Atlantic Institute for AIMS Market Studies

Population Change in Atlantic Canada: Looking at the Past, Thinking About the Future

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McMaster University

Research Report

Atlantic Institute for Market Studies

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Executive Summary

The Atlantic Region has experienced considerable demographic growth in recent decades. Nevertheless, its percentage of the Canadian population has declined continuously during the past half-century, and further declines seem likely. In large measure that can be attributed to the fact that the region, and each province in it, receives disproportionately small shares of immigrants to Canada.

Like the rest of the country, the Atlantic Provinces experienced the postwar baby boom, and the subsequent bust. In consequence their populations are now aging, in a collective sense. In just over a decade the first of the baby boomers will be "old", by conventional definition, and the percentage of population 65 and over will rise continuously in the coming decades.

If fertility rates remain at or near their current low levels, population growth will eventually be replaced by decline.

Net migration to and from the rest of Canada has been strongly negative in Newfoundland in recent years, and the population of that province has actually decreased. Even if a migration balance is restored, the outlook is for substantial further declines in Newfoundland as a result of its exceptionally low fertility rate. While slower growth and eventual declines are in prospect throughout the Atlantic Region, the trend is likely to be much more pronounced in Newfoundland.

As the rate of population growth diminishes in Atlantic Canada, so too does the rate of growth of the labour force. That, coupled with relatively low participation rates, has important implications for the future productive capacity of the region. Actual levels of production (and hence income) continue to be restricted by unemployment rates well above the national average.

In some other respects, the labour force patterns of the region are similar to those of Canada as a whole, most notably the increased participation of women.

The relationship between the working and non-working components of the population can be captured in a simple way by "dependency ratios." Two calculations are significant —the ratio of the total population to the population 20 to 64 years of age, and—the ratio of the total population to the labour force. Both types reflect the "burden" of the age distribution at any given time.

The projections indicate that the "dependency burden" will rise in Atlantic Canada, as elsewhere in the country. And it will continue to rise far into the future, as expected when the population ages. However, even by 2036, the end of the projection period, the "burden" will fall short of what it was in the 1950s and 1960s. The dependent population will be predominantly elderly rather than youthful, as in those earlier decades, but the overall ratios will not be as high. In light of that, issues of reallocation of resources will be the important ones to focus on, rather than the total "cost" of population aging.

The study focuses mainly on a particular set of demographic projections, based on what the researchers think are reasonable assumptions. The projections, like all others, will be wrong; to state the obvious, no one can anticipate the future with certainty. However, alternative projections suggest that the main conclusions are unlikely to be affected much by changing the assumptions. Faster declines in mortality rates would have little effect on the growth and age distribution of the population. Nothing suggests that fertility rates will increase sharply, but even if they do, the age distribution will still shift toward the older end; population aging will still be a future fact of life.

Changes in rates of migration would alter the rates of growth of course, but they too would not reverse the collective aging process. Indeed, if outmigration remains at recent levels in the Atlantic Region as a whole, especially in Newfoundland, the increases in the proportions of elderly people would generally be greater than what this paper predicts, inasmuch as migrants tend to be younger adults.

Slower growth and aging affect the labour force, and hence a region's ability to generate output and income. But they affect virtually all other aspects of the economy too. They affect patterns of saving and household consumption, and hence investment. They have differential effects on sales, production, and investment levels in different industries, and their impact thus falls unevenly on different areas within a region. They affect the tax bases from which provincial governments draw revenue, and they affect the demands for government program expenditures. Work carried out in other contexts suggests the importance of anticipating the effects of population change on government expenditures.

Education, pensions, and health care are major budgetary components that are obviously sensitive to population change, and they deserve special attention. In the case of health care, it is particularly important that the delivery system be viewed as just that—a system—in assessing the implications of population change. Future resource availability must be considered, as well as requirements. That is also true of education and other government program areas, but it is especially important in the case of health care, where piecemeal and inconsistent policies are a greater risk.

The study makes a number of further observations concerning the relationships between prospective demographic change and public expenditures.

In each province in the Atlantic region planners should anticipate that the school age population will be much smaller in the years ahead than it is today. That is of major practical concern: How many teachers will be required in 10, 20, or 30 years in each province? How many will have to be hired, after taking into account the likely numbers of retirements and departures for other reasons? What are the implications for teacher training? How much classroom space will be needed?

At the other end of the age spectrum, planners should anticipate large increases in the numbers of elderly people. What health care and other services will be required to meet the needs of a rapidly aging population? How much of each type of service? And how will future needs for personnel and facilities compare with what are likely to be available?

Only careful analysis can provide the information required to make well informed policy decisions, and policies that take prospective demographic changes into account are likely to be better than those that ignore them. The case was put strongly in the April 1995 Notice of Motion establishing the Select Committee of the Legislature on Demographics in New Brunswick: “It is imperative for government to understand and assess the impact of our changing society in the context of our aging population and the demands and challenges this presents for the design and delivery of programs and services” (Province of New Brunswick, 1996).

INTRODUCTION

The population of a nation changes gradually but continuously. It is renewed by births, augmented by immigration, and depleted by deaths and emigration. And, of course, its members grow older year by year as they move through the life cycle. The population has a long "memory" too: a statistical snapshot at census time reveals it to have a certain size and age composition, reflecting the demographic events of the previous hundred years or so, and indeed, through intergenerational connections, even further back in history. In large measure, the Canadian demographic future is predetermined by the population of today. The baby boomers, born in the two decades following World War II, are now in middle age, and within little more than a decade the first of them will qualify to be called "old". The generation behind them is much smaller, and the record of the 1990s gives no indication that another major birth boom is likely. The population of Canada is thus slowly aging, in a collective sense, and the aging process will continue through many more decades.

What is true for Canada is true for its constituent regions. Patterns of immigration from abroad and migration within the country, and differences in birth and death rates, have engendered faster rates of change in some parts of the country, slower rates in others. But population aging is a prominent characteristic of all regions, and will remain so well into the next century. It is against that background that we give our attention in this paper to the demographic past and future of the Atlantic Provinces.

We begin below with a brief review of some demographic history, going back to the 1950s. We compare the rates of growth in the region and its four provinces with the national rate, take note of their changing shares of the Canadian population, and look at the shifts in age distribution that have occurred over the decades. We then analyse the changes in population in terms of their components—the contributions of births, deaths, and migration. A question of particular interest is the extent to which the decline in the region's population as a percentage of the Canadian population can be attributed to its disproportionately low share of Canadian immigrants.

Demographic change and economic change are inextricably linked, and nowhere is that more obvious than in the population-labour-force nexus. The baby boomers began to enter

the working population on a full time basis around the mid-1960s and their influx continued until the first half of the 1980s. Rates of labour force growth fell sharply thereafter. We review the recent labour force history of the Atlantic Provinces in that setting, and compare it with that of Canada as a whole.

From the past we turn to the future. Using a computer-based demographic model that we have developed and applied in other studies, we project the size and age distribution of the population and labour force for each of the four Atlantic Provinces, and for the region as a whole. Our initial projection—Projection A, as we shall call it—is based on what we regard as realistic assumptions, in the absence of a major change in patterns of demographic behaviour. However, we present some alternative projections too, in order to explore the implications of different assumptions. In all of the projections we take a long view; populations change slowly, and the collective aging process will be with us far into the 21st century. While considering the nearer-term outlook, we think it helpful to consider also the prospects for the next several decades in order to see where Atlantic Canada is headed in the long run in terms of its population and work force.

From a policy perspective, an important question is whether one province, or perhaps the Atlantic Provinces acting in concert, could affect the course of population growth, or whether they must simply respond to demographic changes as they evolve, and make the best of it. The answer is not simple. People tend to move to areas that are prospering and leave those that are not, and it makes no sense to try to attract more immigrants or to hold young people in a region where they cannot find employment. Successful policies leading to more rapid economic growth in the Atlantic Region would be likely to encourage population growth, both by reducing (or even reversing) net interprovincial out-migration and by attracting immigrants. But, as much experience attests, policies leading to sustained economic growth in Atlantic Canada (or elsewhere, for that matter) are hard to find.[1] The search for such policies is, however, not in any central way a *demographic* matter: successful economic policies may have an impact on population growth, but it would probably be better to view that as a by-product rather than their main focus.

[1] The relatively poor economic performance of Atlantic Canada and the associated sustained high rate of unemployment have been the subject of many studies, including Melvin (1987), Atlantic Provinces Economic Council (1987), and DRI (1994). Beyond that, Newfoundland, with its particularly poor economic performance, has been the subject of numerous investigations, including Economic Council of Canada (1980), Copithorne (1986), House (1986), and Feehan (1991).

The general outlook for Canada over the next few decades is one of continuous population aging, a trend that will almost certainly be more pronounced in the Atlantic Region, as we show below. That prospect has raised many concerns. Large increases in health care costs are anticipated, and even larger increases in pension costs. Will the social programs that were put in place three decades ago, when those born during the baby boom were still young, be sustainable in another two or three decades, when the baby boomers are old? Questions of that kind are at the forefront of public concern and debate, with anxieties heightened by occasional pronouncements from apparently knowledgeable people suggesting future insolvency of the Canada Pension Plan, or expressing concern about prospective intergenerational conflicts. We have written about some aspects of those topics elsewhere (Denton and Spencer, 1978, 1985, 1995, 1997). Here we restrict attention more narrowly to demographic matters, and identify those of particular relevance for publicpolicy.

An important aspect of population structure is the relationship between economically "dependent" and economically "active" age groups—between the young and the elderly, on the one hand, and the working population or labour force, on the other. We review the history of "dependency ratios" in the provinces of Atlantic Canada, and evaluate current and projected future ratios in light of the historical ones. The significance of the dependency ratios is that they can be interpreted as measures of the relative "burden" to society of its age distribution, having regard for the costs of raising and educating children, and of supporting and caring for the elderly.

The effects of population change on the labour force and dependency ratios have important implications for the economies of the provinces in the Atlantic Region. However, there is much more to be considered in assessing demographic effects on those economies, and the likely impact on future development. Detailed analyses and projections of the effects are beyond the scope of this paper but we devote some space to an outline of how the population and the economy interact with each other, and the kinds of questions that should be addressed if a careful assessment of the economic effects of future population change were to be undertaken. We note the importance of population aging for the health care and education systems within a province, and for public expenditures over the full range of government budget categories.

The paper ends with a brief summary of its major conclusions.

HISTORICAL PERSPECTIVE

The people of Atlantic Canada numbered somewhat more than 1.6 million in 1951, the year of the first national census taken after Newfoundland joined the confederation. In 1996 the population numbered just under 2.4 million, a gain of almost 50 per cent. During the same period, the Canadian population more than doubled. Thus, although the Atlantic Region has experienced considerable population growth, its share of the national total has declined. The region accounted for 11.5 per cent of the total in 1951, 8.0 per cent in 1996.

The pattern has been consistent, as Table 1 shows. While the population of the region has risen in every five-year period since 1951, its share of the national total has fallen in every period. Net losses through migration to other parts of Canada go some way towards explaining the declining share, but much of the explanation is to be found in the disproportionately small numbers of immigrants to Canada who have taken up residence in the region. We explore that matter in the next section.

The long-run growth pattern has been much the same in each of the four provinces. The population of each has increased in size, but decreased as a percentage of the Canadian total. Within the region, the percentage shares have changed only a little. A modest increase in Newfoundland's share, from 22.4 per cent in 1951 to 23.6 per cent in 1996, was offset by small declines in the shares of Prince Edward Island (6.1 per cent, falling to 5.7) and Nova Scotia (39.6, falling to 38.8); New Brunswick's share was virtually the same in 1996 as in 1951 (31.9 per cent). The population of Atlantic Canada today is distributed among its constituent provinces in pretty much the same way as it was almost half a century ago.

