

Dependency ratios: An international comparison

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Canada's population is aging. The number of persons 65 years and over, 7.6% of the total population in 1966, accounted for 10.9% in 1987. Two factors have contributed to this situation: the declining rate of fertility (from over two children per woman in the 1960s to about 1.6 in the 1980s), and an increase in life expectancy for persons aged 65 and over.

Because of the decline in the fertility rate over the last couple of decades, Canada may not be able to sustain a balance between the proportion of the population retiring from the labour force and the proportion entering the labour force (unless it allows considerably more working-age immigrants to enter the country). Consequently, there may not be enough workers in the coming decades who are able to pay the bulk of direct taxes and other contributions that would finance most of the future pensions of those currently working.

Under the "pay-as-you-go" retirement pension scheme, prevalent in Canada and other major industrialized countries, there is an inter-generational transfer of funds; that is, persons employed today are paying the pension costs of today's elderly, and the cost of pensions for those working today will be borne by those employed in the future. It is this concept of the inter-generational transfer of funds that raises concern about the aging of the population. Society is becoming more conscious about the balance between the number of persons employed, who usually provide most of the financial support, and the number economically dependent, such as retirees, disabled persons, the unemployed, and so on.

Is Canada alone among the industrialized countries in facing the problem of an aging population? How has the "not employed/employed" ratio varied in Canada over the last two decades? How has the growth in the number of working women affected this ratio? What will the ratio be in the year 2030?

This article attempts to answer these questions, using data published by the Organisation for Economic Co-operation and Development (OECD). The focus is on Canada's situation during the last two decades and how we compare with the United States, the United Kingdom, France, West Germany, Italy and

Japan - the seven major economies in the Western world, commonly known as the "G-7" group.

Definitions of dependency ratios

One can compile a multitude of dependency ratios, depending on the choice of the numerator (which identifies the dependent group) and the denominator (which identifies the support group). This study uses only two ratios: the first is the commonly used "age-specific" ratio, and the second is the "labour market adjusted" ratio.



Chart A Percentage distribution of population for seven major OECD countries

Source: Labour Force Statistics, OECD, Paris

The age-specific dependency ratio (R1) is used to study the shift, either over time or across selected countries, in the demographic mix of a population. It expresses the number of assumed dependants (that is, persons under age 15 and over age 64) per 100 persons aged 15-64 (that is, the population considered to be economically active and independent). ⁽¹⁾ Some portion of persons aged 15-64 would not be working because they are still studying, voluntarily not working, physically unable to work, or unemployed. Thus, a more appropriate measure may be a ratio that includes as dependants persons aged 15-64 who are not employed. This labour market adjusted dependency ratio (R2) is more realistic because it shows the number of persons not employed per 100 employed persons. By definition, therefore, R2 has to be greater than R1. ⁽²⁾

Age-specific dependency ratio

Between 1965 and 1987, all the G-7 countries experienced a similar change in the age-mix of their population: the proportion of persons under age 15 declined (reflecting a drop in fertility rates), whereas the proportion of those aged 65 and over increased (reflecting the aging of the populations). The drop in the proportion of persons under age 15 was highest in Canada (12 percentage points) and lowest in France and the United Kingdom (four percentage points each). This compares with a drop of nine percentage points for the United States. On the other hand, Japan showed the largest increase in the proportion of persons aged 65 and over: five percentage points compared with only three for both Canada and the United States.



Chart B Dependency ratios for seven major OECD countries

Source: Labour Force Statistics, OECD, Paris

In a nutshell, although Canada had a relatively greater proportion of younger persons during the mid-1960s, its age-mix had become more similar to that of the United States and Japan by the mid-1980s. Obviously, declining fertility and mortality rates, and the age structure of new immigrants have all contributed to a significant shift in the age-mix of the Canadian population.



Table 1 Percentage distribution of population by age groups for seven major OECD countries, 1965 and 1987

Source: "Labour Force Statistics" published by the OECD, Paris, (1989 edition); for Canada, however data are from Statistics Canada.

The age-specific dependency ratio R1 ([Table 2](#)) shows that in Canada there were 67 dependants (55 under age 15 and 12 over age 65) per 100 potentially active persons during the mid-1960s. This compares with 47 dependants by the late 1980s (31 under age 15 and 16 over age 65), the largest overall drop among the seven countries. In contrast, the overall dependency ratio for Japan fell only marginally, from 47 to 46, although there was quite a shift by age group. For example, the breakdown in terms of Japanese under age 15 versus 65 years and over was 38:9 in 1965 compared with 30:16 in 1987. The make-up of the dependency ratio for the United States, on the other hand, was similar to that of Canada (that is, 51:16 in 1965 compared with 32:18 in 1987).



