Working Paper

Socio-Demographic Changes and the Pension Problem in Canada

Jacques Ledent

WP-92-68
September 1992

IIASA

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INFORMATION ON THE PROJECT

The Canadian case study is part of the project "Social Security, Family and Household in Aging Societies," conducted at IIASA in collaboration with the Netherlands Interdisciplinary Demographic Institute (NIDI).

Other papers related to the project are listed below:

WP-92-48	Demographic Trends and Pensions in Italy: An Outlook for the Future, by Alessandra De Rose and Antonella Pinnelli
WP-92-35	Demographic Effects on the Swedish Pension System, by Tommy Bengtsson and Agneta Kruse
WP-92-30	Demographic Trends and the Pension Problem in Finland, by Jarl Lindgren
WP-92-24	Socio-Demographic Changes and the Pension Problem in France, by Jean-Louis Rallu
WP-92-23	Demographic Trends and the Pension Problem in Poland, by E. Fratczak and J. Józwiak
CP-91-15	The Effects of Changing Marital Status Patterns on Social Security Expenditures in the Netherlands, 1985-2050, by N. Keilman
CP-91-02	Demographic Changes and their Implications on Some Aspects of Social Security in the Unified Germany, by N. Ott, T. Büttner, and H.P. Galler
WP-90-22	Socio-Demographic Changes and the Pension Problem in Austria, by J.-P. Gonnot
WP-90-15	Demographic, Social and Economic Aspects of the Pension Problem: Evidence from Twelve Countries, by J.-P. Gonnot
WP-89-107	Pension Systems and Social Security Trends and National Characteristics, by J.-P. Gonnot and C. Prinz
WP-89-34	Recent Trends in Living Arrangements in Fourteen Industrialized Countries, by J.-P. Gonnot and B. Vukovich

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ABSTRACT

This study investigates the impact of alternative demographic futures on the Canadian pension system.

The Canadian population, disaggregated by age, sex, and marital status, is projected forward to the year 2051 under six alternative sets of assumptions, comprising four sets shared by all national studies (including the benchmark scenario) and two sets specific to this study (including the national scenario). According to these projections, the old age dependency ratio, or ratio of the old age to the working age populations, will be multiplied by about 2.5 between now and 2030--slightly less under the benchmark scenario (based on unchanged patterns of fertility, mortality, and marital status change but assuming no external migration) but slightly more under the national scenario (based on a further mortality decline and allowing for external migration at mid-eighties levels). In other words, socio-demographic changes are likely in the future to exert some tremendous pressures on the financing of public pensions.

Based on these demographic projections, use of the IIASA pension model reveals the ineluctability of a formidable increase in the contribution rate of workers to the Canada/Quebec Pension Plan so that contributions to this plan continue to counterbalance the benefits offered to retirees (old age benefits to which any Canadian aged 65 and over is entitled are paid out of the general budget). But the increase required could be mitigated by the adoption of accompanying policies, two of which (increase in the labor force participation of men and raise of the retirement age) are also briefly investigated.

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SOCIO-DEMOGRAPHIC CHANGES AND THE PENSION PROBLEM IN CANADA

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1. BASIC DEMOGRAPHIC TRENDS SINCE THE SECOND WORLD WAR

Since the end of the Second World War, Canada has experienced broad demographic changes that are similar to those observed in most developed countries. They are:

- an increase followed by a decrease in fertility as well as in nuptiality,
- an increase in divorce, and
- a decrease in mortality.

Fertility

The secular downward trend in fertility was interrupted by the so-called baby boom, which persisted from the early 1940s to the late 1950s. From 3.00 in 1945, the total fertility rate (TFR) increased to a maximum of 3.85 in 1959[1] (see Figure 1).

Initially slow, the decline in fertility that followed the baby boom was truly rapid in the mid-sixties, as the TFR decreased sharply from 3.61 in 1963 to 2.39 in 1968. Thereafter, the TFR continued to decrease, although at a somewhat reduced pace before leveling off. Having fallen to 1.70 in 1980, it has since fluctuated between 1.65 and 1.70.

While the percentage of births to unmarried women was maintained at about 4 percent of all births during the baby boom (Figure 2), it increased steeply thereafter, except between 1968 and 1974, to reach 18.3 percent in 1986.

Nuptiality

Like fertility, nuptiality has since the end of the Second World War experienced a boom followed by a bust. Thus, the proportion of those ever marrying, which increased steadily until some time in the sixties, has declined ever since. From 1971

[1]Concomitant to the one observed in the United States, this maximum preceded similar maxima observed in most European countries by four to five years.

to 1981, this statistic decreased from 92 to 88 percent in the case of females and from 90 to 85 percent in the case of males (see Table 1).[2]

A similar pattern of change can be observed for the remarriage of divorcees. After increasing right after the war, the proportion of divorcees who remarry has been declining since, dropping from 79 percent in 1971 to 69 percent in 1981 in the case of females and, somewhat less, from 85 to 80 percent in the case of males. By contrast, the remarriage of widow(er)s has almost constantly decreased since 1945, falling in 1981 to 17 percent in the case of widowers and to only 6 percent in the case of widows (in contrast to 24 and 9 percent, respectively, ten years earlier).

The amplitude of the variations observed in primo nuptiality can be attributed in part to the variations registered by the mean age at first marriage (see Figure 3). In the case of females, this statistic declined somewhat slowly from 24.3 years in 1945 to 22.2 years in 1972 and thereafter increased relatively quickly to regain by the mid-1980s a value reminiscent of the mid-1940s (24.8 years in 1986). Similarly, for males, this statistic declined from 27.3 years in 1945 to 24.7 years in 1972 before increasing to 27.0 years by 1986.

Finally, although legal marriage is still the dominant type of union in Canada, consensual union is increasingly favored, especially among younger adults. According to Statistics Canada,[3] the proportion of common-law couples among husband-wife families increased from 6.3 percent in 1981 to 8.3 percent in 1986.

Divorce

In the recent past, while the propensity to marry has been oriented downward, the propensity to divorce has been oriented upward. Thus, the proportion of marriages ending in divorce has grown substantially from 19 percent in 1971 to 29 percent in 1981 (see Table 1).

Mortality

Between 1951 and 1986, life expectancy at birth increased by almost nine years for females (from 70.9 to 79.7 years) and by about six and a half years for males (from 66.4 to 73.0 years), thus causing the mortality gap observed between the two sexes to increase from 4.5 to 6.7 years (see Table 2). This improvement in life expectancy at birth, however, was not regular over time, in particular for males. After experiencing a substantial increase in the fifties, female life expectancy at birth grew steadily over the next two decades before registering a modest gain in the early eighties. By contrast, male life expectancy displayed a more erratic pattern of

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[2]The figures shown in this table (as well as in Table 2) are drawn from multistate life tables calculated on the basis of mortality, nuptiality, divorce, and widowhood rates, measured as three-year averages around the census years.

[3]Statistics Canada. 1989. *1986 Census of Canada-Population and Dwelling Characteristics-Families: Part I,* Catalogue 93-106. Ottawa: Supply and Services Canada (Table 2).

change as it improved comparatively less in the 1960s and comparatively more in the early 1980s.

Note that these changes in life expectancy compound differing paces of change in mortality rates across the age continuum. Thus, if a large part of the improvement in life expectancy at birth until the late 1970s can be attributed to declining mortality rates in the older segment of the Canadian population, such is not the case in the early 1980s. Because mortality rates did not drop much beyond age 60 and not at all beyond age 80, the rise in life expectancy at birth observed between 1981 and 1986 (from 71.9 to 73.0 years in the case of males) stemmed essentially from a decrease in mortality under age 60.

Immigration

Canada's growth has been sparked by successive waves of immigrants who arrived in periods of favorable socio-economic conditions. Today, although the proportion of immigrants is smaller in relation to the country's population, net immigration remains an important component of population growth. This is because the other component, natural increase, tends to drop under the influence of low fertility rates (see Figure 4).

Future Trends

Extrapolation of the most recent trends suggest the probability of a stabilization of fertility at a level equal to or slightly below present level. Thus, for the purpose of defining a "national scenario" for Canada, unchanged patterns of fertility are assumed.

In the case of marital change, we presume that, if they were available for 1986, multistate life table statistics directly comparable to those presented in Table 1 for previous census years would most likely reveal a trend toward the stabilization of marriage and divorce rates. As a result, patterns of marital change are also assumed to remain unchanged in the national scenario.

Even though further improvement in life expectancy at birth can be rightfully expected, projection of mortality rates is not that obvious. Given this, it is simply assumed in the national scenario that age-specific mortality rates will decline by a common percentage point (different for each gender) so that the resulting life expectancies at birth present an evolution identical to that hypothesized by Statistics Canada in its last round of national projections.[4] By 2011, life expectancy at birth should reach 84.0 years for females and 77.2 years for males, thus leaving unchanged the mortality gap between the sexes observed in 1986.[5]

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[4]Statistics Canada. 1990. *Population Projections for Canada, Provinces, and Territories, 1989-2011,* Catalogue 91-520. Ottawa: Supply and Services Canada.

[5]Observe that this assumption means a slightly higher reduction in mortality for males than for females.