Table 1: The Population of the Atlantic Provinces and Canada, 5-Year Intervals, 1951-1996

	1951	1956	1961	1966	1971	1976	1981	1986	1991	1996
Population ('000)										
Newfoundland	369.0	423.7	467.1	503.3	532.9	563.9	576.5	578.1	580.3	565.0
Prince Edward Island	99.5	100.4	105.7	109.7	112.8	118.8	124.0	128.8	130.8	136.2
Nova Scotia	651.3	703.9	746.4	765.5	799.3	836.6	856.4	892.1	917.9	930.7
New Brunswick	523.8	563.1	606.8	625.9	644.4	691.5	708.4	727.7	748.5	766.0
Atlantic Region	1643.7	1791.0	1926.0	2004.3	2089.4	2210.8	2265.3	2326.7	2377.6	2397.9
Canada	14315.5	16426.2	18621.4	20430.7	22026.4	23517.5	24900.0	26203.8	28120.1	29840.6
Increase, last 5 years ('000)										
Newfoundland	--	54.7	43.4	36.2	29.6	31	12.6	1.6	2.2	-15.3
Prince Edward Island	--	0.9	5.3	4	3.1	6	5.2	4.8	2	5.4
Nova Scotia	--	52.6	42.5	19.1	33.8	37.3	19.8	35.7	25.8	12.8
New Brunswick	--	39.3	43.7	19.1	18.5	47.1	16.9	19.3	20.8	17.5
Atlantic Region	--	147.3	135	78.3	85.1	121.4	54.5	61.4	50.9	20.3
Canada	--	2110.7	2195.2	1809.3	1595.7	1491.1	1382.5	1303.8	1916.3	1720.5
% Increase, last 5 years										
Newfoundland	--	14.8	10.2	7.7	5.9	5.8	2.2	0.3	0.4	-2.6
Prince Edward Island	--	0.9	5.3	3.8	2.8	5.3	4.4	3.9	1.6	4.1
Nova Scotia	--	8.1	6.0	2.6	4.4	4.7	2.4	4.2	2.9	1.4
New Brunswick	--	7.5	7.8	3.1	3.0	7.3	2.4	2.7	2.9	2.3
Atlantic Region	--	9.0	7.5	4.1	4.2	5.8	2.5	2.7	2.2	0.9
Canada	--	14.7	13.4	9.7	7.8	6.8	5.9	5.2	7.3	6.1
% of Region										
Newfoundland	22.4	23.7	24.3	25.1	25.5	25.5	25.4	24.8	24.4	23.6
Prince Edward Island	6.1	5.6	5.5	5.5	5.4	5.4	5.5	5.5	5.5	5.7
Nova Scotia	39.6	39.3	38.8	38.2	38.3	37.8	37.8	38.3	38.6	38.8
New Brunswick	31.9	31.4	31.5	31.2	30.8	31.3	31.3	31.3	31.5	31.9
Atlantic Region	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
% of Canada										
Newfoundland	2.6	2.6	2.5	2.5	2.4	2.4	2.3	2.2	2.1	1.9
Prince Edward Island	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Nova Scotia	4.5	4.3	4.0	3.7	3.6	3.6	3.4	3.4	3.3	3.1
New Brunswick	3.7	3.4	3.3	3.1	2.9	2.9	2.8	2.8	2.7	2.6
Atlantic Region	11.5	10.9	10.3	9.8	9.5	9.4	9.1	8.9	8.5	8.0

Note: The population figures relate to July 1. For 1971 to 1996, they are taken or calculated from published Statistics Canada data; for 1951 to 1966, June 1 census figures have been adjusted by the authors to reflect current Statistics Canda definitions.

The age distribution of the population is quite a different matter; it has been anything but constant over the past four or five decades, as Table 2 makes clear. The postwar baby boom, and the subsequent baby bust, were historical experiences shared throughout the country, and the Atlantic Region was no exception. (Roughly the same boom and bust sequence was experienced throughout the United States too, and in a number of other developed countries.) In 1961, more than 46 per cent of the people in the region were under the age of 20. (The all-Canada figure was about 42 per cent.) By 1996, the proportion had fallen below 27 per cent (about equal to the all-Canada figure). Concomitantly, the proportion 65 and older rose from less than 8 per cent to more than 12 per cent. In Newfoundland, the median age of the population was 20.9 in 1971; by 1996 it had risen to 33.9, a quite remarkable change in just two and a half decades. The increases in median age were a little smaller in the other three provinces, but large nevertheless: 24.8 to 34.5 in Prince Edward Island; 25.4 to 35.5 in Nova Scotia; 23.9 to 35.2 in New Brunswick. For comparison, the all-Canada median rose from 26.2 to 35.2. The pattern of collective aging is well established. It will be a dominant feature in the demography of Atlantic Canada, as in the rest of the country, for a long time to come.

Table 2: Percentages of the Population Under 20 Years of Age and 65 and Over, Atlantic Provinces and Canada, 5-Year Intervals, 1951-1996

	1951	1956	1961	1966	1971	1976	1981	1986	1991	1996
% of population under 20										
Newfoundland	47.1	48.9	51.0	51.0	48.3	44.6	40.3	35.7	31.6	27.3
Prince Edward Island	41.6	42.9	44.3	44.7	41.9	38.9	35.2	31.4	30.2	28.6
Nova Scotia	40.4	41.8	43.3	43.3	40.5	37.3	33.4	29.5	27.7	26.1
New Brunswick	43.7	45.2	46.7	46.4	42.7	39.1	35.1	30.8	28.6	26.2
Atlantic Region	43.0	44.6	46.3	46.2	43.2	39.8	35.8	31.5	29.1	26.6
Canada	37.6	39.4	41.5	41.8	39.1	35.6	31.8	28.6	27.5	26.7
% of population 65 and over										
Newfoundland	6.4	5.9	5.8	5.9	6.1	6.5	7.6	8.7	9.6	10.6
Prince Edward Island	9.8	10.3	10.4	10.7	11.0	11.2	12.1	12.6	13.1	13.0
Nova Scotia	8.4	8.4	8.5	8.8	9.1	9.7	10.9	11.8	12.4	12.8
New Brunswick	7.5	7.7	7.8	8.1	8.6	8.9	10.0	11.0	11.9	12.6
Atlantic Region	7.8	7.7	7.8	8.0	8.3	8.7	9.8	10.8	11.6	12.2
Canada	7.7	7.7	7.6	7.6	8.0	8.6	9.6	10.5	11.4	12.2

The Components of Population Change

Statistics Canada conducts a national census every five years and produces detailed estimates of the population for each noncensus year. The change in the population of a province or region between the middle of one year and the middle of the next is exactly equal to the number of births, minus the number of deaths, plus migration into the region, minus migration out of it. The Statistics Canada estimates are calculated in just that way—by starting with the most recent census, adding births and in-migration, and subtracting deaths and emigration. Unavoidably, the estimates are not exact. Migration is particularly difficult to measure. Moreover, the census enumerations themselves are subject to some error, and require adjustment for estimated undercounting. Nevertheless, the work of Statistics Canada provides not only a record of the changes in population from year to year and census to census, but also a record of the sources of change—the contributions of births, deaths, and migration flows of different types. We organize the records into a set of demographic accounts in Tables 3 and 4. Table 3 shows, for the region and each province, as well as Canada, the changes in population over five-year intervals, from 1971 to 1996, and the contributions to those changes of births, deaths, and net in-migration from all sources. Table 4 shows the main components of migration for the same period—immigration from other countries, emigration to other countries, in-migration from the rest of Canada, and out-migration to the rest of Canada.

Births exceeded deaths in every period shown in Table 3, and indeed in every single year of the quarter-century covered by the table. But the gap has narrowed. In 1971-76, there were about 193,000 births and 82,000 deaths in the Atlantic Region as a whole, and thus a natural increase in population of 111,000; in 1991-96, there were 143,000 births and 93,000 deaths, leaving a natural increase of only 50,000. Similar patterns of decline in natural increase can be seen in each of the four provinces. Underlying the declines in births are dramatic decreases in fertility rates (the average numbers of children born per woman at different ages in the childbearing range). The decreases in fertility commenced early in the 1960s, continued through the 1970s, and have left the rates at unprecedentedly low levels in the 1980s and 1990s—so low that if the rates were to remain at those levels the population eventually would fail to reproduce itself, and only immigration could keep it from a continuous decline.

Table 3: The Major Components of Population Change in the Atlantic Provinces and Canada, 5-Year Intervals, 1971-1976 to 1991-1996

	1971-76	1976-81	1981-86	1986-91	1991-96
	(thousands)				
Newfoundland					
Population increase	31.0	12.6	1.6	2.2	-15.3
Births	58.5	51.0	44.1	38.3	32.6
Deaths	16.5	16.0	17.4	18.5	19.6
Apparent net in-migration	-11.0	-22.4	-25.1	-17.6	-28.3
Prince Edward Island					
Population increase	6.0	5.2	4.8	2.0	5.4
Births	9.8	9.8	9.8	9.8	8.8
Deaths	5.3	5.1	5.3	5.6	5.7
Apparent net in-migration	1.5	0.5	0.3	-2.2	2.3
Nova Scotia					
Population increase	37.3	19.8	35.7	25.8	12.8
Births	66.4	62.1	61.8	61.9	56.5
Deaths	34.4	34.7	35.3	36.7	38.3
Apparent net in-migration	5.3	-7.6	9.2	0.6	-5.4
New Brunswick					
Population increase	47.1	16.9	19.3	20.8	17.5
Births	58.5	54.9	51.7	48.3	44.9
Deaths	25.6	25.9	26.4	27.2	29.2
Apparent net in-migration	14.2	-12.1	-6.0	-0.3	1.8
Atlantic Region					
Population increase	121.4	54.5	61.4	50.9	20.3
Births	193.2	177.7	167.4	158.3	142.8
Deaths	81.7	81.7	84.4	88.0	92.7
Apparent net in-migration	9.9	-41.5	-21.6	-19.4	-29.8
Canada					
Population increase	1491.1	1382.5	1303.8	1916.3	1720.5
Births	1754.8	1819.9	1872.2	1933.3	1934.8
Deaths	823.6	842.6	885.5	946.0	1029.0
Apparent net in-migration	559.9	405.2	317.1	929.0	814.7

Note: Apparent net in-migration is equal to immigration from other countries, minus emigration to other countries, plus in-migration from the rest of Canada, minus out-migration to the rest of Canada, plus Canadians returning from other countries, plus the net increase in non-permanent residents, plus the statistical discrepancy. (The statistical discrepancy is assumed to arise primarily from inaccuracies in the measurement of migration flows.)

Mortality rates have fallen too, and life expectancies have risen over the decades. That has had some effect on the rate of natural increase. However, the dominant factor by far has been the precipitous fall in fertility rates, and the consequent reduction in the numbers of children born annually. That is true throughout the Atlantic Region, as it is in all other parts of the country.

The other component of population change shown in Table 3 is what we term "apparent net in-migration". We use the word "apparent" because the statistical discrepancy is included—the difference between the sum of the measured components of change and the total five-year change, as calculated from census counts. The discrepancy is the result of either inaccuracies in the measurement of migration flows or differences in the degree of undercounting in successive censuses. (Births and deaths must be registered, by law, and hence are recorded with great accuracy.) The overall population changes shown in the table incorporate estimated adjustments for undercounting, and it seems likely that the statistical discrepancy should be interpreted as unrecorded additional net migration. That is the way we have treated it.