Table 2 Selected dependency ratios* for seven major OECD countries, 1965 and 1987

Source: These ratios have been compiled by the author using data from the "Labour Force Statistics" published by the OECD, Paris, (1989 edition); for Canada, however, data are from Statistics Canada.

* The dependency ratios are defined as follows:

$$R1 = [\{ (persons < 15) + (persons 65 +) \} / (persons 15-64)] \times 100$$

$$R2 = [\{ (persons < 15) + (persons 65 +) + (persons 15-64 not employed) \} / (employed persons 15-64)] \times 100$$

In the mid-1960s, a greater proportion of the dependants in each G-7 country were persons under age 15. Twenty years later, however, the make-up of the dependency ratio had changed due to the increasing numbers of the elderly. The continuation of this trend may necessitate changes, not only in the allocation of public expenditures on pensions, health, and education, but also in the financial, institutional, and consumer markets. For example, with the continuing growth in the elderly population, we may have to spend more on pensions, and health care (such as hospitals and nursing homes) than on education and related services.

Labour market adjusted dependency ratios (3)

The R2 dependency ratios ([Table 2](#)) show that, during the mid-1960s, for every 100 employed Canadians aged 15-64, 199 persons were not employed. This compares with 215 not employed in the United States, 158 in the United Kingdom, 160 in West Germany, 199 in France, 198 in Italy, and 126 in Japan. In other words, the United States had the highest dependency ratio and Japan had the lowest. By the late 1980s, however, Canada and Japan ranked on top (with ratios of 138), followed by the United States.

Between the mid-1960s and the late 1980s, the R2 ratio dropped significantly for Canada and the United States, but it increased for the four European countries. (The highest jump occurred in Italy.)

Such contrasting movements for the North American and European countries may indicate changes in their respective labour markets. These changes may arise due to differential growths in economics, creation of jobs and other structural changes. As well, other demographic shifts, such as aging, and migration of populations may also contribute to these changes.

One of the most significant developments in each of the seven countries was the growth in the number of women in the labour force over the period in question. During the mid-1960s, women accounted for 30.4% of the employed labour force in Canada, 34.8% in the United States, 34.6% in the United Kingdom, 37.1% in West Germany, and 28.8% in Italy. By the late 1980s their proportions had moved to 43.2%, 44.8%, 43.1%, 39.5% and 34.3%, respectively. (4) This indicates that in terms of the change in the representation of women in the employed labour force, Canada ranked higher than all other major industrialized countries.

The dependency ratios would have increased over time in all countries if the remarkable growth in the number of employed women had been excluded ([Table 2](#)). However, the magnitude of the increase would have varied from country to country; for example, the ratio would have moved up anywhere between 10 and 20 percentage points for the United States and Canada, compared with 24 to 49 percentage points for the European countries. The growth in the number of employed women in each of the seven countries has been largely due to the growth in the service industries in each of these seven countries.

The dependency ratio (R2) would have shown relatively excessive increases for the European countries if

it had been based only on the increase in the number of employed men. This indicates either that the employment opportunities for men did not keep pace with those for women or that the men who were not employable, due to disability or to some structural changes in the labour market, had opted for earlier retirement. As noted in the most recent International Labour Office study on social security in Europe, "...the most significant trend in the past decade has in fact been towards allowing greater 'flexibility' in retirement age, by adopting a set of new eligibility conditions enabling persons to retire earlier than the normal 'statutory' age (with or without a reduction in benefit) It is not entirely clear whether increased flexibility ...was motivated mainly or exclusively by labour market or social considerations or whether demographic concern played a role" (5)

Perspective on future dependency ratios (6)

The problem of an aging population is not unique to Canada. Other industrialized countries are also facing the same problem. According to a recent OECD report, *Ageing Populations* (1988), the Canadian population 65 years and over will increase from 9.5% of the total in 1980 to 22.4% in 2030. Over the same 50-year period, the proportion of the elderly will grow from 11.3% to 19.5% in the United States, from 14% to 21.8% in France, from 15.5% to 25.8% in West Germany, and from 14.9% to 19.2% in the United Kingdom. (7)

As was noted in the OECD report, the dependency ratio R1 will also rise during the coming decades in all of the seven industrialized countries; for example, for every 100 persons 15-64 years, Canada will have 66 dependants in 2030 compared with 62 in the United States, 69 in West Germany, 64 in France, and 60 in Japan. The corresponding dependency ratios for these countries in 1980 were 48 in Canada, 51 in the United States, 51 in West Germany, 57 in France, and 48 in Japan. (8) In other words, over the 50-year period the age-specific dependency ratio (R1) will show the highest increase for Canada, at 38%, compared with 22% for the United States, 35% for West Germany, and only 12% for France.