Finally, net immigration is a much more volatile factor. For example, the number of immigrants admitted into the country was substantially higher in the second than in the first half of the 1980s. Considering the current desire of Canadian authorities to maintain a high immigration level (250,000 annual immigrants until 1995), surviving immigrants (that is, immigrants surviving to the end of each projection interval) were, for the purpose of the national scenario, set at twice their 1981-1986 level (without altering their age/sex composition).[6]

2. CHANGES IN THE SIZE AND AGE STRUCTURE OF THE POPULATION

Since the end of the baby boom, the population of Canada has continued to grow, but its rate of growth has diminished continuously so that a decrease in total population is a definite possibility in the more or less distant future. Under unchanged demographic conditions ("benchmark scenario"),[7] the size of the Canadian population (25.3 million in 1986) would, some time in the early 21st century, reach a maximum of slightly over 30 million and thereafter would decrease at a pace that would tend to accelerate after 2031.

A similar pattern of change would be observed under the "mortality scenario" and the "western scenario" (see Table 3). But, whereas the restruction of the mortality gap between the two genders built into the mortality scenario would delay the occurrence of the population maximum as well as inflate its size (by about two million persons), the decrease in fertility built into the western scenario would have an opposite effect: the occurrence of the population maximum would be hastened and its size deflated by 1.5 million persons.

By contrast, in the case of the other impact scenarios, population size would continue to increase until the projection horizon (2051), the year in which it would reach 33.3 million (fertility scenario) or 36.4 million (migration scenario).

Finally, since the only feature that distinguishes the national scenario from the migration scenario is a more favorable mortality assumption (declining rather than constant mortality rates), the same evolution--but somewhat amplified-- would be observed under the national scenario: population size would reach 38.5 million in 2051.

In other words, the six scenarios considered can be grouped into two categories: a first category of scenarios (including the benchmark scenario) in which a reversal in the evolution of total population would take place some time within the first three decades of next century and a second category of scenarios (including the

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[6]The same hypothesis was used for the migration scenario.

[7]Surviving immigrants were taken equal to their 1981-1986 level while emigration rates were kept *identical* to their 1986 values.

national scenario) in which total population would continue to grow beyond the middle of next century.

The above categorization of scenarios remains in force when examining the pattern of change that would be observed at the level of three broad age groups: under 15 (young-age population), 15-59 (working-age population), and 60 and over (elderly population). Under the scenarios of the first category (comprising the benchmark scenario), a pattern of change similar to that observed at the aggregate level (increase followed by a decrease) would be observed for all three age groups. But again, the maximum population level would be reached more or less rapidly and at a level more or less similar to the corresponding 1986 level. For example, the size of the young-age population would pass through a maximum very quickly and thereafter would decrease rapidly, falling in 2051 by as much as 30 percent in the benchmark and mortality scenarios and 60 percent in the western scenario with regard to the 1986 level. For the working-age population, the decline in population would be much less (about 20 percent in the benchmark and mortality scenarios, and 35 percent in the western scenario). Finally, the size of the elderly population would increase more substantially and pass at a comparatively later date through a comparatively higher maximum so that by 2051 it would range between 1.6 (benchmark scenario) and 2.4 times (mortality scenario) the 1986 level.

Under the scenarios of the other category (comprising the national scenario), the young-age and working-age populations would continue to grow for a while before fluctuating around levels similar to (fertility scenario) or substantially higher than (migration and national scenarios) their 1986 levels. At the same time, the old-age population would continue to increase until the projection horizon, thus ensuring the continuous pattern of growth exhibited at the aggregate level.[8]

Viewed in relation to the evolution of the total population, the changes reported above mean that, regardless of the scenario examined, the proportion of the younger and older age groups in the total population would continue to evolve in the same direction as in the last 25 years. According to the benchmark scenario, the proportion of those under 15, which declined from 33.9 percent in 1961 to 21.3 percent in 1986, would decline further, but at a slower pace, to reach 16.3 percent in 2031, whereas the proportion of those 60 and over, which increased from 10.8 percent in 1961 to 15.1 percent in 1986, would increase further--at an especially rapid pace in the first quarter of next century--to reach 27.3 percent in 2031. Changes of similar magnitudes would be observed in the case of the national scenario. But, as one would expect, more moderate changes would be observed in the fertility scenario--by 2031, the proportion of those under 15 would be as high as 19.5 percent and that of those of 60 and over would be as low as 23.6 percent--and amplified changes would be observed in the western scenario--by 2031,

[8]Under the fertility scenario, however, the old-age population would decline slightly after 2031 but the size fluctuations displayed by the other two groups are such that, as seen earlier, population would continue to grow at the aggregate level.

the young-age proportion would be as low as 11.8 percent and the elderly population as high as 34.3 percent.

At the same time, the proportion of the working-age population, which grew from 55.2 percent in 1961 to 63.8 percent in 1981 is expected to decrease, especially after 2001, and to fall by 2031 to about its 1961 level (except in the mortality scenario in which the decline would be larger by 2.5 percentage points).

As time passes, the growth rates of the populations in the three broad age groups tend to converge--unless alternative fertility assumptions are made (in the fertility and western scenarios)--and thus in most instances the three age group proportions tend to stabilize, notably after 2031. In other words, the Canadian population will experience substantial aging in the future, but, unless fertility behavior changes, this phenomenon will virtually cease after 2031.

The latter result is also apparent in Table 4 which presents the expected evolutions of various dependency ratios'. According to this table, the young-age dependency ratio is expected to decrease until 2016 and the old-age dependency ratio to increase until 2031, with only small variations expected thereafter. In particular, the young-age dependency ratios displays the same evolution under the benchmark and the national scenario, whereas the old-age dependency ratio would increase faster under the national scenario than under the benchmark scenario (because the substantial decline in mortality built into the national scenario would hasten the increase in this ratio even more than a doubling of immigration also built into this scenario would delay it).

3. CHANGES IN THE MARITAL COMPOSITION OF THE ELDERLY POPULATION

In Canada, just as in the other countries in this comparative study, the elderly population presents a striking imbalance between the genders, although less severe since Canada registered comparatively fewer war losses. In 1986, there were 77.1 men per 100 women in the population aged 60 and over. In the future, such a gender imbalance should remain at more or less the same proportion. Under present mortality conditions but with zero net immigration (benchmark scenario), the masculinity ratio of the population aged 60 and over should change very little between now and the middle of next century as it would fluctuate by no more than one percentage point from its 1986 value. Further mortality reductions along recently observed trends--that is, slightly more for males than for females--would improve the value of this ratio, whereas accounting for immigration at a level equal to or double of its level in the early 1980s would worsen it. But, in both cases, the absolute change in value that would result would be so small that, for any plausible combination of mortality/immigration assumptions, the masculinity ratio would experience variations that do not depart radically from those in the benchmark scenario. By 2051, there would be 75.3 men per 100 women in the national scenario as against 76.6 in the benchmark scenario (and 77.1 in 1986). Only if the mortality gap between the two genders were substantially reduced (by half according to the

mortality scenario) would the masculinity ratio increase substantially (up to 91.7 percent by 2051).

As one would expect from its gender imbalance, the elderly population displays and will display a marital structure for females that is somewhat different from that for males. In 1986, only one in two elderly women (49.0 percent) were married as opposed to four in five elderly men (79.2 percent), and two in five elderly women (40.3 percent) were widowed as opposed to one in ten elderly men (10.5 percent) (see Table 5). The proportion of elderly single, however, was similar (7.9 percent for females and 7.5 percent for males), as was, because of higher remarriage rate of divorced males, the proportion divorced (2.8 percent for females and 2.7 percent for males).

With marriage and divorce intensities maintained at their 1986 levels (in all scenarios except the western scenario), the marital composition of the elderly population would evolve in much the same way. Thus, the proportion single among elderly of both genders would experience an initial moderate decline followed by a substantial increase. But the reversal would take place earlier and at a faster pace for males than for females so that in year 2051 the proportion single would reach 9.8-10.6 percent for females but 13.8-15.2 percent for males (as opposed to 7.5 and 7.9 percent, respectively, in 1986). The lower values corresponding to the national scenario and the higher ones to the benchmark scenario.

The proportion married for both genders would initially register a substantial decline, and, after a 15-year period of relative respite during which the male proportion would remain unchanged or increase slightly and the female proportion would decrease slightly, it would register another substantial decline. Excluding the mortality scenario, this would, by 2051, bring down the female proportion to 36.1-38.8 percent and the male proportion to 62.1-63.3 percent (as opposed to 49.0 and 72.0 percent, respectively, in 1986). The lower values correspond this time to the benchmark scenario and the higher ones to the national scenario. Were the mortality gap between the two genders to be reduced according to the mortality scenario, the two proportions would still present the same pattern of evolution, but, as one would expect, the proportion of females married would increase (because of the reduced incidence of widowhood) and that for males would decrease more (because of the increased incidence of widowhood) to reach by 2051 41.7 and 59.4 percent, respectively.

The proportion divorced for both genders would initially increase and after about a quarter of a century would stabilize, at a level of about 12 percent for females and 9 percent for males (about four and three times, respectively, the 1986 level) and a slightly higher level (by one percentage point) in the case of the mortality scenario.

Finally, the proportion widowed would present a more complex evolution as it would first increase, then decrease, and finally increase again. By 2051, this proportion would range from 39.5 to 42.0 percent as opposed to 40.3 percent in 1986 in the case of females and from 13.7 to 14.0 percent as opposed to 10.5

percent in 1986 in the case of males. A substantial reduction in the mortality gap, however, would help to deflate the proportion of widowed females and inflate that of widowed males to 35.4 and 16.3 percent, respectively (mortality scenario).