The table shows the Atlantic Region to have been a net loser in the combined exchange of migrants with other countries and other parts of Canada. Net in-migration was negative in each of the last four five-year periods, and over the past quarter-century the region's apparent net loss was about 102,000. That compares with a *gain* of about 3 million from migration for the country as a whole.

The losses have been distributed unevenly among the provinces. Newfoundland has been a consistent net loser from migration, while the other provinces have had mixed experiences. In the most recent period, 1991-96, the Atlantic Region appears to have lost almost 30,000 people through migration, a result of net outflows of 28,300 from Newfoundland and 5,400 from Nova Scotia, offset in part by net inflows of 1,800 into New Brunswick and 2,300 into Prince Edward Island. Caution is certainly warranted in interpreting the migration figures because of the measurement problems noted above. At a general level, though, it is clear that the Atlantic Region has lost substantial numbers of people through migration (while Canada has gained large numbers), and that the migration pattern for the region has been dominated by Newfoundland.

It would be a mistake to think of negative or positive net migration as indicating movements in one direction only. Regardless of the net balance, there are, in any period, large numbers of people moving in and large numbers moving out. That is especially true

of migration to and from the rest of Canada, as Table 4 makes clear. While some 904,000 people moved from the Atlantic Region to other parts of Canada during the quarter-century 1971-96, 841,000 moved in the opposite direction, based on the Statistics Canada estimates. In Newfoundland, where the net losses have been greatest, 300,000 people left the province for elsewhere in the country, while 227,000 moved in. As always, the migration estimates should be treated with care because of the possibilities for error. However, the fact that the gross flows of population into and out of a province or region are generally far in excess of the net flows is not in question. (Some of the migration into Newfoundland or any other province would represent people who had left in an earlier period and were now returning, and that would be true also for the region as a whole. Some of the movements into and out of individual provinces would be to and from other provinces within the region, although the largest fractions would be movements to and from the rest of Canada.)

Immigration from other countries is relatively unimportant as a source of population growth in the Atlantic Region, as Table 4 again makes clear. About 115,000 foreign immigrants came to the region between 1971 and 1996, 46 per cent of them going to Nova Scotia. In the most recent five-year period, about 28,000 foreign immigrants came to the Atlantic Region, and 61 per cent of those went to Nova Scotia. The 28,000 figure compares with a total of about 1.3 million for the country as a whole.

Let us explore the immigration issue a little further. Table 5 compares the percentage shares of the Canadian population in the region and its four provinces with the corresponding shares of Canadian immigration. The differences have consistently been large. Looking back over the past quarter-century, the proportion of immigrants to Canada who went to the Atlantic Region has ranged from less than two-tenths to a little over three-tenths of the proportion of the population living in the region. In 1991-96, the region accounted for 8.2 per cent of the Canadian population but received only 1.9 per cent of all immigrants. The share differences vary among the provinces, but the same general pattern holds in all four. In each, the immigration share has invariably been much smaller than the population share.

A simple calculation serves to bring out the implications. In 1971, the Atlantic Region had 9.5 per cent of the Canadian population. If, in the following 25 years, the region had received 9.5 per cent of Canadian immigration, some 445,000 immigrants would have taken up residence there, compared with an actual total of 115,000. (See Table 4.) Some of the additional immigrants would have died or left the region subsequently, but on the other hand there would have been more births to immigrant parents, thus augmenting the population. The calculation is rough, but taking it one step further, the addition of another

Table 4: Migration Into and Out of the Atlantic Provinces and Canada, 5-Year Intervals, 1971-1976 to 1991-1996

	1971-76	1976-81	1981-86	1986-91	1991-96
			(thousands)		
Newfoundland					
Immigration from other countries	5.9	3.7	2.7	3.1	4.1
Emigration to other countries	2.4	1.8	2.3	1.4	1.4
In-migration from rest of Canada	61.4	43.4	37.4	47.7	36.8
Out-migration to rest of Canada	63.3	63.0	52.5	60.6	60.9
Prince Edward Island					
Immigration from other countries	1.5	1.2	0.9	1.0	1.0
Emigration to other countries	0.6	0.4	0.5	0.3	0.4
In-migration from rest of Canada	23.2	18.0	15.3	15.4	13.7
Out-migration to rest of Canada	19.5	18.6	14.9	15.6	11.6
Nova Scotia					
Immigration from other countries	12.8	8.6	6.5	8.0	16.9
Emigration to other countries	3.3	2.5	2.4	2.9	4.2
In-migration from rest of Canada	125.5	98.0	89.9	92.7	82.9
Out-migration to rest of Canada	114.1	105.8	82.3	93.8	88.4
New Brunswick					
Immigration from other countries	12.2	7.9	5.4	5.7	5.7
Emigration to other countries	6.0	4.6	4.7	4.4	4.7
In-migration from rest of Canada	109.7	73.8	64.0	67.5	57.7
Out-migration to rest of Canada	93.0	84.4	63.9	71.0	61.2
Atlantic Region					
Immigration from other countries	32.4	21.4	15.4	17.8	27.7
Emigration to other countries	12.3	9.4	9.8	8.9	10.7
In-migration from rest of Canada	235.7	162.5	148.3	161.1	133.6
Out-migration to rest of Canada	206.0	200.1	155.4	178.6	164.1
Canada					
Immigration from other countries	1038.6	739.6	629.7	992.2	1288.4
Emigration to other countries	358.1	278.2	277.6	212.5	230.5

Note: Immigration from other countries includes returning Canadians who emigrated from Canada at an earlier time. Migration of non-permanent residents into and out of Canada and the statistical discrepancy are not included in this table.

330,000 immigrants would have more than doubled the total population increase in the region—from an actual increase of 308,000 over the quarter-century to 638,000. Indeed, that may be a somewhat conservative estimate. If the additional natural increase associated with the larger number of immigrants exceeded any associated addition to out-migration, the population would have grown by even more. All of this is hypothetical, of course—a "what-if-history-had-been-different" calculation. Nevertheless, it serves to make the point that how immigrants have distributed themselves across the country (with concentrations in Ontario, Quebec, and British Columbia) has had important demographic (and hence economic) implications for Atlantic Canada.

Table 5: Shares of the Atlantic Provinces in Canadian Immigration Compared with Population Shares, 5-Year Intervals, 1971-1976 to 1991-1996

	1971-76	1976-81	1981-86	1986-91	1991-96
Newfoundland					
% of Canadian population	2.4	2.4	2.3	2.1	2.0
% of Canadian immigration	0.5	0.5	0.3	0.3	0.3
Prince Edward Island					
% of Canadian population	0.5	0.5	0.5	0.5	0.5
% of Canadian immigration	0.1	0.2	0.1	0.1	0.1
Nova Scotia					
% of Canadian population	3.6	3.5	3.4	3.3	3.2
% of Canadian immigration	1.3	1.2	1.1	0.8	1.3
New Brunswick					
% of Canadian population	2.9	2.9	2.8	2.7	2.6
% of Canadian immigration	1.1	0.9	0.7	0.4	0.3
Atlantic Region					
% of Canadian population	9.4	9.3	9.0	8.6	8.2
% of Canadian immigration	3.0	2.8	2.2	1.5	1.9

Note: Population shares are based on average populations over the five-year intervals.

THE LABOUR FORCE: GROWTH, SIZE, AND COMPOSITION

Population changes have their most direct impact on the supply side of the economy through their effects on the labour force. Table 6 provides estimates of the labour force, its growth rates, and related information, based on data from Statistics Canada's monthly Labour Force Survey. The figures in the table are annual averages of the monthly data, or have been calculated from annual averages. They cover the period 1976 to 1996. (Changes in the survey make it difficult to construct consistent series going back further than 1976.) In accordance with the definitions used by Statistics Canada, the figures exclude full-time members of the armed forces, inmates of institutions, and persons living on Indian reserves. Those exclusions are of little importance for our purposes.

The Atlantic Region had 7.3 per cent of the Canadian labour force in 1996, compared with 8.0 per cent of the population. The difference between population and labour force shares was greatest in Newfoundland, but Nova Scotia and New Brunswick had slightly smaller shares also. Consistent with the share differences, 45.9 per cent of the regional population were in the labour force, compared with 50.8 per cent for Canada. In some degree that difference may reflect differing population age structures, but higher unemployment rates probably play an important role. (Average rates of unemployment have been a third to a half greater in the region than in Canada during the past 20 years, and about twice as high in Newfoundland.) A known and long-standing absence of jobs has an obvious disincentive effect on people who might otherwise look for work. In Newfoundland, only a third of the population was employed in 1996, compared with about 46 per cent for Canada.

The rates of growth of the labour force reflect the history of the birth rate. Between 1976 and 1981, when "baby boomers" were entering the world of work in large numbers, the region's labour force grew by 12.8 per cent—less than the all-Canada rate of 17.1 per cent, but a high rate of growth nevertheless. The years 1981-86 caught the tail end of the boom generation, and the Atlantic labour force increased by another 9.4 per cent. The growth rate then fell to 7.3 per cent in 1986-91, and to only 1.3 per cent in 1991-96. In Newfoundland, in 1991-96, the labour force registered a drop of 5.1 per cent, reflecting both a high net rate of out-migration and a decline in labour force participation in an economy characterized by severely limited employment opportunities.

Table 6: The Labour Force of the Atlantic Provinces and Canada, 5-Year Intervals, 1976-1996

	1976	1981	1986	1991	1996
Labour force ('000)					
Newfoundland	184.2	213.7	228.3	248.1	235.5
Prince Edward Island	47.2	53.6	60.1	64.3	70.4
Nova Scotia	327.5	365.4	406.2	434.1	440.6
New Brunswick	262.6	293.6	318.5	340.3	354.1
Atlantic Region	821.5	926.3	1013.1	1086.8	1100.6
Canada	10530.0	12331.9	13377.7	14407.8	15145.4
Increase, last 5 years ('000)					
Newfoundland	--	29.5	14.6	19.8	-12.6
Prince Edward Island	--	6.4	6.5	4.2	6.1
Nova Scotia	--	37.9	40.8	27.9	6.5
New Brunswick	--	31.0	24.9	21.8	13.8
Atlantic Region	--	104.8	86.8	73.7	13.8
Canada	--	1801.9	1045.8	1030.1	737.6
% Increase, last 5 years					
Newfoundland	--	16.0	6.8	8.7	-5.1
Prince Edward Island	--	13.6	12.1	7.0	9.5
Nova Scotia	--	11.6	11.2	6.9	1.5
New Brunswick	--	11.8	8.5	6.8	4.1
Atlantic Region	--	12.8	9.4	7.3	1.3
Canada	--	17.1	8.5	7.7	5.1
Labour force as % of population					
Newfoundland	32.7	37.1	39.5	42.8	41.7
Prince Edward Island	39.7	43.2	46.6	49.1	51.7
Nova Scotia	39.1	42.7	45.5	47.3	47.3
New Brunswick	38.0	41.4	43.8	45.5	46.2
Atlantic Region	37.2	40.9	43.5	45.7	45.9
Canada	44.8	49.5	51.1	51.2	50.8
Employed labour force as % of population					
Newfoundland	28.4	31.9	31.9	34.9	33.6
Prince Edward Island	35.9	38.3	40.4	40.8	44.1
Nova Scotia	35.4	38.3	39.6	41.6	41.4
New Brunswick	33.8	36.7	37.5	39.7	40.8
Atlantic Region	33.2	36.2	37.1	39.3	39.5
Canada	41.6	45.8	46.2	45.9	45.8

Note: The labour force figures are annual averages. Following the definition in the Statistics Canada Labour Force Survey, they exclude full-time members of the armed forces, inmates of institutions, and persons living on Indian reserves.