For each of these countries, the age-specific dependency ratio between the mid-1960s and the year 2030 would follow a U-pattern. The dependency ratio, which has fallen since the mid-1960s, will continue to drop until 2010 for Canada, France and the United States, and then begin to edge upwards. The turning point for all the other countries, however, would occur after 1990. As well, the composition of the dependency ratio would have changed during this period; the elderly population, which accounted for anywhere between 19% to 35% of the so-called dependent population in the mid-1960s, would constitute between 50% and 63% by the year 2030 (OECD, 1988).

The relative shifts over time in dependency ratios based only on age by no means reflect the magnitude of change in the support burden to be experienced by each of these countries. Age-specific dependency ratios do not take into account labour force participation rates, unemployment rates, formation and dissolution of families, social security systems and other economic conditions of countries. Thus, these ratios should always be compared with some degree of caution.

Notes

Note 1

Alternatively, one could have considered persons aged 25-60 years as the potentially active population since most persons 15-24 years are students and more workers are retiring before age 65.

Note 2

The dependency ratios R1 and R2 can be linked algebraically to calculate the employment/population ratio for persons 15-64 years:

$$\text{employment/population ratio} = (R1 + 1)/(R2 + 1)$$

The ratio R2, which by definition has to be greater than R1, has been calculated on the assumption that persons 65 + were not employed.

Note 3

Some of the differences in dependency ratios based on the number of employed persons could be attributed to the differences in the means and sources of data collection, their compilation, the conceptual frameworks used to define persons as employed and not employed, and other sampling and non-sampling errors. For an insight into the problems involved in comparing international data on labour force statistics, see Sorrentino ([1981](#), [1983](#)), [Moy](#) (1988), [McMahon](#) (1986) and [OECD](#) (1988).

Note 4

Changes in participation rates of men and women over the same period for these industrialized countries will be discussed in a separate paper to be published in a forthcoming issue of *Perspectives on Labour and Income*.

Note 5

See p. 83, [ILO](#) (1989)

Note 6

This section is based on data on R1 ratios as projected by the [OECD](#) (1988) report. No attempt is made here to provide a future perspective on R2 ratios, which would require assumed values of employment/population ratios. This in turn would depend on the prevailing economic situation of each country as well as on several other extraneous factors.

Note 7

See Table 6, p. 22, [OECD](#) (1988).

Note 8

See Table 13, p. 29, [OECD](#) (1988).

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Source

Perspectives on Labour and Income, Summer 1990, Vol. 2, No. 2 (Statistics Canada, Catalogue 75-001E). This is the fifth of six articles in the issue.

 HIGHLIGHTS

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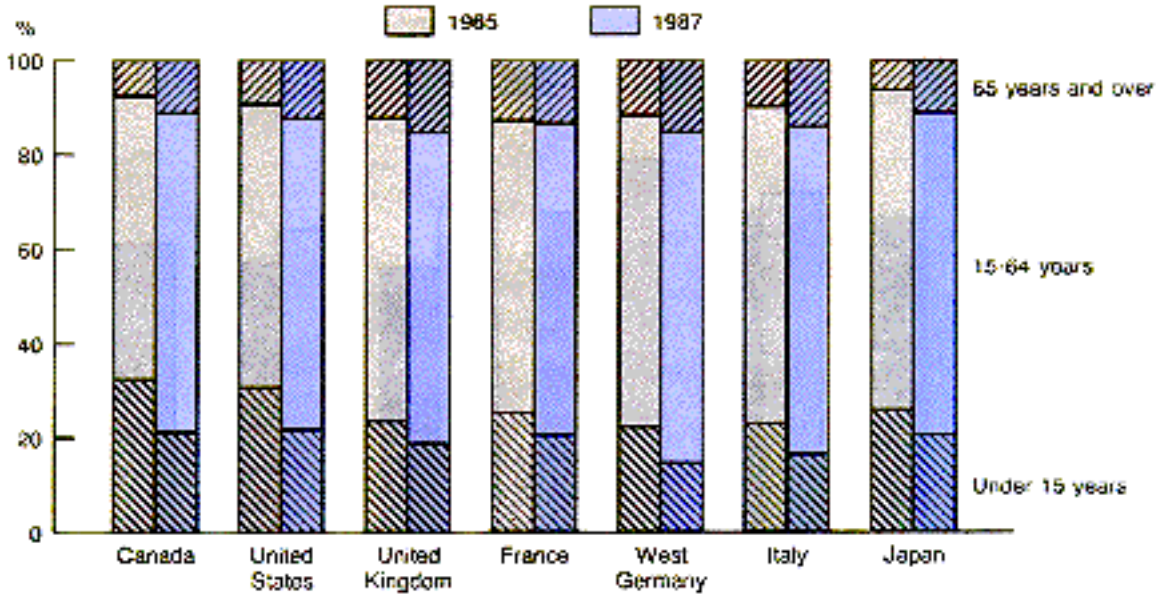
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Percentage distribution of population for seven major OECD countries