Interestingly, changes in nuptiality intensity as assumed in the western scenario would not fundamentally alter the evolutions of the various marital proportions discussed above, at least until 2031 (date at which the population aged 60 and over is the one surviving from the 1986 population aged 15 and over). But after this date, striking changes would take place as the proportion single would about double over the next 20 years to reach, by 2051, 20.2 percent for females and 29.3 percent for males (as opposed to 10.6 and 15.2 percent, respectively, in the benchmark scenario). Accordingly, the proportion married would decrease sharply, falling by 2051 to 27.8 percent for males and 45.1 percent for females (as opposed to 36.1 and 62.1 percent, respectively, in the benchmark scenario).

It thus seems that, despite current uncertainty about the evolution of marriage and divorce patterns, there is little uncertainty about the evolution of the marital composition of the elderly population of both genders. Between now and the middle of next century, the proportion single will double (if nuptiality rates remain unchanged) or quadruple (if they evolve as assumed in the western scenario), whereas the proportion divorced will triple for males and quadruple for females (if nuptiality rates remain unchanged) and somewhat more (in the western scenario).

Finally, as the magnitudes of the evolutions expected for the various marital proportions differ slightly between the genders, it is likely that the similarity of the female and male marital compositions will vary over time. According to the figures shown in the last column of Table 5, the two marital compositions will, regardless of the scenario, become more similar and after 2031 (as one would expect from the evolutions of the individual marital status proportions) more dissimilar. The level of dissimilarity reached by 2051 would be comparable to that of 1986 under all scenarios except the mortality scenario in which it would be substantially less.

4. THE PUBLIC PENSION SYSTEM

Canada's system of public pensions encompasses three main programs:

1. the Old Age Security (OAS) program, a universal *demogrant* program with a common benefit paid to all who reach age 65 after meeting residency requirements;
2. the Canadian and Quebec Pension Plans (C/QPP), a *social insurance* program with employment-related benefits to those who contributed during their working lives; and
3. the Guaranteed Income Supplement (GIS) program, a *social welfare* program with benefits subject to an income test, which takes account of income from the C/QPP and other sources.

Both the OAS and GIS programs are run by the federal government through taxation.[9] In mid-1986, whereas virtually every Canadian aged 65 and over received under the OAS program a monthly benefit of $291.51, almost exactly one in two received an additional benefit under the GIS program. And although only one beneficiary in five received the maximal amount ($346.45 for a single pensioner and $225.63 for each pensioner in a two-pensioner family), the average monthly benefit paid under this program amounted to about $250 (see Table 6).

The Canadian Pension Plan and the Quebec Pension Plan are compulsory government plans that call for contributions, analogous to insurance premiums, from employees and employers alike, and from self-employed workers, without government subsidy. Until 1986, employees contributed 1.8 percent of their earnings and their employers an identical amount, whereas self-employed contributed 3.6 percent of their earnings.[10] The contributions are essentially used to provide retirement pensions and survivor's benefits.[11]

Regarding retirement pensions, the general aim of the C/QPP is to provide, in addition to the GIS pension, 25 percent of a worker's earned income up to a maximum of 25 percent of the national average wage. The normal age for retirement is age 65, but flexible retirement provisions (see details below) make it possible for retirement to occur any time between ages 60 and 70. In mid-1986, because the C/QPP had not yet reached maturity--it was created in 1966--less than six in ten elderly aged 65 and over received a retirement pension, and, of those, less than three in ten received the maximal amount of $486.11 a month. The average monthly pension paid was then about half that amount ($249.93).

Survivor's benefits are paid to the surviving spouse of a dead contributor if he/she is aged 35 or more at the time of the contributor's death. Age is not a factor, however, if he/she has dependent children or is disabled. In 1986, a monthly premium of at most 60 percent of the deceased contributor's pension and equal to $164.44 on average (the maximum was $291.67) was received by more than a half a million people. Among the beneficiaries were 300,000 persons aged 65 and over--that is, just over one in three of those widowed in that age group.

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[9]On September 1, 1985, the federal government initiated another program, the Spouse's Allowance (SPA) program, intended to provide a special benefit to 60-to-64-year-old widow(er)s, irrespective of the deceased spouse's age at death.

[10]Commencing in 1987, a schedule of rising contributions was adopted, under which the total contribution rate would rise 0.2 percent a year for five years and then 0.15 percent a year for the next 20 years, thus reaching 7.6 percent by 2011 (as opposed to 3.6 percent in 1986).

[11]Other benefits include disability pensions, orphan's benefits, as well as death benefits paid to a contributor's spouse or estate on his/her death.

5. WORK AND RETIREMENT PATTERNS

Over the last two decades, labor force participation has increased substantially, especially for females, as revealed by a single comparison of age-specific labor force participation (LFP) rates in 1971 and 1986 (see Figure 5). But, while LFP rates are still oriented upward for females, they are now oriented downward for males. This picture, however, only applies to the core of the working-age population (ages 15 to 64). LFP rates for those ages 55 to 64 have either remained unchanged (in the case of females) or decreased slightly (in the case of males), whereas LFP rates for those 65 and over (for both genders) have dropped significantly, having been cut by half between 1971 and 1986.

Naturally, labor force participation is strongly affected by marital status. In the case of females, the never-married are comparatively more active (above age 20), while the married are comparatively less active (between ages 25 and 64) (see Figure 6). The opposite situation, however, holds for males as the never-married (married) are comparatively less (more) active.

In the past, although they were not eligible for a C/QPP retirement pension (as well as for OAS benefits) until reaching age 65, Canadians often retired before that age. At the same time, a small fraction continued to work past age 65 so that in 1986 the mean age at retirement was 63.1 years for females and 63.4 years for males. Using past LFP rates observed for the proper cohort, the average number of years worked at mean age of retirement was estimated at 42.2 years for males as opposed to 17.1 years for females. In the future, based on LFP rates kept constant at their 1986 levels, lifetime activity is supposed to decrease slightly for males (because LFP rates in 1986 are slightly less than what they once were) and naturally to increase substantially for females. Eventually, lifetime activity would level off and stabilize (while registering small fluctuations) shortly after 2000 for males and some 30 years later for females. The average number of years worked would eventually reach 40 years for males and 31 years for females (see Table 7).

In view of the variability of the age at which Canadians actually retire, recent legislation has made possible for those retiring earlier (later) than 65 to draw upon retirement (at any age between ages 60 and 70) smaller (larger) benefits. The basic premium awarded to a 65-year-old is reduced (in case of early retirement) or increased (in case of postponed retirement) by 0.5 percent for each month between the attainment of age 65 and the time of retirement.

Introduction of the above retirement provisions do not appear to have radically altered age patterns of retirement, although Canadians are now prone to retire as soon as they can take advantage of the new provisions. In the summer of 1989, 54.5 percent of new C/QPP beneficiaries (60.2 percent for females, 49.7 percent for males) were less than 65 years old, with about half of them (25.6 percent of all new beneficiaries) being exactly the minimal pensionable age of 60 years (see Figure 7). Virtually all other beneficiaries were age 65--the fraction of those older than 65 years was 4.72 percent--because payment of a C/QPP pension is no longer contingent on a retirement test!

6. THE FUTURE OF PUBLIC PENSIONS

Benefits

On the benefits side, the IIASA pension model operates at the level of the average retiree. Consequently, since the average Canadian retiree enjoys a higher income than is needed to receive benefits under the GIS program, its application to the Canadian context ignores GIS payments entirely. Thus, it only considers two types of benefits: old-age benefits (OAS benefits + C/QPP retirement pensions) and survivor's benefits (C/QPP survivor's pensions).

The evolution of estimated benefits, assuming a constant value through time of OAS and C/QPP payments to individual beneficiaries,[12] is displayed in Tables 8 and 9. Under the benchmark scenario, total benefits would increase steadily over the next decades and after passing in about 50 years from now through a maximum (equal to 2.5 times the level estimated for 1986)[13] would decrease moderately: see Table 9. Note the somewhat parallel evolution of the two types of benefits so that the proportion of survivor's benefits in the total amount of benefits would remain more or less constant at 5.5 percent: see Table 9.

Under the other scenarios except the national, very similar evolutions would be observed inasmuch as the marital composition of the elderly population would change in much the same way as in the benchmark scenario. Such is the case especially in the migration scenario but not in the mortality scenario. The reduction in the mortality differentials between the two genders, and specifically the decrease in mortality rates of males built into this scenario, would lead to a prolonged increase in the two types of benefits, especially in the case of survivor's benefits--they would not decline after 2031. Nevertheless, the magnitude of the increase would be higher for old-age benefits than for the alternative type so that in this case the proportion of survivor's benefits would in fact decline, falling to 4.2 percent by 2051.

As suggested by the figures pertaining to the mortality and migration scenarios, higher immigration and especially reduced mortality would bring about a more substantial increase in total benefits, peaking at a later date. In fact, under appropriate combinations of (a) a high enough immigration level and (b) a substantial reduction in mortality as in the national scenario, total benefits would continue to increase until after the horizon of our projection (2051). By then, they

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[12]As a result, the evolutions of the two types of benefits simply reflect the evolutions of (a) the number of retirees in the case of old-age benefits and (b) the number of survivors in the case of survivor's benefits.