The age composition of the labour force has reflected the historical pattern of births too, as shown by Table 7. In 1976, 29.7 per cent of all persons in the Atlantic Region's labour force were under the age of 25. By 1996, with smaller numbers of new entrants, the percentage had fallen to 17.3. The latter figure was still above the national percentage of 16.1. Indeed, one labour force characteristic of note throughout the region has been the higher proportions of young people. In every one of the four provinces, and in every year of the period covered by Table 7, the percentage of the labour force under 25 years of age was well above the all-Canada average.

One of the most significant postwar social and economic developments in Canada, as in the United States and other countries, has been the increased labour force participation of women. The trend has been persistent during the past four or five decades. Table 7 covers only the last 20 years, but the trend is clearly evident in the Atlantic Region for that period. The proportion of women rose in every province of the region in every five-year period shown in the table. For the region as a whole, the proportion in 1996—45.2 per cent—was exactly equal to the national average. The percentage varied a little from province to province—somewhat lower in Newfoundland, somewhat higher in Prince Edward Island—but the most striking features are the broad similarity of the percentages, and the roughly similar trends.

The rates of labour force participation are generally lower in the Atlantic Region than in the country as a whole, as shown by Table 8. That is true of men and women in all age groups. It is also true of three of the four provinces: with the notable exception of Prince Edward Island, the provincial rates fell short of the national rates in all age categories in 1996. The rates in Newfoundland have been the lowest by far: 29.5 per cent and 27.3 per cent for men and women under 20 years of age in 1996, compared with 48.1 and 46.6 per cent for the nation; 63.6 and 56.1 per cent for men and women 20 to 24, compared with 78.8 and 72.1. Even in the "prime" working ages, 25 to 54, the rates were far below the national ones. The low Newfoundland rates probably reflect in large measure the depressed state of the labour market in that province. The figures in Table 8 are annual averages. If one looks at seasonal patterns of participation, it is clear that the biggest gaps between provincial and national rates occur in the winter months, when opportunities for employment are particularly scarce. However, the rates are lower at other times too, and whatever the seasonal pattern, the net effect is that the average labour force over the course of a year is well below its potential level.

Table 7: Percentages of the Labour Force Under 25 Years of Age and 55 and Over, and the Percentage of Women in the Labour Force, Atlantic Provinces and Canada, 5-Year Intervals, 1976-1996

	1976	1981	1986	1991	1996
% of labour force under 25					
Newfoundland	31.2	28.1	23.3	20.9	17.1
Prince Edward Island	30.1	27.2	24.3	20.1	18.9
Nova Scotia	28.5	27.3	24.3	19.5	17.0
New Brunswick	30.0	27.3	23.4	19.7	17.4
Atlantic Region	29.7	27.5	23.8	19.9	17.3
Canada	27.3	26.5	22.6	18.3	16.1
% of labour force 55 and over					
Newfoundland	9.0	8.0	7.3	6.3	6.6
Prince Edward Island	14.2	11.6	10.6	10.4	9.7
Nova Scotia	12.9	10.2	8.9	8.2	8.4
New Brunswick	11.4	10.4	8.9	8.0	8.1
Atlantic Region	11.6	9.8	8.6	7.8	8.0
Canada	11.5	10.9	10.2	9.5	9.4
Women as % of total labour force					
Newfoundland	31.8	36.4	40.4	43.4	43.7
Prince Edward Island	37.5	40.9	43.6	45.9	46.4
Nova Scotia	36.6	40.7	42.5	44.9	45.7
New Brunswick	36.1	39.6	42.1	44.3	45.4
Atlantic Region	35.4	39.4	42.0	44.4	45.2
Canada	37.4	40.6	42.8	44.7	45.2

Table 8: Annual Average Labour Force Participation Rates of Men and Women, by Age Group, Atlantic Provinces and Canada, 5-Year Intervals, 1976-1996

	Men					Women				
	1976	1981	1986	1991	1996	1976	1981	1986	1991	1996
	(percentages)									
Ages 15-19										
Newfoundland	36.9	41.3	30.4	33.7	29.5	32.9	34.0	27.2	31.7	27.3
Prince Edward Island	60.3	55.4	52.7	53.8	57.1	46.0	46.0	49.1	47.9	51.0
Nova Scotia	47.5	50.5	45.8	48.4	42.4	40.1	48.1	47.0	48.9	41.1
New Brunswick	45.9	46.9	42.4	45.2	42.8	38.5	43.9	41.2	44.9	42.2
Atlantic Region	44.8	47.1	40.7	43.4	40.0	38.0	42.8	39.6	42.7	38.4
Canada	52.6	58.4	56.1	55.9	48.1	47.2	53.4	53.1	54.0	46.6
Ages 20-24										
Newfoundland	79.9	75.2	71.0	69.3	63.6	52.6	61.1	63.3	65.6	56.1
Prince Edward Island	82.0	82.7	81.4	85.4	84.0	68.0	70.4	74.1	77.1	75.5
Nova Scotia	85.3	82.7	83.1	79.9	77.4	64.5	69.3	76.2	73.9	72.0
New Brunswick	83.6	78.5	79.5	75.6	72.4	60.1	65.9	68.7	67.7	68.6
Atlantic Region	83.2	79.4	78.8	75.9	72.6	60.1	66.2	70.5	69.9	67.0
Canada	85.2	86.6	84.8	81.5	78.8	68.2	73.9	77.2	75.9	72.1
Ages 25-54										
Newfoundland	85.5	86.3	84.3	82.5	76.6	35.2	46.5	56.5	64.0	61.6
Prince Edward Island	90.9	91.1	90.8	89.7	90.4	49.5	61.4	70.5	79.0	81.8
Nova Scotia	91.4	91.4	91.7	90.2	86.6	46.5	56.9	64.0	71.9	72.5
New Brunswick	88.3	88.6	87.0	85.5	84.7	45.7	54.5	62.5	68.7	70.8
Atlantic Region	88.9	89.2	88.3	86.7	83.8	43.7	53.8	62.1	69.4	69.9
Canada	94.7	94.8	93.8	92.5	91.0	52.3	63.2	70.4	76.0	76.4
Ages 55 and over										
Newfoundland	36.1	33.1	29.6	24.5	22.2	8.6	9.0	8.9	9.2	9.0
Prince Edward Island	43.9	37.2	37.3	35.2	32.8	16.8	15.3	14.6	16.9	17.2
Nova Scotia	42.5	34.5	31.3	28.6	27.3	15.1	12.9	11.9	12.1	12.3
New Brunswick	39.6	36.8	31.6	28.0	25.6	14.2	13.6	12.4	11.5	13.0
Atlantic Region	40.3	35.1	31.4	27.9	25.9	13.6	12.5	11.6	11.6	12.1
Canada	47.9	45.7	40.8	36.0	32.7	17.7	18.4	17.3	16.9	16.8

Note: A participation rate is the percentage of the eligible population that is in the labour force in a given age group. Following the definitions in the Statistics Canada Labour Force Survey, both the labour force and the eligible population exclude full-time members of the armed forces, inmates of institutions, and persons living on Indian reserves. (The population definition differs from the one used in Table 6, where the labour force and employed labour force are expressed as percentages of the *total* population, all ages combined, with no exclusions.)

The Future Population

Now let us look into the crystal ball. We begin with a projection of the population, based on a computer model that we have developed, and applied in other contexts (Denton, Feaver, and Spencer, 1994, 1997). Taking a long view, we project the population all the way to the year 2036, at five-year intervals. Like other demographic or economic projections, this one will, of course, be wrong. No one can know exactly what the population will be at any future date, and chances are that the further into the future we look, the less accurate will be the results. Nevertheless, much of what is going to happen can, in fact, be predicted rather well, at least in broad outline. We can say with absolute certainty that the 40-year-olds of today will be 50 years of age in 10 years (those who do not die), and the 50-year-olds will be 60. We cannot know exactly what future mortality rates will be at different ages, but the rates change rather slowly, and differences in the rates will have rather a small effect on the projection. We cannot know just what fertility rates will be in the future, either. Another baby boom does not have zero probability, but the rates have been rather stable for many years now, and a large increase seems highly unlikely from today's perspective. In our basic projection—Projection A—we assume that current fertility levels will persist, and that mortality rates will continue to decline, although at a somewhat slower rate than in the past quarter-century.

Migration is a more difficult matter. Barring a major shift in the locational patterns of immigrants, variations in Canadian immigration levels are unlikely to have much effect on the population of Atlantic Canada. (Our assumption for projection purposes is that Canadian immigration will continue at roughly the level of recent years, and that the proportionate distribution of new immigrants among the provinces will remain the same.) However, variations in migration between the region and other parts of Canada could have a greater effect. What we have done is to assume, for purposes of Projection A, that net migration of that kind will change gradually from the average annual rate in the period 1992-97 to a rate of zero by 2006—that by 2006 the numbers moving into each of the four provinces will exactly balance the numbers moving out. That assumption has significant implications for Newfoundland, in particular, and we explore later the consequences of assuming instead that the out-migration of recent years will continue unabated. In order to focus mainly on a single projection, though, we have made the gradual tapering-off of net migration our basic assumption, and we think that a reasonable choice. The recent rates of loss of population from Newfoundland, especially, do not seem sustainable in the long run.

The Projection A population figures are presented in Table 9 for the region, its individual provinces, and Canada. The Canadian population is seen to increase every five years over the whole of the 40-year projection period, but the rate of increase is seen to decline markedly. Between 1991 and 1996, the population of Canada increased by 6.1 per cent. In spite of an assumed relatively high level of foreign immigration, it is projected to increase by only 5.7 per cent between 1996 and 2001, and by 2031-36 by a mere 2.0 per cent. The long-run consequences of continuing low fertility levels are clearly apparent in the projection for Canada.

They are apparent too in the regional and provincial projections. Under the assumptions we have made, the population of Atlantic Canada will continue to grow in each five-year period for the next 20 years. However, the rates of growth will be far below the Canadian rates, and after 2016 they will be replaced by decreases: from 2016 to 2036, the population of the region is projected to decline by about 5 per cent. With rates of increase consistently below the Canadian rates, and eventually giving way to declines, the share of the Atlantic Region in the national population will fall over the 40-year projection period, just as it has over the past 40 or 50 years. The region accounted for 8.0 per cent of the Canadian population in 1996; by 2016 the share is projected to fall to 6.8 per cent, and by 2036 to 5.8 per cent. On that basis, four decades from now the Atlantic Region's population share will be only about half of what it was when Newfoundland came into the confederation.

A pattern of declining growth rates is common to all four provinces, although the rates themselves vary considerably. In recent years Newfoundland has had by far the lowest fertility rates in the region (indeed, in the country). In spite of the assumption that its losses from net out-migration will diminish, and disappear entirely within a decade, its population is projected to decrease continuously over the 40-year projection period. On the other hand, Prince Edward Island and Nova Scotia are projected to increase in population until near the end of the projection period. In New Brunswick, the projected decreases begin in 2011-16.

The changes in Newfoundland are especially striking. The projected figure of about 462,000 implies a population in 2036 of roughly the same size as in 1960, and some 20 per cent below the level of the early 1990s. When Newfoundland became part of Canada, it accounted for about 2.6 per cent of the national total; by 2036 its share would be only 1.1 per cent.