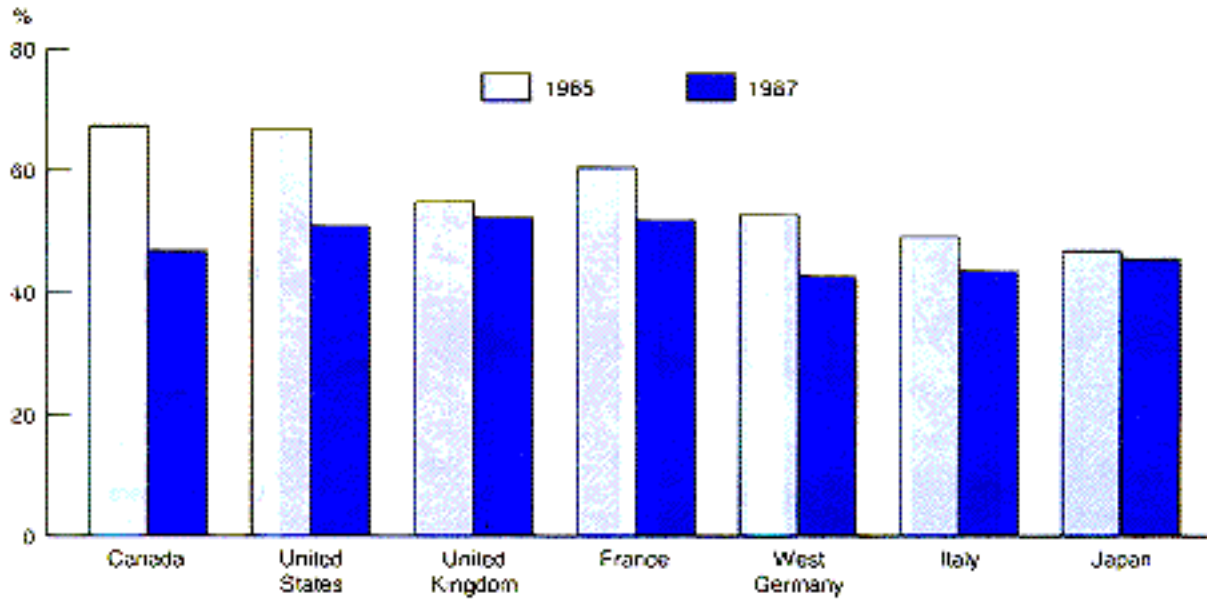
For each country the proportion of the elderly population has grown over the 1965-87 period.



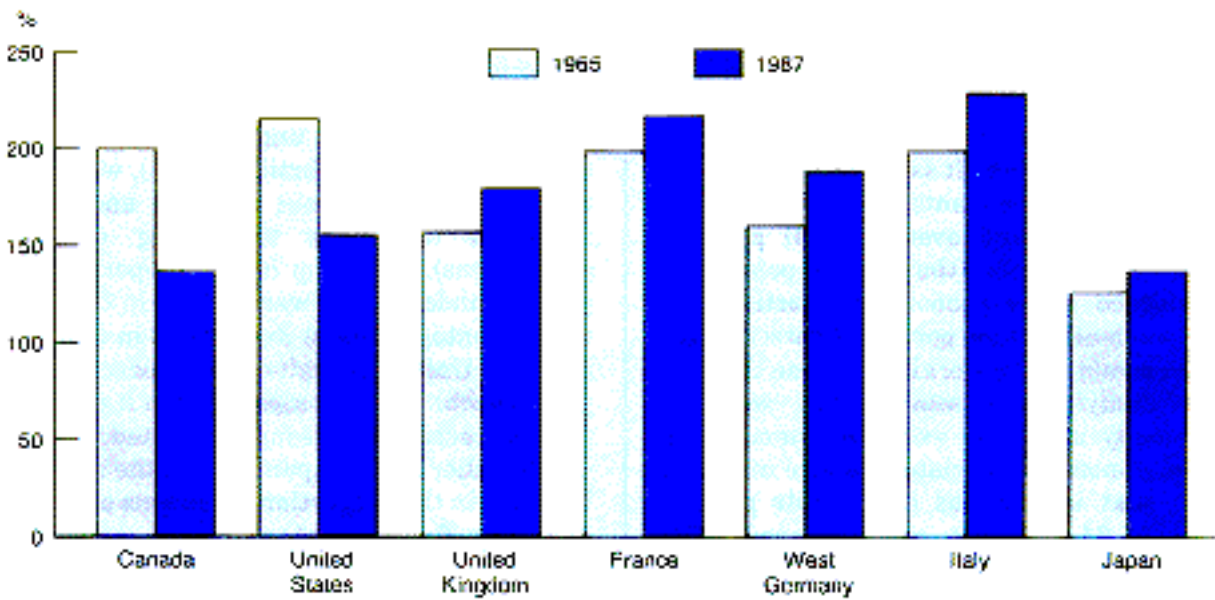
Source: Labour Force Statistics, OECD, Paris