[13]For the initial year of the projection (1986), survivor's benefits are correctly estimated at $1.3 million, whereas old-age benefits are overestimated: $20.1 million versus an actual level of $13.2 million. Such a discrepancy follows from the fact that the average retiree received somewhat less than the maximal benefits (as assumed by the IIASA model)--a situation that will persist until the C/QPP reaches maturity.

would reach $77.0 billion, that is, is 3.3 times the estimated level of 1986 or 5.3 times the actual level of 1986. Note that until 2031 old-age benefits would grow slightly faster than survivor's benefits--the proportion of survivor's benefits in the total benefits would thus fall from 5.6 percent in 1986 (in this case) to 4.5 percent in 2031--but slightly less rapidly after that date, thus contributing to a reversal in the evolution of the above proportion (4.9 percent in 2051).

Contributions

On the contributions side, the IIASA pension model considers only employment-related contributions and thus no account is taken here of the provision of the OAS benefits paid by the federal government out of the general budget. We thus concern ourselves with just C/QPP contributions.

Such contributions are determined by applying to the size of the labor force an average individual contribution maintained through time at its 1986 value ($784), which was obtained as the appropriate fraction (3.6 percent) of the average industrial wage ($420 per week or $21,840 for the year). Thus, given the size of the labor force (13.2 million), estimated contributions for 1986 amount to $10.3 million.[14]

In the future, estimated contributions would indeed change in direct proportion to total labor force, the evolution of which under various scenarios is shown in Table 10 (upon assuming constant age-specific LFP rates). Under the benchmark scenario, the size of the labor force would increase until early next century and after approaching 15 million (as opposed to 13.2 million in 1986) would decrease, falling to 13.7 million by 2051. Such an evolution, which is reminiscent of the one observed earlier in the case of the working-age population, would also take place under the mortality and western scenarios. By contrast, under the other scenarios, labor force would grow further, reaching 15.8 million (benefits scenario) to 17.9 million (national scenario).

It thus follows that the future evolution of contributions will be much less dramatic than that of benefits. Estimated contributions will increase slightly over the next three decades before returning by the middle of next century to a level equal or similar to their 1986 level. With high enough immigration, however, such a reversal would be delayed, but estimated contributions would grow so slowly that they would keep the same order of magnitude.

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[14]As with benefits, this estimated number overestimates somewhat (by about two-thirds) the actual one (6.4 million). This is because (a) total labor force overestimates the number of contributors (11.8 million)--total employment would be more appropriate--and (b) the average contribution per active person was only $542.

Contributions-to-Benefits Ratio

Based on the IIASA pension model, contributions are presently much lower than benefits--for 1986, the ratio of the former to the latter was estimated to be 0.44. Moreover, since expected demographic changes will drive up contributions even more than benefits, the gap between the two will increase in the future. By 2051, the contributions-to-benefits ratio will fall to 0.19 under the national scenario and, more generally, to 0.15-0.22, depending on the scenario retained (see upper panel of Table 11).

Recall that part of the old-age benefits (OAS benefits) are provided by the federal government out of the general budget. Thus, for the above contributions-to-benefits ratio (labeled as type I ratio), let us substitute a similar ratio (labeled as type II ratio) obtained by subtracting OAS payments from old-age benefits. Evolution of this alternative ratio (see lower panel of Table 11) is still oriented downward, but, as would be expected, its values are much higher. Thus, under the national scenario, the type II ratio would decrease from 0.74 in 1986 to 0.31 in 2051.

Because the IIASA pension model overestimates both contributions and benefits, but in different proportions, the observed value of the type II ratio for 1986 is not 0.74 but rather 6.4 billion/5.5 billion = 1.16. And, had the C/QPP already reached maturity, benefits would have been higher by 5.3 billion[15] and the type II ratio would have then been 0.59. This suggests that, under the national scenario, the type II ratio is more likely to decrease from 1.16 in 1986 to 0.31 x 0.59/0.74 = 0.25 in 2051. In accordance with the demographic slowdown likely to take place after 2031, the mismatch between contributions and benefits, however, would increase up to 2031 and then stabilize.

Table 12 displays the contribution rates that would result in a balanced pension system up to the middle of the next century. Under the national scenario, the balanced contribution rate would have to increase from 4.8 percent in 1986 to 6.0 percent in 2001 and 11.1 percent in 2031. Adjusting for the overestimation of contributions and benefits in the IIASA pension model, the balanced contribution rate would have in fact to increase from 3.6 percent in 1986 to 14.8 percent in 2051. Note that the value required for 2016 (10.2 percent) is somewhat higher than the contribution rate (8.35 percent) that will be effective that year under the measures recently taken to revamp the C/QPP (see Section 4).

As a consequence of the lower mortality implicit to them, the western and mortality scenarios assume a comparatively higher number of beneficiaries and thus suggest higher contribution rates to maintain the pension system under financial equilibrium. By contrast, the effort required is slightly less under the migration scenario and especially the fertility scenario. In the latter case, the additional labor force induced by higher fertility manages after some time (after 2031) to drive up

[15]This figure was obtained by attributing to each recipient the maximum amount of OAS or survivor's pension he/she would be entitled to.

contributions faster than benefits and thus to push down the balanced contribution rate.

7. IMPACT OF SELECTED POLICY MEASURES

In view of the anticipated degradation of contributions vis-à-vis benefits, this section investigates how policy measures designed to bring about a larger labor force would contribute to reducing the mismatch between contributions and benefits. Below two possible scenarios based on demographic conditions similar to those underlying the benchmark scenario[16] are examined. In the first, the "GDR scenario", a larger labor force stems from increasing labor force participation, whereas in the second, the "65 scenario", it stems from delaying retirement.

Specifically, the GDR scenario assumes that by the year 2006, Canadians will have a pattern of labor force participation identical to that exhibited in 1985 in the German Democratic Republic. This latter pattern is characterized by a high participation of women and, as a result, the average number of years worked by females would increase very rapidly, reaching 35.2 years in 2001 versus 22.1 years in the benchmark scenario (see Table 13).

As a consequence of higher labor force participation, the size of the labor force would surpass substantially that of the benchmark scenario. At the turn of the century, the addition to the labor force would be 12.1 percent higher. Thereafter, as labor force participation rates are assumed to remain constant after 2006, the additions to the labor force should decline slightly in absolute terms (as a result of the built-in demographic assumptions) but should not change much in relative terms. In fact, a uniform magnification of 12-13 percent--which on the basis of the IIASA pension model is equally applicable to the amount of contributions--would be observed throughout the first half of next century.

At the same time, the number of retirees would register a deficit of only several hundred thousand in 2001 that would increase slightly over time as the additions to the labor force just mentioned would eventually retire. Note that this deficit would consist exclusively of women as the labor force participation of older males in the GDR is virtually identical to that observed in Canada. In relative terms, the shortfall in the retired population would oscillate between 6 and 8 percent throughout the next half of the century. As the amount of survivor's benefits would remain the same as in the benchmark scenario, this translates into a 5-7 percent deficit in the amount of total benefits.

Compounding the relative changes in contributions and benefits estimated above yields a relative change of about 20 percent in the contributions-to-benefits ratio which, considering the anticipated low values of this ratio under the benchmark

[16]Implementation of this section was carried out by simply assuming no external migration. Accounting for this component of change, however, would affect the results only marginally.

scenario, is unlikely to restore financial equilibrium of the C/QPP scheme (see Table 14).

Alternatively, the 65 scenario assumes that age at retirement for both genders is progressively raised to reach 65 years by 2005 and that no survivor's pensions are served under 60.[17] With such an assumption, the average number of years worked would register a rather modest upward shift of 1.2 years for females and 2.2 years for males by 2051 (see Table 13). The size of the labor force thus would present additions, divided equally between the two genders, of about half a million in absolute terms and about 4 percent in relative terms. Such an impact is indeed much smaller than in the GDR scenario (12-13 percent) because, unlike the latter scenario which assumes an upward shift in labor force participation for all age groups, the 65 scenario assumes such an upward shift only for the older age groups.

By contrast, the shortfall in the retired population, again divided equally between the genders, would be much higher than in the GDR scenario. It could reach 1.3 million early next century before stabilizing at 1.1 million after 2031. This is about 15 percent above the corresponding level in the benchmark scenario versus 6.8 percent in the case of the GDR scenario.

The combined influence of the shifts in the labor force and in the retired population just assessed results, on the basis of the IIASA pension model, in an upward shift in the contributions-to-benefits ratio of about 20 percent, but slightly under this mark this time (see Table 14).

To conclude, the two alternative policy measures investigated here appear to have very similar long-term effects on the Canadian system of public pensions. Both would lead to a 20 percent improvement in the value of the contributions-to-benefits ratio relating to the C/QPP scheme (slightly more in the case of the GDR scenario, slightly less in the case of the 65 scenario), but they would achieve this result in quite a different way. The first scenario is geared foremost toward increasing contributions whereas the second is essentially aiming to reduce benefits.[18]

8. CONCLUSION

Under any plausible scenario, the anticipated growth of the old-age population will be higher than that of the working-age population until about 2030. Thus, the ratio of the former to the latter (old-age dependency ratio) will be multiplied by 2.3 between now and 2030, which is likely to exert some tremendous pressures on the

[17]Higher labor force participation rates are also assumed for the age groups 55-59 and 60-64.