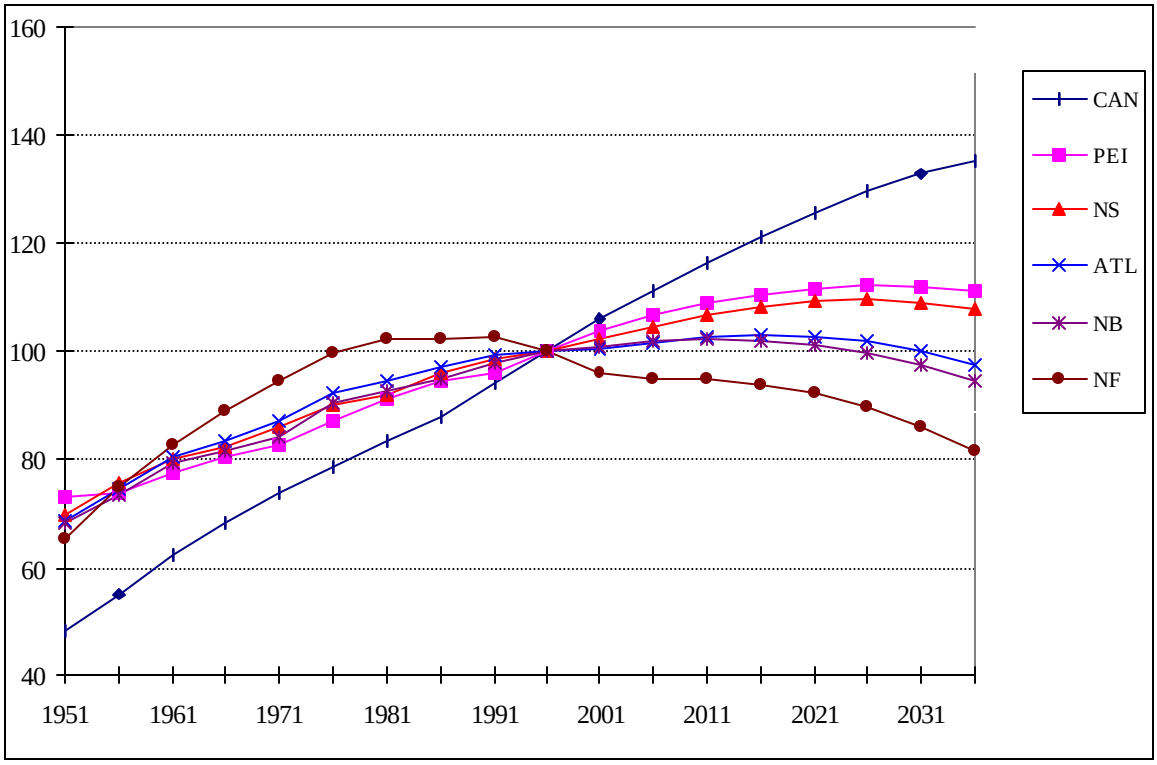
Table 9: The Future Population of the Atlantic Provinces and Canada, 5-Year Intervals, 1996-2036: Projection A

	1996	2001	2006	2011	2016	2021	2026	2031	2036
Population ('000)									
Newfoundland	565.0	541.4	536.0	535.0	530.1	520.7	506.0	486.1	461.6
Prince Edward Island	136.2	141.1	145.1	148.0	150.4	151.9	152.5	152.2	151.1
Nova Scotia	930.7	952.7	973.0	991.3	1006.0	1015.6	1018.4	1014.0	1003.5
New Brunswick	766.0	772.6	778.7	781.6	780.3	774.3	762.7	745.4	722.7
Atlantic Region	2397.9	2407.8	2432.8	2455.9	2466.8	2462.5	2439.6	2397.7	2338.9
Canada	29840.6	31554.5	33168.0	34692.3	36136.1	37471.1	38647.1	39624.7	40398.3
Increase, last 5 years ('000)									
Newfoundland	-15.3	-23.6	-5.4	-1.0	-4.9	-9.4	-14.7	-19.9	-24.5
Prince Edward Island	5.4	4.9	4.0	2.9	2.4	1.5	0.6	-0.3	-1.1
Nova Scotia	12.8	22.0	20.3	18.3	14.7	9.6	2.8	-4.4	-10.5
New Brunswick	17.5	6.6	6.1	2.9	-1.3	-6.0	-11.6	-17.3	-22.7
Atlantic Region	20.3	9.9	25.0	23.1	10.9	-4.3	-22.9	-41.9	-58.8
Canada	1720.5	1713.9	1613.5	1524.3	1443.8	1335.0	1176.0	977.6	773.6
% Increase, last 5 years									
Newfoundland	-2.6	-4.2	-1.0	-0.2	-0.9	-1.6	-2.8	-3.9	-5.0
Prince Edward Island	4.1	3.6	2.8	2.0	1.6	1.2	0.4	-0.2	-0.7
Nova Scotia	1.4	2.4	2.1	1.9	1.5	1.1	0.3	-0.4	-1.0
New Brunswick	2.3	0.9	0.8	0.4	-0.2	-0.8	-1.5	-2.3	-3.0
Atlantic Region	0.9	0.4	1.0	0.9	0.4	-0.2	-0.9	-1.7	-2.5
Canada	6.1	5.7	5.1	4.6	4.2	5.1	3.1	2.5	2.0
% of Region									
Newfoundland	23.6	22.5	22.0	21.8	21.5	21.1	20.7	20.3	19.7
Prince Edward Island	5.7	5.9	6.0	6.0	6.1	6.2	6.3	6.3	6.5
Nova Scotia	38.8	39.6	40.0	40.4	40.8	41.2	41.7	42.3	42.9
New Brunswick	31.9	32.1	32.0	31.8	31.6	31.4	31.3	31.1	30.9
Atlantic Region	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
% of Canada									
Newfoundland	1.9	1.7	1.6	1.5	1.5	1.4	1.3	1.2	1.1
Prince Edward Island	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Nova Scotia	3.1	3.0	2.9	2.9	2.8	2.7	2.6	2.6	2.5
New Brunswick	2.6	2.4	2.3	2.3	2.2	2.1	2.0	1.9	1.8
Atlantic Region	8.0	7.6	7.3	7.1	6.8	6.6	6.3	6.1	5.8

Note: See text for assumptions underlying the projection.

Indexes of population size (with 1996 set equal to 100.0) are shown in Figure 1 for each of the provinces, for the region as a whole, and for Canada. Historical and projected values are plotted at five-year intervals for the period 1951 through 2036. The use of indexes facilitates comparisons across the various jurisdictions over this 85-year period, and many of the points made earlier stand out clearly. For example, the relative flatness of the plot for the Atlantic Region reflects its slower population growth as compared to that of Canada, both before 1996 and more especially in the projection period. Also, the continued population growth for Canada as a whole stands in contrast to the projected decline in the Atlantic Region after 2016. Within the region, Newfoundland differs notably from the other provinces, in both its relatively high rate of population growth in the first two decades, and the early reversal of that growth, and onset of decline, after 1991.

Figure 1: Population Indexes, Atlantic Provinces and Canada, 1951-2036 (1996 = 100.0)



Note: Indexes are based on the actual population totals reported in Table 1 (for 1951-1996) and the projected totals in Table 9 (for 2001-2036).

Declining rates of growth across the country will be accompanied by marked shifts in age distribution, as shown in Table 10. For Canada, the proportion of the population 65 years of age and over is projected to double in the next 40 years. In 1996 it was 12.2 per cent; it is projected to be 16.5 per cent by 2016, and 24.5 per cent by 2036. To put it differently, about one in every six Canadians will be 65 or older within 20 years, and one in four within 40 years. In the Atlantic Region, the prospective shift towards the older ages is even more pronounced—from 12.2 per cent aged 65 and over in 1996 to 29.4 per cent (three out of 10) in 2036, for the region as a whole, and from 10.6 per cent to 31.2 per cent for Newfoundland. Accompanying the increases in the proportions of older people will be decreases at the young end of the age spectrum (barring some unforeseen major turn-around in fertility rates). Again, that is a national trend that is shared by the Atlantic Provinces. From 26.6 per cent of the regional population in 1996, the percentage under 20 years of age is projected to fall to 16.6 over the next 40 years; in Newfoundland, the percentage is projected to drop by roughly half—from 27.3 to 13.7.

Table 10: Projected Percentages of the Population Under 20 Years of Age and 65 and Over, Atlantic Provinces and Canada, 5-Year Intervals, 1996-2036: Projection A

	1996	2001	2006	2011	2016	2021	2026	2031	2036
% of population under 20									
Newfoundland	27.3	23.9	21.1	19.1	17.7	16.6	15.5	14.5	13.7
Prince Edward Island	28.6	27.1	25.6	24.1	23.2	22.3	21.5	20.8	20.2
Nova Scotia	26.1	24.6	22.9	21.2	20.1	19.4	18.8	18.3	17.7
New Brunswick	26.2	24.2	22.3	20.7	19.4	18.4	17.5	16.8	16.2
Atlantic Region	26.6	24.4	22.5	20.8	19.6	18.7	17.9	17.2	16.6
Canada	26.7	25.5	24.2	22.9	21.9	21.4	21.0	20.5	20.1
% of population 65 and over									
Newfoundland	10.6	11.6	12.6	14.5	17.9	21.7	25.3	28.6	31.2
Prince Edward Island	13.0	13.3	13.7	14.9	17.4	19.6	22.2	24.4	25.9
Nova Scotia	12.8	13.3	14.0	15.4	18.0	20.7	23.8	26.5	28.0
New Brunswick	12.6	13.3	14.2	15.8	18.9	22.2	25.7	28.9	31.0
Atlantic Region	12.2	12.9	13.7	15.3	18.2	21.3	24.6	27.5	29.4
Canada	12.2	12.7	13.3	14.5	16.5	18.7	21.2	23.4	24.5

Further information about changes in age structure is provided in Figure 2, which shows population "pyramids" for each of the provinces, for the region, and for Canada, at 20-year intervals from 1956 through to 2036. The horizontal bars show the percentages of the total population in each age group, with the youngest (ages 0 to 4) at the base and the oldest (ages 90 and over) at the top. (Except for the 90 and over group, all bars refer to five-year age groups.) Males are shown on the left side of the vertical line, females on the right.