Dependency ratios for seven major OECD countries

For each country the age-specific dependency ratio has dropped over the 1965-87 period . . .



. . . but the labour market adjusted dependency ratio has increased over the same period in each country except Canada and the U.S.



Source: Labour Force Statistics, OECD, Paris

Table 1

Percentage distribution of population by age groups for seven major OECD countries, 1965 and 1987

Country	Percentage distribution of population				Women as proportion of population				Total population '000
	Under15 years	15-64 years	65 years and over	Total %	Under15 years	15-64 years	65 years and over	Total	
1965									
Canada*	32.6	59.8	7.6	100.0	49.1	49.5	53.3	49.7	20,470
United States	30.5	60.0	9.5	100.0	49.1	50.7	56.6	50.8	194,303
United Kingdom	23.4	64.5	12.2	100.0	49.7	50.5	62.0	51.5	54,350
France†	25.0	62.3	12.8	100.0	49.0	49.9	62.7	51.2	50,318
West Germany	22.6	65.4	12.0	100.0	48.7	52.4	61.1	52.6	58,619
Italy	23.1	67.1	9.8	100.0	49.1	51.4	56.2	51.4	50,840
Japan	25.7	68.0	6.3	100.0	48.9	51.2	56.2	50.9	97,950
1987									
Canada*	21.0	68.1	10.9	100.0	48.7	50.1	58.1	50.7	26,115
United States	21.5	66.3	12.2	100.0	48.8	50.5	59.4	51.2	243,915
United Kingdom	18.9	65.6	15.5	100.0	48.7	49.9	60.4	51.3	56,930
France†	20.6	65.9	13.5	100.0	48.7	50.0	61.2	51.3	55,630
West Germany	14.6	70.1	15.4	100.0	48.9	49.7	66.1	52.1	61,199
Italy	16.3	69.5	14.1	100.0	48.6	50.7	57.7	51.3	56,664
Japan	20.4	68.7	10.8	100.0	48.8	50.1	59.6	50.8	122,090

Source: "Labour Force Statistics" published by the OECD, Paris, (1989 edition); for Canada, however data are from Statistics Canada.

* For Canada, figures are shown for 1966 and 1987.

† For France, figures are shown for 1969 and 1987.

Table 2

Selected dependency ratios* for seven major OECD countries, 1965 and 1987

Country	R1			R2	
	1965	1987	1965	1987	
				Excluding 1965-87 increase in employed women	Including 1965-87 increase in employed women
				%	
Canada†	67.3	46.9	199.4	211.3	137.7
United States	66.6	50.9	215.1	225.4	155.8
United Kingdom	55.1	52.3	157.5	200.2	179.6
France††	60.6	51.7	198.6	243.3	216.5
West Germany	52.9	42.7	160.1	184.4	188.1
Italy	49.0	43.8	198.2	247.0	228.5
Japan	47.0	45.5	125.8	151.5	137.8

Source: These ratios have been compiled by the author using data from the "Labour Force Statistics" published by the OECD, Paris, (1989 edition); for Canada, however, data are from Statistics Canada.

** The dependency ratios are defined as follows:*

$$R1 = [\{ (persons < 15) + (persons 65 +) \} / (persons 15-64)] \times 100$$

$$R2 = [\{ (persons < 15) + (persons 65 +) + (persons 15-64 not employed) \} / (employed persons 15-64)] \times 100$$

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