[18]To evaluate fully this result, it must be borne in mind that the benchmark scenario used in this section assumes non-zero retirement ratios before age 65, whereas in fact payments under the OAS scheme and, until recently, under the C/QPP scheme, are made only to elderly 65 and over.

financing of (1)OAS benefits through taxation and (2) retirement and survivor's pensions through the C/QPP.

In addition, the lower nuptiality and higher divorce intensities that prevail today as compared to earlier decades leads one to anticipate a significant modification of the marital composition of the elderly population. On the one hand, the expected decrease in the proportion married and thus in the proportion widowed (all the more so because of an expected reduction in mortality) will reduce the proportion of those elderly entitled to survivor's pensions and thus under the C/QPP scheme retirement benefits will grow comparatively more than survivor's pensions. On the other hand, the expected increase in the proportion single and divorced will augment the proportion of those entitled to full-rate payments under the federal government's GIS scheme.

In other words, the expected aging of the Canadian population is likely to exert tremendous pressures on Canada's public pension system. Benefits are likely to increase rapidly and, based on demographic considerations alone, the increase will be higher (lower) for GIS benefits (C/QPP survivor's benefits) than for retirement benefits paid under both the OAS and C/QPP schemes.

Regarding the Q/CPP scheme, future demographic patterns (in terms of fertility, mortality, marital change, and immigration) are likely to bring about, between now and 2030, a doubling in value of the ratio of the number of beneficiaries to that of contributors.[19] From this, application of the IIASA pension model, based on an unchanged contribution rate, suggests the inevitable degradation of the financial equilibrium of the C/QPP scheme. The same result, however, would be obtained, were the contribution rate increased according to the schedule indicated in footnote 10.

[19]Beyond 2030, the two numbers will evolve more or less in the same way.

Table 1

Nuptiality statistics by gender: 1970-1972, 1975-1977, and 1980-1982

	Females			Males		
	1970-1972	1975-1977	1980-1982	1970-1972	1975-1977	1980-1982
Proportion ever marrying	.92	.90	.88	.90	.88	.85
Mean age at first marriage (in years)	22.80	23.75	24.69	24.95	25.95	26.98
Proportion of marriages						
- ending in widowhood	.58	.53	.51	.23	.20	.20
- ending in divorce	.19	.26	.29	.19	.27	.29
Proportion of individuals remarrying among						
- widow(er)s	.09	.07	.06	.24	.21	.17
- divorcees	.79	.75	.69	.85	.84	.80

Source: O. B. Adams and D. N. Nagnur (1988), *Marriage, Divorce, and Mortality: A Life Table for Canada and Regions, 1980-1982*, Catalogue 84-536. Ottawa: Supply and Services Canada.

Table 2

Mortality statistics by gender, 1950-1982 to 1985-1987

Year	Life expectancy (in years)			Survivors (per 1,000 born)	
	At birth 60	At age 80	At age 60	At age 80	At age
			Females		
1950-1952	70.90	18.66	6.43	819	377
1960-1962	74.26	19.94	6.97	864	452
1970-1972	76.45	21.47	8.00	879	513
1980-1982	79.06	22.93	8.95	904	576
1985-1987	79.73	23.17	8.93	914	594
			Males		
1950-1952	66.40	16.48	5.82	746	270
1960-1962	68.44	16.75	6.20	776	290
1970-1972	69.40	16.99	6.52	788	300
1980-1982	71.88	17.97	6.87	825	350
1985-1987	73.04	18.41	6.91	846	376

Sources: 1950-1952 to 1985-1987: Statistics Canada, *Life Tables and Provinces*, Catalogue 84-206. Ottawa: Supply and Services Canada (various issues).

1985-1987: Statistics Canada (1989), *Life Tables, Canada and Provinces, 1985-1987*, Standard Table 41044. Health Division, Statistics Canada, Ottawa.

Table 3

Population by broad age groups, 1951-2051

Year	Absolute (thousands)				Relative (percent)			
	0-14	15-59	60+	Total	0-14	15-59	60+	Total
1951	4 251	8 166	1 592	14 009	30.3	58.3	11.4	100.0
1961	6 192	10 072	1 975	18 239	33.9	55.2	10.8	100.0
1971	6 381	12 666	2 521	21 568	29.6	58.7	11.7	100.0
1981	5 482	15 520	3 340	24 342	22.5	63.8	13.7	100.0
1986	5 392	16 095	3 823	25 310	21.3	63.6	15.1	100.0
			Benchmark scenario					
2001	5 744	17 825	4 859	28 428	20.2	62.7	17.1	100.0
2016	5 083	17 993	6 752	29 828	17.0	60.3	22.6	100.0
2031	5 096	16 817	8 232	30 145	16.9	55.8	27.3	100.0
2051	4 698	16 275	7 859	28 832	16.3	56.4	27.3	100.0
			Fertility scenario					
2001	6 031	17 825	4 859	28 715	21.0	62.1	16.9	100.0
2016	6 016	18 268	6 752	31 036	19.4	58.9	21.8	100.0
2031	6 318	17 966	8 232	32 516	19.4	55.3	25.3	100.0
2051	6 499	18 988	7 859	33 346	19.5	56.9	23.6	100.0
			Mortality scenario					
2001	5 752	17 876	5 076	28 704	20.0	62.3	17.7	100.0
2016	5 114	18 193	7 829	31 136	16.4	58.4	25.1	100.0
2031	5 152	17 088	10 127	32 367	15.9	52.8	31.3	100.0
2051	4 774	16 641	10 330	31 745	15.0	52.4	32.5	100.0
			Western scenario					
2001	5 382	17 836	4 911	28 129	19.1	63.4	17.5	100.0
2016	3 912	17 690	6 984	28 586	13.7	61.9	24.4	100.0
2031	3 664	15 427	8 617	27 708	13.2	55.7	31.1	100.0
2051	2 866	13 113	8 348	24 327	11.8	53.9	34.3	100.0
			Migration scenario					
2001	6 144	18 909	5 016	30 069	20.4	62.9	16.7	100.0
2016	5 852	20 288	7 144	33 284	17.6	61.0	21.5	100.0
2031	6 157	20 172	9 104	35 433	17.4	56.9	25.7	100.0
2051	6 130	20 882	9 379	36 391	16.8	57.4	25.8	100.0
			National scenario					
2001	6 151	18 954	5 221	30 326	20.3	62.5	17.2	100.0
2016	5 882	20 436	7 883	34 201	17.2	59.8	23.1	100.0
2031	6 213	20 392	10 380	36 985	16.8	55.1	28.1	100.0
2051	6 209	21 198	11 093	38 500	16.1	55.1	28.8	100.0

Source: 1951 to 1986: Statistics Canada (1987), *1986 Census of Canada - Population and Dwelling Characteristics - Age, Sex, and Marital Status*, Catalogue 93-101. Ottawa: Supply and Services Canada.

Table 4

Dependency ratios, 1986-2051

Scenario	Year				
	1986	2001	2016	2031	2051
		Young-age dependency ratio			
Benchmark	31.3	30.2	25.5	27.4	26.0
Fertility		31.7	29.8	32.0	31.2
Mortality		30.1	25.3	27.1	25.7
Western		28.3	19.9	21.2	19.2
Migration		30.5	26.2	27.7	26.5
National		30.4	26.1	27.6	26.4
		Old-age dependency ratio			
Benchmark	15.7	19.2	24.1	34.6	33.4
Fertility		19.2	23.8	32.5	29.1
Mortality		20.1	28.7	43.3	45.3
Western		19.4	25.5	39.4	43.5
Migration		18.6	22.7	31.6	31.0
National		19.5	25.5	36.5	37.4
		Total dependency ratio			
Benchmark	47.0	49.3	49.6	61.9	59.4
Fertility		50.9	53.5	64.5	60.3
Mortality		50.3	53.9	70.5	71.0
Western		47.7	45.4	60.7	62.7
Migration		49.1	48.8	59.2	57.6
National		49.9	51.6	64.1	63.8

Table 5

Marital composition of the population aged 60 and over by gender, 1986-2051

Year	Females					Males					Index of dissimilarity[a]
	Single	Married	Divorced	Widowed	Total	Single	Married	Divorced	Widowed	Total	
1986	7.9	49.0	2.8	40.3	100.0	7.5	79.2	2.7	10.5	100.0	30.3
						Benchmark scenario					
2001	6.1	44.4	7.1	42.4	100.0	6.5	73.3	6.8	13.4	100.0	29.4
2016	6.3	44.4	10.7	38.6	100.0	7.1	71.3	8.6	12.9	100.0	27.8
2031	8.7	40.2	11.6	39.5	100.0	11.4	66.2	8.9	13.6	100.0	28.3
2051	10.6	36.1	11.4	42.0	100.0	15.2	62.1	8.8	14.0	100.0	30.6
						Mortality scenario					
2001	6.1	46.4	7.2	40.3	100.0	6.5	73.6	6.8	13.1	100.0	27.6
2016	6.3	50.4	11.0	32.3	100.0	7.0	71.4	8.9	12.7	100.0	21.7
2031	8.4	47.5	12.4	31.7	100.0	10.7	65.8	9.5	14.1	100.0	20.3
2051	10.2	41.7	12.7	35.4	100.0	14.5	59.4	9.8	16.3	100.0	22.0
						Western scenario					
2001	6.1	44.5	6.8	42.6	100.0	6.6	73.3	6.5	13.6	100.0	29.3
2016	6.5	42.8	11.7	39.0	100.0	7.7	68.0	10.8	13.6	100.0	26.9
2031	10.1	36.1	15.4	38.4	100.0	14.9	57.5	13.6	13.9	100.0	26.8
2051	20.2	27.8	15.4	36.6	100.0	29.3	45.1	12.6	13.1	100.0	26.9
						Migration scenario					
2001	6.1	44.3	7.0	42.6	100.0	6.4	73.5	6.7	13.4	100.0	29.5
2016	6.2	44.4	10.4	39.0	100.0	6.9	71.7	8.5	12.9	100.0	28.0
2031	8.4	41.0	11.3	39.4	100.0	10.9	66.9	8.8	13.4	100.0	28.5
2051	10.0	37.4	11.1	41.5	100.0	14.2	63.1	8.8	14.0	100.0	30.4
						National scenario					
2001	6.1	45.0	7.0	41.9	100.0	6.4	74.5	6.7	12.4	100.0	29.8
2016	6.2	46.5	10.5	36.8	100.0	6.9	72.8	8.7	11.6	100.0	27.0
2031	8.2	43.5	11.7	36.6	100.0	10.5	68.0	9.1	12.4	100.0	26.8
2051	9.8	38.8	11.8	39.5	100.0	13.8	63.3	9.2	13.7	100.0	28.5

a. This index is calculated by means of $D = 0.5 \sum_i | f_i - m_i |$ where f_i and m_i are the proportions of those aged 60 and over who are of marital status i among females and males, respectively.