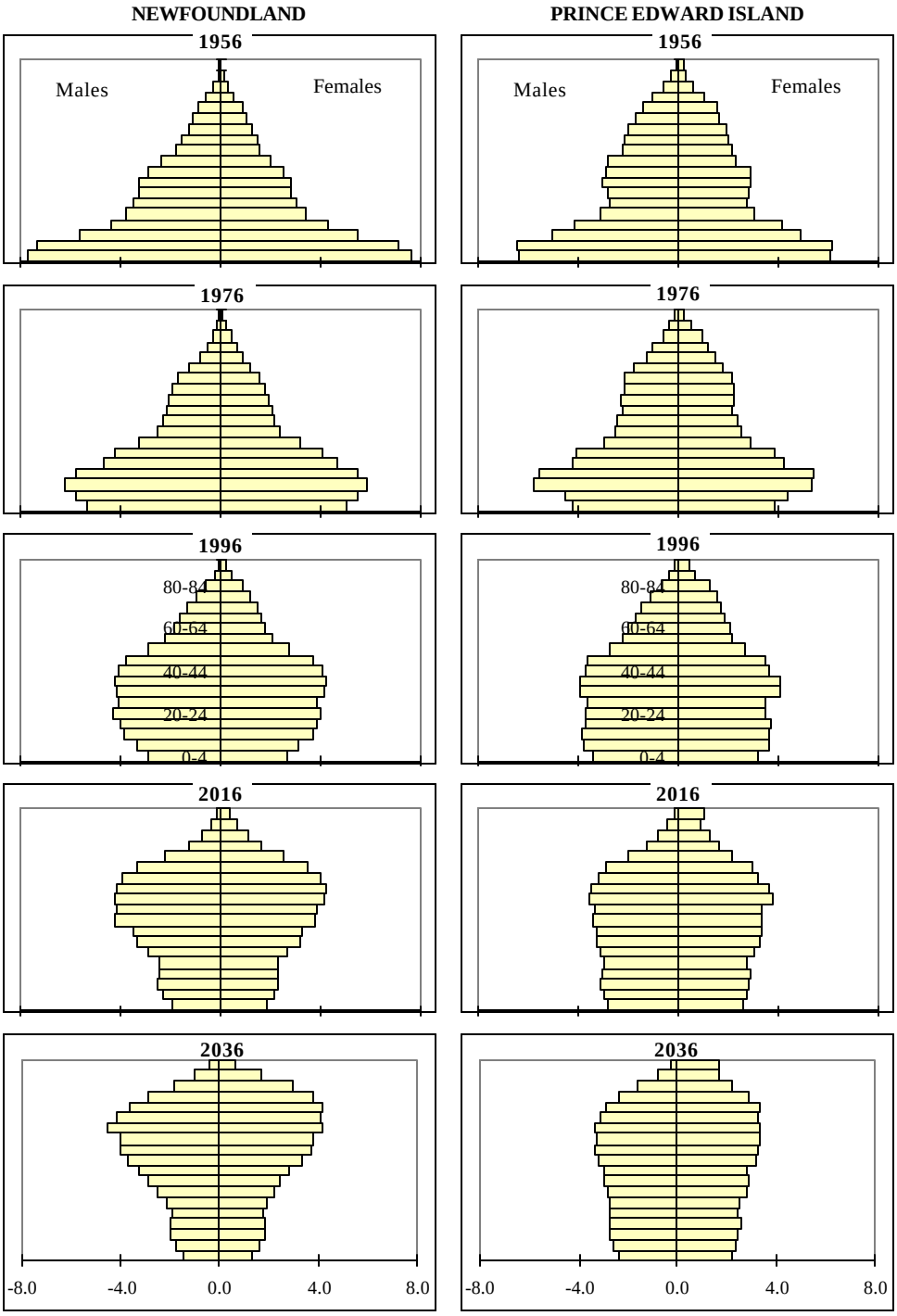
Perhaps the most obvious features of the pyramids are (a) that they are generally similar in shape in the different areas, and (b) that their shapes change markedly over time. All the 1956 pyramids have broad bases, reflecting the baby boom that was then under way throughout Canada. The subsequent narrowing of the bases in 1976, and again in 1996, reflects the baby bust. By 1996, as a close approximation, members of the baby boom generation were between the ages of 30 and 50, and their relatively large numbers are evident in the bulges in the 1996 pyramids for the age groups 30-34 through 45-49. With the assumptions underlying the projections, the bases of the pyramids continue to diminish, so that by 2016, and more especially 2036, the populations become concentrated in the older age groups.

While the changes in the shapes of the pyramids are broadly similar from one area to another, there are important differences that reflect what has happened and what is in prospect. A striking indication of the relatively rapid aging of the population in the region as a whole is evident from comparisons of the Atlantic Region pyramids with those for Canada. As can be seen, the region had relatively high proportions in the youngest age groups in 1956 and 1976. By 2016, however, it is projected that the age groups 40-44 through 70-74 will be proportionately larger in the region than in Canada as a whole, and that by 2036 the proportions in all of the age groups 50-54 and older will be larger than the corresponding all-Canada proportions.

Another notable difference is the absence of the baby boom "echo" in the Atlantic Region. In 1996, the all-Canada age groups 5-9 and 10-14 (children of the baby boomers) were larger than the age group 15-19, whereas in the Atlantic Region the reverse was true. Reductions in the size of the school age population in the Atlantic Region have obvious implications for the provision of educational services, just as the increases in the older population have implications for the health care system and social security.

The pattern of change in age distribution is quite similar in New Brunswick and Nova Scotia (the provinces with the largest populations) to that of the region as a whole. However, the situation is much different in Newfoundland. That province had an especially high proportion of young people in 1956 and 1976, and is projected to have an especially high proportion of middle-aged people by 2016, and middle-aged and older people by 2036. The situation is different also in Prince Edward Island, which is projected to have an increasingly large proportion of young people relative to the rest of the region. Indeed, the projected age distribution of PEI's population looks very much like the all-Canada one.

Figure 2: Population Age Pyramids, Atlantic Provinces and Canada, 1956-2036



Note: The horizontal bars on each side of the vertical lines represent, for males and females, the percentages of the total population in each five-year age group from 0-4 to 85-89 and in the group 90 and over. The pyramids for 1956, 1976, and 1996 are based on Statistics Canada data; those for 2016 and 2036 relate to Projection A by the authors. (See the text for assumptions underlying the projection.)

Figure 2: (Continued)

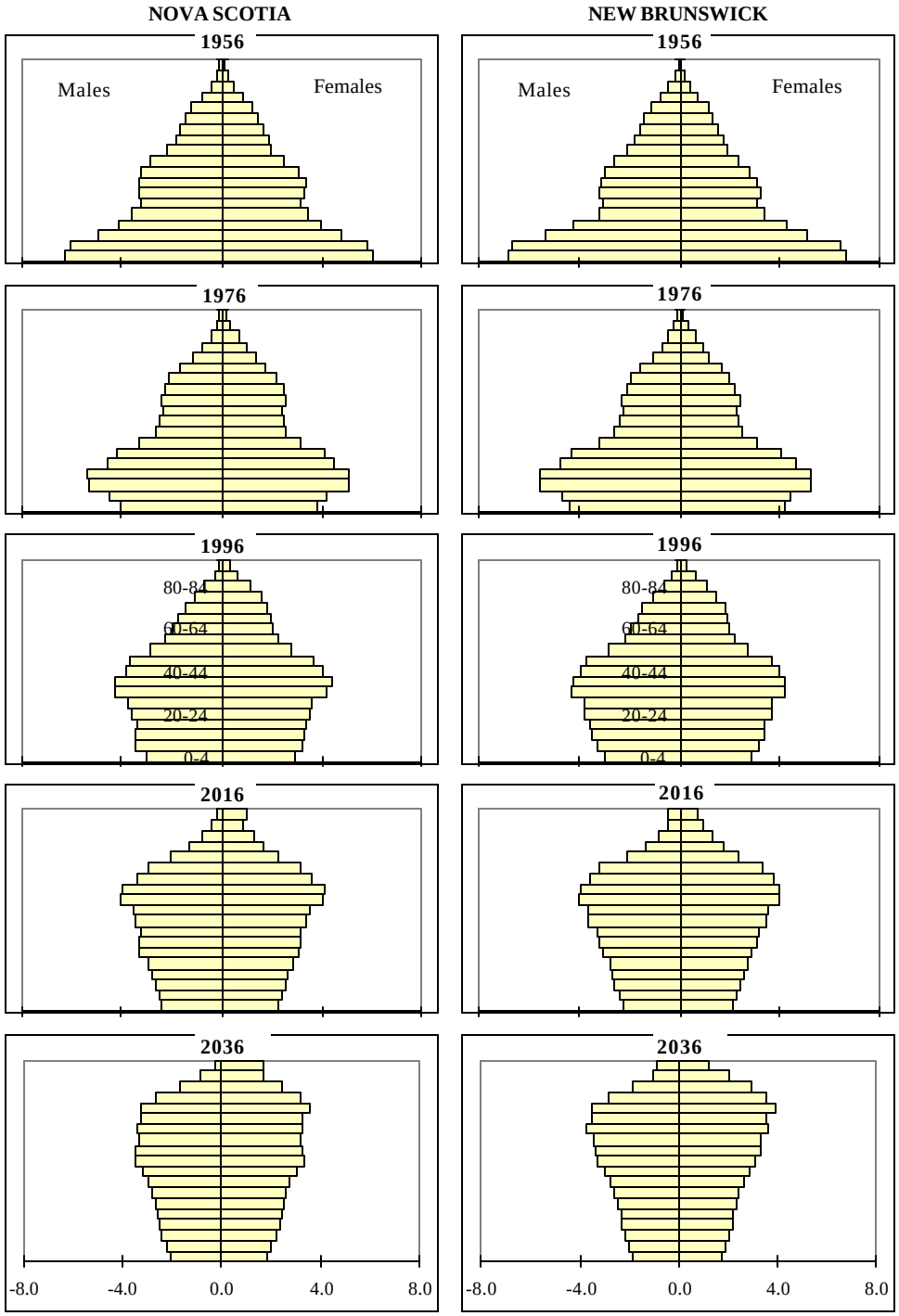
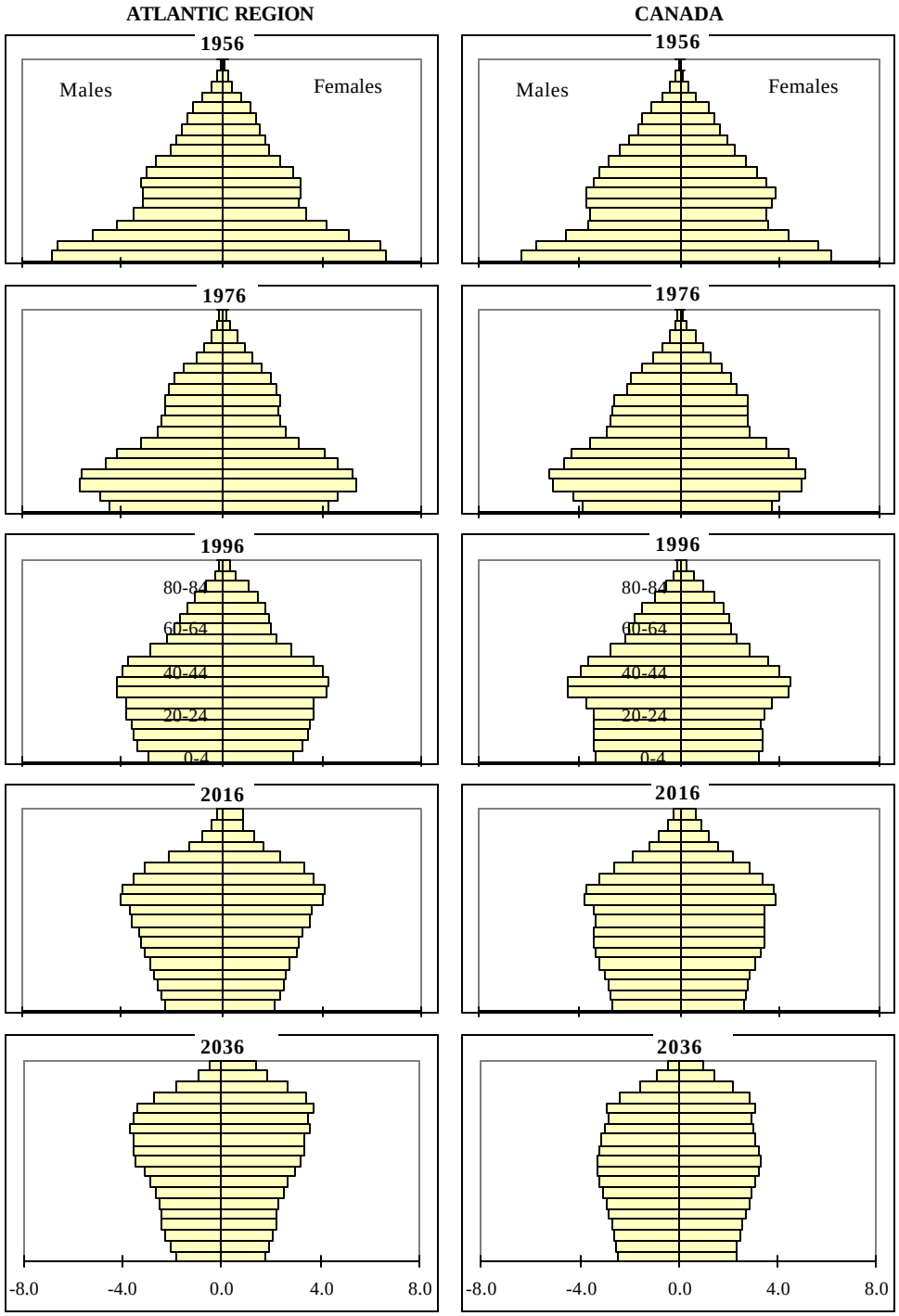


