 | 20,255 |
| -- Participation rates adjust | 20,255 | 21,339 | 21,122 | 22,866 | 22,129 |
| *Labour Force / Age-Eligible Population* | | | | | |
| 1966 | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 |
| 2010 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 |
| 2035 | | | | | |
| -- Participation rates constant | 2.0 | 2.3 | 2.2 | 2.7 | 2.4 |
| -- Participation rates adjust | 2.0 | 2.4 | 2.3 | 3.0 | 2.7 |

Note: See text for description of alternative projections.

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