Table 6

A Canadian public pension schemes, 1986

Scheme	Number of beneficiaries (thousands)[a]	Benefits per recipient Maximum	Benefits per recipient Average	Total benefits (billions of dollars)[b]
		Schemes financed through taxation		
1. Old Age Security (OAS)	2 651.2[c]	291.51	291.51	8.9
2. Guaranteed Income Security (GIS)	1 329.9[d]	346.45/ 225.63[e]	~ 250	3.3
			Total	12.5[f]
		Canada/Quebec Pension Plan (C/QPP)[g]		
3a. Retirement benefits	1 573.5[h]	486.11	249.93	4.3
3b. Survivors' benefits	1 556.5[i]	291.67	164.44	1.2
			Total	6.8[j]

a. In March 1986.
b. For fiscal year 1985-1986.
c. According to the 1986 census, the population aged 65 and over was 2,697.6 thousand.
d. 21.1 percent of those beneficiaries received the maximum amount of benefit.
e. The first figure is the maximum amount awarded to a single pensioner; the second is the maximum amount awarded to each pensioner in a two-pensioner family.
f. Includes $0.3 billion under the new Spouse's Allowance (SPA) program.
g. During the 1986 calendar program, 11,761.9 thousand people contributed to the C/QPP plan for a total amount of $6.4 billion.
h. Percent of those beneficiaries who receive the maximum benefit.
i. Includes 251.9 thousand survivors under 65 years old.
j Includes other types of benefits (disability benefits, orphan's benefits, and death benefits).

Sources: Health and Welfare Canada (1986), *Canada Pension Plan Statistical Bulletin*, vol. 18, no 2.
Health and Welfare Canada (1986), *Canada Pension Plan Contributors 1986.*
Ministère des affaires sociales du Québec (1988), *Statistiques 1987 - Régime de rentes du Québec / Allocations familiales du Québec.*
Health and Welfare Canada (1988), *Inventory of Income Security Programs in Canada. Recent Initiatives and Statistical Update as of January 1987.*

Table 7

Average number of years worked at mean age at retirement by gender, 1986-2051 (benchmark scenario)

Gender	Year 1986	2001	2016	2031	2051
Females	17.1	22.1	28.4	31.1	31.1
Males	42.2	40.9	39.8	40.4	40.1

Table 8

Pension benefits, 1986-2051

Scenario	Type of benefits	Value (millions of dollars)					Index (1986 = 100)			
		1986	2001	2016	2031	2051	2001	2016	2031	2051
Benchmark	Old age	22 265	30 222	39 675	53 268	50 225	136	178	239	226
	Survivor's	1 324	1 801	2 299	2 809	2 863	136	174	212	216
	Total	23 590	32 023	41 974	56 077	53 088	136	178	238	225
Mortality	Old age		31 908	48 012	68 409	70 159	143	216	307	315
	Survivor's		1 762	2 146	2 688	3 063	133	162	203	231
	Total		33 670	50 158	71 097	73 222	143	213	301	310
Western	Old age		30 628	41 479	56 343	54 127	138	186	253	243
	Survivor's		1 829	2 406	2 865	2 657	138	182	216	201
	Total		32 457	43 885	59 209	56 785	138	186	251	241
Migration	Old age		31 125	41 869	58 133	59 472	140	188	261	267
	Survivor's		1 871	2 459	3 107	3 392	141	186	235	256
	Total		32 996	44 328	62 139	62 865	140	188	260	266
National	Old age		32 736	47 607	68 283	73 230	147	214	307	329
	Survivor's		1 892	2 500	3 223	3 752	143	189	243	283
	Total		34 628	50 107	71 506	76 982	147	212	303	326

Table 9

Pension benefits, 1986-2051: distribution by type and average annual growth rates

Scenario	Type of benefits	Distribution by type					Average annual growth rate (%)			
		1986	2001	2016	2031	2051	1986-2001	2001-2016	2016-2031	2031-2051
Benchmark	Old age	94.4	94.4	94.5	95.0	94.6	2.0	1.8	2.0	-0.3
	Survivor's	5.6	5.6	5.5	5.0	5.4	2.0	1.6	1.3	0.1
	Total	100.0	100.0	100.0	100.0	100.0	2.0	1.8	1.9	-0.3
Mortality	Old age		94.8	95.7	96.2	95.8	2.4	2.7	2.4	0.1
	Survivor's		5.2	4.3	3.8	4.2	1.9	1.3	1.5	0.7
	Total		100.0	100.0	100.0	100.0	2.4	2.7	2.3	0.1
Western	Old age		94.4	94.5	95.2	95.3	2.1	2.0	2.0	-0.2
	Survivor's		5.6	5.5	4.8	4.7	2.2	1.8	1.2	-0.4
	Total		100.0	100.0	100.0	100.0	2.1	2.0	2.0	-0.2
Migration	Old age		94.3	94.5	94.9	94.6	2.2	2.0	2.2	0.1
	Survivor's		5.7	5.5	5.1	5.4	2.3	1.8	1.6	0.4
	Total		100.0	100.0	100.0	100.0	2.2	2.0	2.2	0.1
National	Old age		94.5	95.0	95.5	95.1	2.6	2.5	2.4	0.3
	Survivor's		5.5	5.0	4.5	4.9	2.4	1.9	1.7	0.8
	Total		100.0	100.0	100.0	100.0	2.6	2.5	2.4	0.4

Table 10

Evolution of the labor force by gender, 1986-2051

Scenario	Gender	Year				
		1986	2001	2016	2031	2051
		Size (thousands)				
Benchmark	Females	5 673	6 248	6 338	6 004	5 768
	Males	7 490	8 283	8 582	8 217	7 924
	Both	13 163	14 530	14 920	14 221	13 693
Fertility	Females		6 248	6 419	6 393	6 671
	Males		8 283	8 674	8 697	9 088
	Both		14 530	15 093	15 090	15 759
Mortality	Females		6 264	6 406	6 109	5 914
	Males		8 338	8 822	8 570	8 365
	Both		14 601	15 228	14 678	14 278
Western	Females		6 293	6 421	5 760	4 962
	Males		8 248	8 313	7 400	6 332
	Both		14 540	14 735	13 160	11 294
Migration	Females		6 637	7 143	7 192	7 397
	Males		8 872	9 614	9 770	10 084
	Both		15 409	16 756	16 962	17 481
National	Females		6 660	7 214	7 302	7 553
	Males		8 808	9 750	9 978	10 363
	Both		15 468	16 964	17 280	17 916
		Index				
Benchmark	Females	100	110	112	106	102
	Males	100	111	115	110	106
	Both	100	110	113	108	104
Fertility	Females		110	113	113	118
	Males		111	116	116	121
	Both		110	115	115	120
Mortality	Females		110	113	108	104
	Males		111	118	114	112
	Both		111	116	112	108
Western	Females		111	113	102	87
	Males		110	111	99	85
	Both		110	112	100	86
Migration	Females		117	126	127	130
	Males		117	128	130	135
	Both		117	127	129	133
National	Females		117	127	129	133
	Males		118	130	133	138
	Both		118	129	131	136

Table 11

Evolution of the contributions-to-benefits ratio, 1986-2051

Scenario	Year				
	1986	2001	2016	2031	2051
		Type I ratio			
Benchmark	0.44	0.36	0.28	0.20	0.20
Fertility		0.36	0.28	0.21	0.23
Mortality		0.34	0.24	0.16	0.15
Western		0.35	0.26	0.17	0.16
Migration		0.37	0.30	0.22	0.22
National		0.37	0.28	0.22	0.19
		Type II ratio			
Benchmark	0.74	0.60	0.47	0.34	0.25
Fertility		0.60	0.48	0.36	0.29
Mortality		0.58	0.41	0.28	0.26
Western		0.59	0.45	0.30	0.27
Migration		0.62	0.50	0.36	0.37
National		0.59	0.45	0.32	0.31

Table 12

Contribution rates (percent) corresponding to a balanced pension fund, 1986-2051

Scenario	Year				
	1986	2001	2016	2031	2051
Benchmark	4.8	6.0	7.7	10.6	14.4
Fertility		6.0	7.5	10.0	12.4
Mortality		6.2	8.8	12.9	13.8
Western		6.1	8.0	12.0	13.3
Migration		5.8	7.2	10.0	9.7
National		6.0	7.9	11.1	11.5

Note: 1986 actual contribution rate was 3.6 percent.