Figure 2: (Continued)



The Future Labour Force

A projection of the labour force is provided in Table 11. It is based on population Projection A, coupled with assumptions about participation rates for men and women in different age groups. The participation rates we have assumed take account of recent trends and our judgments as to likely modifications of the trends. Different assumptions would alter the labour force calculations, but only to a limited extent. Changes in the size and age distribution of the population will be the major determinant of the future labour force.

The rates of growth of the labour force have been lower in the Atlantic Provinces than in Canada as a whole in the past five years, with the notable exception (once again) of Prince Edward Island. Newfoundland is already experiencing negative growth and, according to the projections, will be joined by New Brunswick by 2006-11. By 2011-16 all four provinces will have started to register declines. If relatively high rates of foreign immigration continue (our assumption, but of course not a certainty), the Canadian labour force will be roughly constant after 2016, whereas all of the Atlantic Provinces will experience decreases. The Atlantic Region's share of the national labour force, like that of the national population, will continue to fall.

Table 11: The Future Labour Force of the Atlantic Provinces and Canada, 5-Year Intervals, 1996-2036

	1996	2001	2006	2011	2016	2021	2026	2031	2036
Labour force ('000)									
Newfoundland	235.5	229.8	227.3	222.6	211.1	197.3	183.0	167.8	153.9
Prince Edward Island	70.4	74.0	76.2	77.1	76.0	74.4	72.7	70.8	69.0
Nova Scotia	440.6	454.0	463.9	467.5	457.4	443.5	429.6	415.8	405.3
New Brunswick	354.1	361.4	362.7	358.3	343.6	325.8	308.1	289.2	273.0
Atlantic Region	1100.6	1119.2	1130.1	1125.5	1088.2	1040.9	993.4	943.5	901.2
Canada	15145.4	16099.6	16950.2	17617.8	17856.9	17935.3	17993.0	18051.1	18186.6
Increase, last 5 years ('000)									
Newfoundland	-12.6	-5.7	-2.5	-4.7	-11.4	-13.8	-14.3	-15.2	-13.8
Prince Edward Island	6.1	3.6	2.2	0.9	-1.1	-1.6	-1.6	-1.9	-1.8
Nova Scotia	6.5	13.4	9.9	3.6	-10.1	-13.9	-13.8	-13.8	-10.5
New Brunswick	13.8	7.3	1.3	-4.4	-14.7	-17.9	-17.7	-18.9	-16.2
Atlantic Region	13.8	18.6	10.9	-4.6	-37.3	-47.3	-47.5	-49.9	-42.4
Canada	737.6	954.2	850.6	667.6	239.1	78.4	57.8	58.1	135.5
% Increase, last 5 years									
Newfoundland	-5.1	-2.4	-1.1	-2.1	-5.1	-6.1	-7.3	-8.3	-8.2
Prince Edward Island	9.5	5.1	3.0	1.2	-1.4	-2.7	-2.2	-2.7	-2.6
Nova Scotia	1.5	3.1	2.2	0.8	-2.2	-3.4	-3.1	-3.2	-2.5
New Brunswick	4.1	2.1	0.4	-1.2	-4.1	-5.6	-5.4	-6.1	-5.6
Atlantic Region	1.3	1.7	1.0	-0.4	-3.3	-4.7	-4.6	-5.0	-4.5
Canada	5.1	6.3	5.3	3.9	1.4	0.6	0.3	0.3	0.8
Labour force as % of population									
Newfoundland	41.7	42.4	42.4	41.6	39.8	37.9	36.2	34.5	33.3
Prince Edward Island	51.7	52.4	52.5	52.1	50.5	49.0	47.7	46.5	45.7
Nova Scotia	47.3	47.7	47.7	47.2	45.5	43.7	42.2	41.0	40.4
New Brunswick	46.2	46.8	46.6	45.8	44.0	42.1	40.4	38.8	37.8
Atlantic Region	45.9	46.5	46.5	45.8	44.1	42.3	40.7	39.4	38.5
Canada	50.8	51.0	51.1	50.8	49.4	47.9	46.6	45.6	45.0

Note: The projected labour force is based on population Projection A, combined with projected participation rates.

Age Structure and Dependency Relations

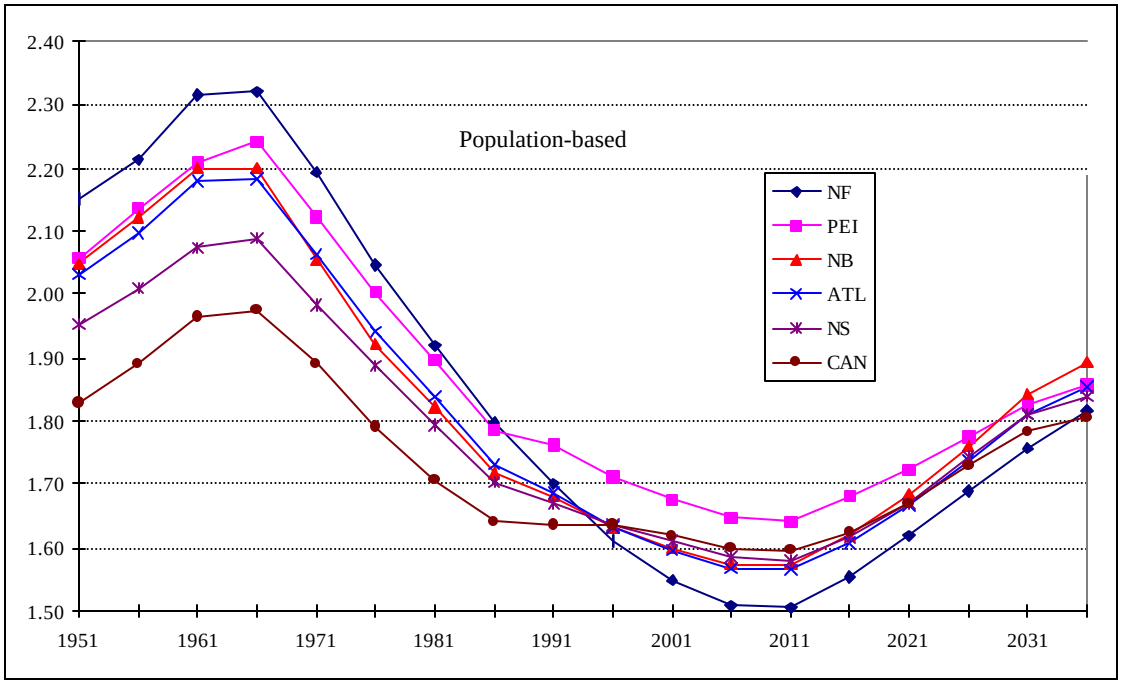
The population and labour force projections can be used to calculate measures of "dependency"—of the total number of "mouths to feed" in relation to the number of "providers", so to speak. Table 12 and Figure 3 show two types of dependency measures. The first is the ratio of the total population to the number of people aged 20 to 64, the latter represents a rough approximation to the population of working age. The second measure is the ratio of the total population to the number of people actually in the labour force. Historical values are shown in the table for comparison with the projected ones. As crude as they are, the two measures of dependency serve to indicate, in a rough way, the "burden" of a given population age structure for the economy.

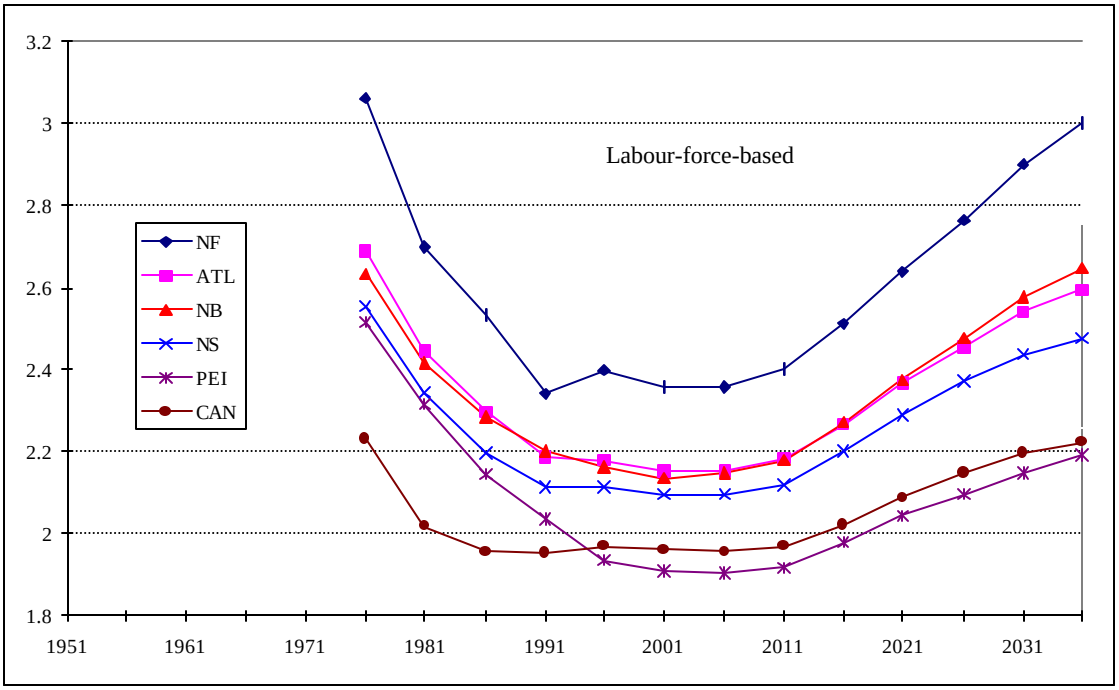
Table 12: Dependency Ratios, Historical and Projected, Atlantic Provinces and Canada, 10-Year Intervals, 1956-2036

	1956	1966	1976	1986	1996	2006	2016	2026	2036
Population-based ratios									
Newfoundland	2.21	2.32	2.04	1.80	1.61	1.51	1.55	1.69	1.82
Prince Edward Island	2.14	2.24	2.00	1.79	1.71	1.65	1.68	1.78	1.86
Nova Scotia	2.01	2.09	1.89	1.70	1.64	1.59	1.62	1.74	1.84
New Brunswick	2.12	2.20	1.92	1.72	1.63	1.57	1.62	1.76	1.89
Atlantic Region	2.10	2.18	1.94	1.73	1.63	1.57	1.61	1.74	1.85
Canada	1.89	1.98	1.79	1.64	1.64	1.60	1.62	1.73	1.80
Labour-force-based ratios									
Newfoundland	--	--	3.06	2.53	2.40	2.36	2.51	2.77	3.00
Prince Edward Island	--	--	2.52	2.14	1.93	1.90	1.98	2.10	2.19
Nova Scotia	--	--	2.55	2.20	2.11	2.10	2.20	2.37	2.48
New Brunswick	--	--	2.63	2.28	2.16	2.15	2.27	2.48	2.65
Atlantic Region	--	--	2.69	2.30	2.18	2.15	2.27	2.46	2.60
Canada	--	--	2.23	1.96	1.97	1.96	2.02	2.15	2.22

Note: The ratios for 2006 to 2036 are calculated using population Projection A. A population-based dependency ratio is defined as the ratio of the total population to the population aged 20 to 64. A labour-force-based ratio is defined as the ratio of the total population to the total labour force.