Table 13

Impact of selected policy measures on the gender-specific results of the benchmark scenario, 1986-2051

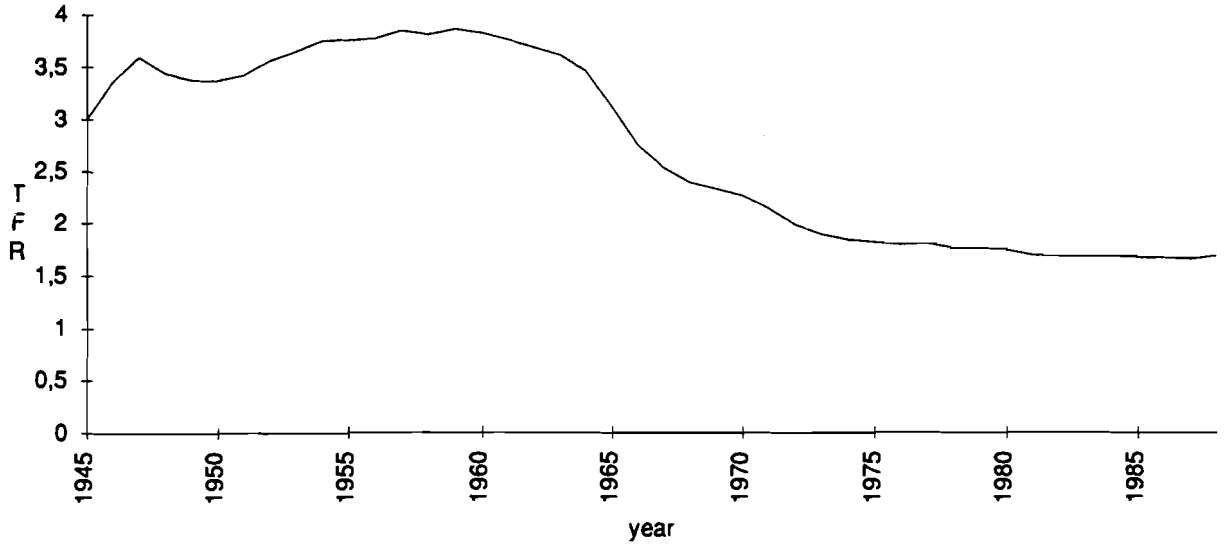
Scenario	Gender	Year 1986	2001	2016	2031	2051
	A- Percentage change in the average number of years worked					
GDR	Females	59.2	27.8	16.7	16.7	
	Males	9.2	11.0	8.2	8.2	
65	Females	5.8	4.2	3.8	3.8	
	Males	4.6	5.3	5.5	5.5	
	B- Percentage change in total benefits					
GDR	Females	-10.9	-10.5	-9.0	-10.0	
	Males	*	*	*	*	
	Both	-6.4	-6.1	-5.3	-5.9	
65	Females	-15.7	-18.5	-12.3	-14.5	
	Males	-20.8	-24.2	-17.4	-18.1	
	Both	-17.5	-20.9	-14.4	-16.0	
	C- Percentage change in labor force					
GDR	Females	18.0	17.2	16.6	16.9	
	Males	7.6	9.3	9.5	10.0	
	Both	12.1	12.6	12.5	12.9	
65	Females	3.6	5.3	4.4	5.3	
	Males	2.7	3.6	3.9	4.1	
	Both	3.1	4.3	4.1	4.6	

Table 14

Impact of selected policy measures on the contributions-to-benefits (type II) ratio of the benchmark scenario, 1986-2051

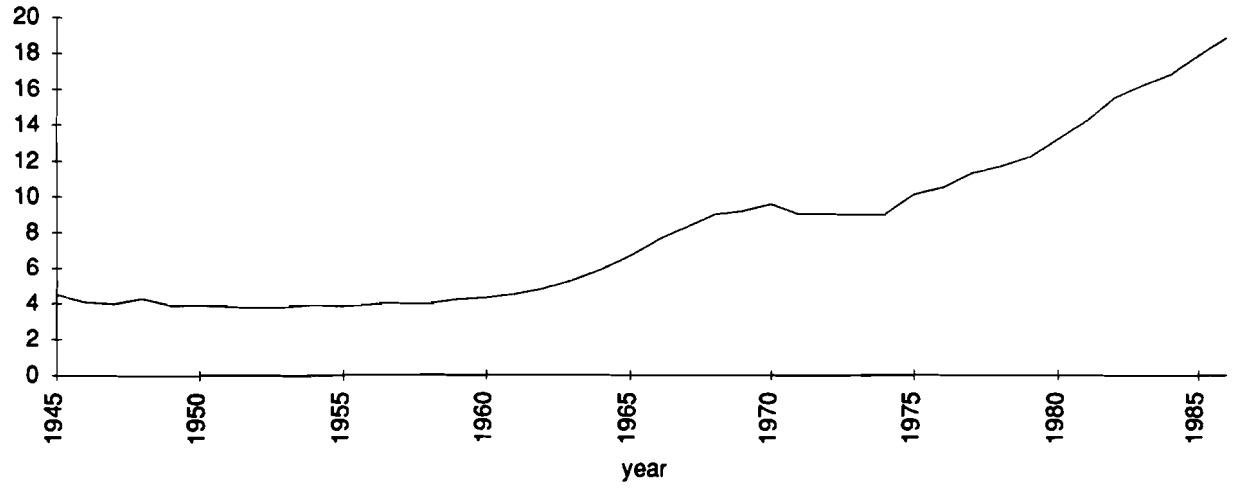
Scenario	Year 1986	2001	2016	2031	2051
Benchmark	0.74	0.60	0.47	0.34	0.25
GDR		0.72	0.56	0.40	0.30
65		0.75	0.62	0.41	0.31

Figure 1
Total fertility rate, 1945-1988



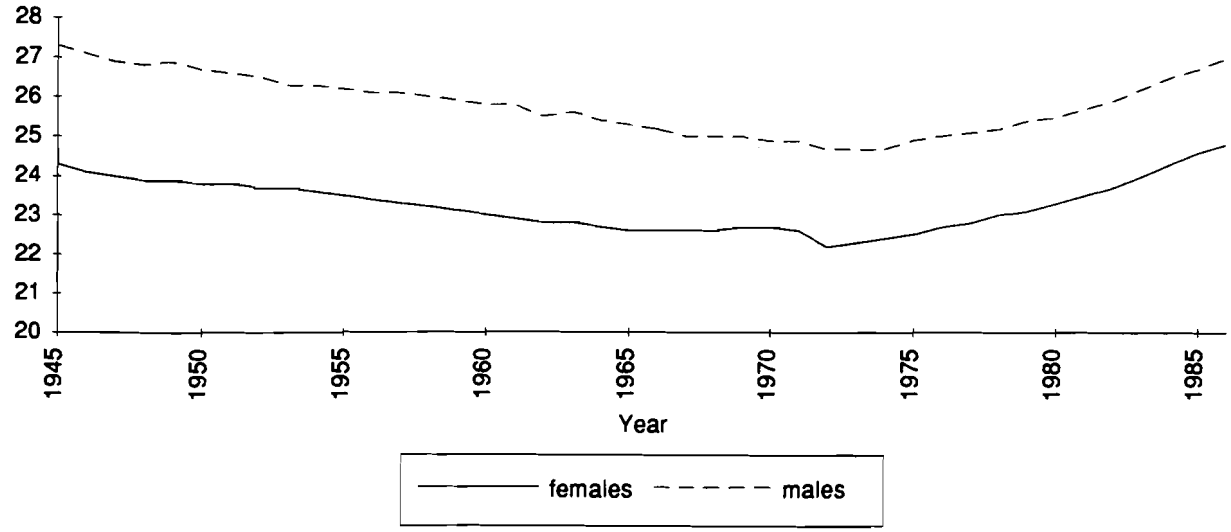
Source: Statistics Canada, *Vital Statistics - Births and Deaths*, Catalogue 84-204. Ottawa: Supply and Services Canada (various annual issues).

Figure 2
Percentage of births to non-married females, 1945-1986



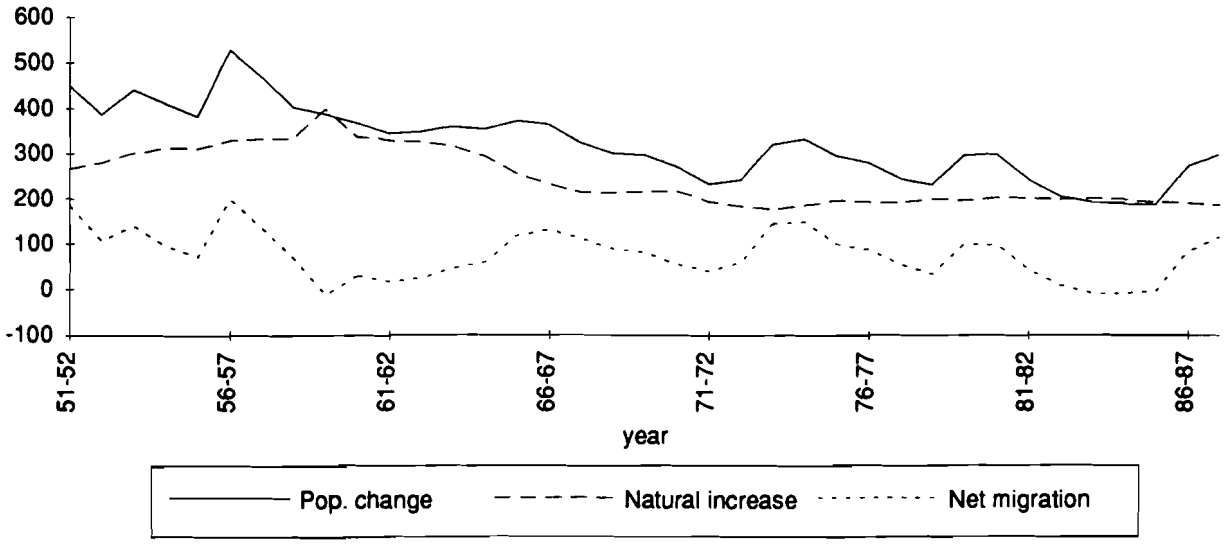
Source: Statistics Canada, *Vital Statistics - Births and Deaths*, Catalogue 84-204. Ottawa: Supply and Services Canada (various annual issues).

Figure 3
Mean age at first marriage by gender, 1945-1986



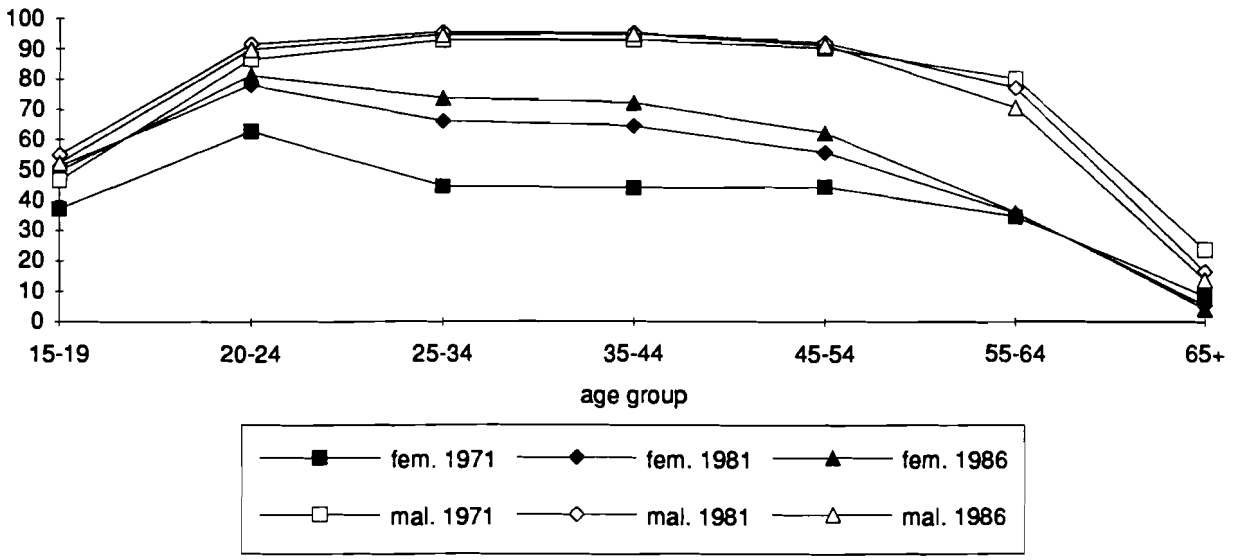
Source: Statistics Canada, *Vital Statistics - Marriages and Divorces*, Catalogue 84-205. Ottawa: Supply and Services Canada (various annuel issues).

Figure 4
Components of population growth (thousands), 1951-1952 to 1987-1988



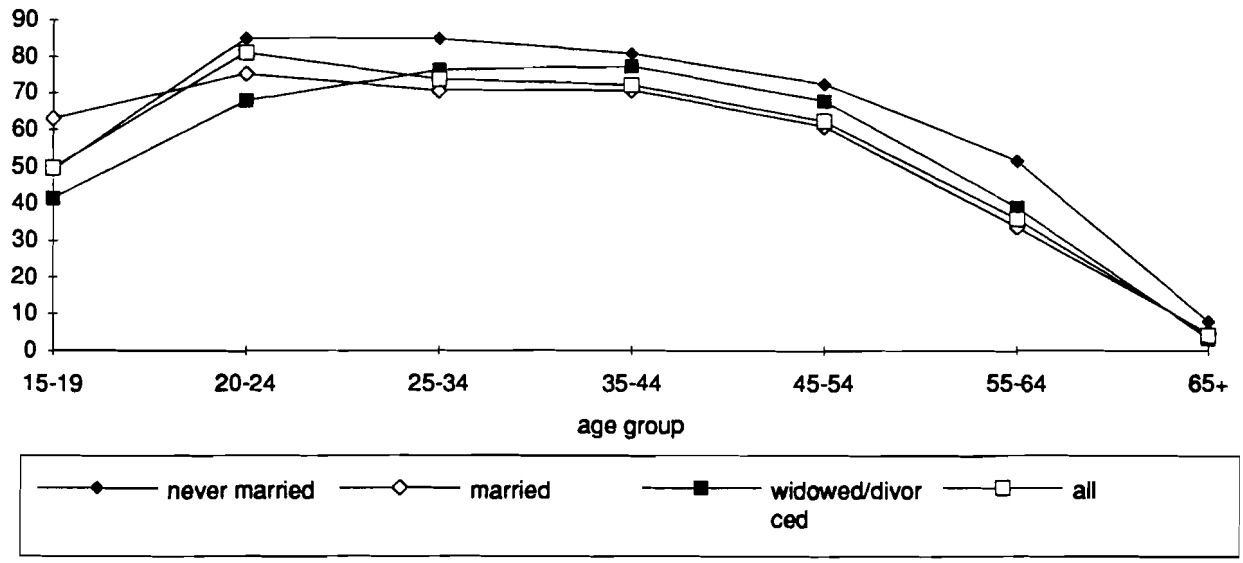
Source: Statistics Canada (1990), *Postcensal Annual Estimates of Population by Marital Status, Age, Sex, and Components of Growth for Canada, Provinces, and Territories, June 1, 1989*, Catalogue 91-210. Ottawa: Supply and Services Canada.

Figure 5
Labor force participation rates (percent)
by gender: 1971, 1981, and 1986



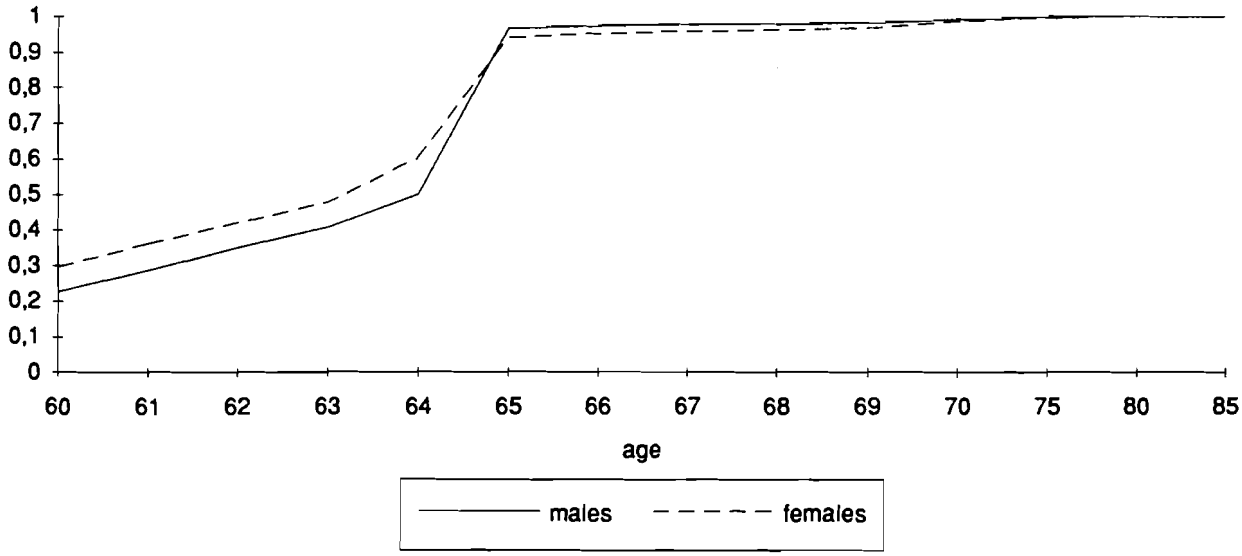
Source: Statistics Canada (1989), *1986 Census of Canada - Activity*, Catalogue 93-111. Ottawa: Supply and Services Canada.

Figure 6
Female labor force participation rates (percent)
by marital status, 1986



Source: Statistics Canada (1989), *1986 Census of Canada - Activity*, Catalogue 93-111. Ottawa: Supply and Services Canada.

Figure 7
Cumulative distribution of new C/QPP retirement pensions by age: July-September 1989



Source: Health and Welfare Canada, *Income Security Programs - Monthly Statistics*, Ottawa (various monthly issues).