Figure 3: Dependency Ratios, Atlantic Provinces and Canada, 1951-2036





Note: See Table 12.

The population-based ratios go back to 1956 in Table 12, and to 1951 in Figure 3. The ratios rose between 1951 and 1966, reflecting the high fertility levels and large numbers of children born in that period. They then fell, as fertility rates dropped sharply, and as the baby boomers came of working age and thus changed their status from "dependents" to "providers". The decline in the ratios has continued for three decades, and is projected to continue for another decade. As the baby boom generation moves into old age, though, the ratios will once again start to increase. The increase will begin in about the second decade of the next century, and will continue to the end of the projection period. While the ratios differ between the Atlantic Region and Canada as a whole, and among the four provinces of the region, the most striking feature of the top parts of Table 12 and Figure 3 is the consistency of the patterns. The directions of change are the same in every province and at the national level.

The "dependency burden", as measured by the population-based ratio, is destined to rise, then, according to the projections. However, it is worth noting that even by 2036 the ratio will not be as high as it was in 1956 and 1966, in Canada or in any of the Atlantic Provinces. The composition of the "dependent" population will be different in 2036 from what it was in those earlier times, of course; it will be largely an old rather than a child population. Overall, though, the ratio of the total population to the population of working age will fall short of the levels attained during the 1950s and 1960s.

The labour-force-based ratios in the lower parts of Table 12 and Figure 3 are higher than the population-based ones but their patterns of change are generally the same. They can be calculated back only to 1976, thus missing the peak levels of the 1950s and 1960s. However, even using 1976 as a standard, the projected ratios will be roughly what they were then by the year 2036, and in some cases they will be lower.

As we have said, the dependency ratios are but crude indicators of the "burden" of the age structure. They do suggest, though, that the problems will lie not so much with the overall economic burden as with the need to reallocate public and private expenditure to accommodate the shift from a younger to an older population. Relatively less will need to be directed to education, for example, and more to health care and pensions. But in the aggregate, reallocation rather than total cost would seem to be the major concern for the future.

CHANGING THE PROJECTION ASSUMPTIONS

It is of interest to see how the population projections would be affected by changing some of the basic assumptions. Three alternative projections are offered in Table 13, together with the original one, Projection A. Projection B assumes that recent rates of net migration to and from the rest of Canada will be maintained—specifically, that the annual rate in each of the four provinces will be equal to its 1992-97 average. Projection C assumes that mortality rates will decline more rapidly than in Projection A. Life expectancy at birth in A increases at the national level by 5.1 years between 1996 and 2036 for men, and by 3.8 years for women; in C, with lower mortality rates, the increases are 6.7 and 5.6 years. Mortality rates in each of the four Atlantic Provinces have been modified in a manner commensurate with the changes in the national rates. Finally, Projection D assumes a sharp upward movement of fertility rates—a rise of 50 per cent over the decade 1996 to 2006, with the rates remaining at the higher levels thereafter. We hasten to add that we do not expect such an increase in fertility; the higher rates would still be well below the levels of the 1950s and earlier 1960s, but there is nothing to suggest that an increase of the assumed magnitude is likely. Nor do we expect the rates of migration in Projection B actually to hold over the next four decades. (The alternative assumptions about mortality rates underlying Projection C are more plausible, although our preferred choice is those of A.) Our sole purpose in displaying the alternative projections in Table 13 is to explore the sensitivity of the projections to changes in basic assumptions—to see how "robust" are the conclusions we have drawn above. In the interest of brevity, we show the alternative projections only at 20-year intervals in the table.

How much difference do the changes in assumptions make? The changes in migration assumptions have large effects on the population totals in the Atlantic Provinces, as seen by a comparison of Projection B with Projection A. The Prince Edward Island population is increased while the populations of the other three provinces are reduced. In A the population of Newfoundland is projected to fall to about 462,000 by the year 2036; in B it is projected to fall to 216,000. Again, we do not think the assumption underlying B is credible, but the comparison serves to highlight the critical importance of migration to the demographic future of Newfoundland, and more generally the Atlantic Region.

Table 13: The Future Population and Its Age Distribution, Atlantic Provinces and Canada, 20-Year Intervals, 1996-2036: Four Alternative Projections

	Population ('000)			% under 20			% 65 and over		
	1996	2016	2036	1996	2016	2036	1996	2016	2036
Projection A									
Newfoundland	565.0	530.1	461.6	27.3	17.7	13.7	10.6	17.9	31.2
Prince Edward Island	136.2	150.4	151.1	28.6	23.2	20.2	13.0	17.4	25.9
Nova Scotia	930.7	1006.0	1003.5	26.1	20.1	17.7	12.8	18.0	28.0
New Brunswick	766.0	780.3	722.7	26.2	19.4	16.2	12.6	18.9	31.0
Atlantic Region	2397.9	2466.8	2338.9	26.6	19.6	16.6	12.2	18.2	29.4
Canada	29840.6	36136.1	40398.3	26.7	21.9	20.1	12.2	16.5	24.5
Projection B									
Newfoundland	565.0	429.1	215.5	27.3	15.4	2.6	10.6	21.5	60.3
Prince Edward Island	136.2	157.0	168.5	28.6	23.5	20.9	13.0	16.8	24.0
Nova Scotia	930.7	986.5	953.2	26.1	19.9	17.3	12.8	18.3	29.1
New Brunswick	766.0	764.2	681.4	26.2	19.2	15.7	12.6	19.2	32.5
Atlantic Region	2397.9	2336.8	2018.6	26.6	19.1	15.5	12.2	19.1	33.2
Canada	29840.6	36136.1	40398.3	26.7	21.9	20.1	12.2	16.5	24.5
Projection C									
Newfoundland	565.0	531.8	468.3	27.3	17.6	13.6	10.6	18.1	32.0
Prince Edward Island	136.2	151.1	153.8	28.6	23.1	19.8	13.0	17.6	27.0
Nova Scotia	930.7	1010.7	1022.3	26.1	20.0	17.4	12.8	18.3	29.1
New Brunswick	766.0	783.8	736.5	26.2	19.3	15.9	12.6	19.1	32.1
Atlantic Region	2397.9	2477.4	2380.9	26.6	19.5	16.3	12.2	18.5	30.4
Canada	29840.6	36282.6	41018.7	26.7	21.9	19.9	12.2	16.7	25.4
Projection D									
Newfoundland	565.0	564.6	541.9	27.3	22.7	20.2	10.6	16.8	26.6
Prince Edward Island	136.2	163.5	186.9	28.6	29.4	28.5	13.0	16.0	21.0
Nova Scotia	930.7	1081.4	1202.8	26.1	25.7	25.2	12.8	16.7	23.3
New Brunswick	766.0	838.1	869.9	26.2	25.0	23.9	12.6	17.6	25.8
Atlantic Region	2397.9	2647.6	2801.5	26.6	25.1	24.0	12.2	17.0	24.6
Canada	29840.6	39070.6	48652.0	26.7	27.8	27.8	12.2	15.3	20.3

Note: Projection A is the basic projection; B, C, and D incorporate particular departures from the assumptions underlying A. Projection B assumes continuation of 1992-97 migration patterns throughout the projection period. C assumes greater declines in mortality rates and D assumes a rise in fertility rates. See text for additional detail.

The sharply reduced Newfoundland population in Projection B is accompanied by a much higher proportion of elderly people: in A the proportion 65 and over is projected to be about 31 per cent by 2036; in B it is projected to be 60 per cent, reflecting the disproportionately large losses of younger people associated with out-migration. There are changes in the proportion of elderly people in the other provinces too, although they are of a much smaller order than in Newfoundland.

What about mortality: do changes in the assumptions about death rates have much effect? The answer is no. The effects are rather minor, even after 40 years, as a comparison of Projections C and A makes clear. That conclusion applies to the total population, and it applies also to its age distribution. Contrary to popular belief, lower mortality rates and greater life expectancies would have little consequence for the collective aging process, as represented by the increased percentage of population 65 and over.

Increases in fertility rates would have more of an effect, as evidenced by Projection D. They would produce a larger population in each province, of course, and they would raise the percentage of young people and lower the percentage of old. But the percentage old would still double in the Atlantic Region as a whole over the next four decades, and would still rise sharply in each of the provinces. Combining this result with the results observed for Projections B, C, and D, it is safe to say that population aging will be a prominent fact of life for the provinces of Atlantic Canada over the coming decades, regardless of what happens to migration, mortality, and fertility. As elsewhere in the country, the inertia of the collective aging process is too strong to be offset by other demographic influences.

We can go further. Suppose that an immediate and sustained improvement in the economic fortunes of the region resulted in a sudden reversal of demographic trends, all favouring more rapid population growth. Suppose an increase in fertility (Projection D) were to be combined with an immediate end to net interprovincial out-migration from each of the provinces (an exaggeration of the assumption underlying Projection A) and that each were to begin immediately to receive a proportionate share of immigrants. We do not show the projection based on this implausible set of assumptions, but simply note that even then the proportion of older people would increase sharply. We conclude that population aging is inevitable, and something that cannot be ignored in the framing of economic and social policy. If ever there was something that could be anticipated far in advance, it is surely the future increase in the elderly population.

What Effects on the Economy?

Population growth and age structure have profound economic implications. It is beyond the scope of this paper to explore in any detail how the economies of the Atlantic Provinces will be affected by demographic change. However, it is perhaps helpful to indicate the nature of the effects that one would look for, and some of the questions that one would want to address if effects on the economy were to be explored further.

The most direct and obvious effect of population change is on the productive capacity of the economy. A higher birth rate produces a larger number of new entrants into the labour market after a little less than two decades. The potential size of the work force is thus increased. But there are other effects too. On the one hand, young entrants have received their formal training only recently. They are the bearers of new ideas, and are likely to be more adaptable than older workers. On the other hand, they are inexperienced, and that tends to limit their immediate contribution to productivity. The labour force will be numerically greater as a consequence of an influx of youth, but when and by how much its average level of productivity will rise depends on the net result of those opposing tendencies. Studies have shown productivity to rise generally with age, but to flatten out in mid-career, and then possibly fall somewhat as retirement age approaches. (That is an average sort of pattern; the pattern varies from one occupation to another.)

The present situation in the Atlantic Provinces, and generally throughout Canada, is of course the reverse of what we have just described. The low birth rates of the past quarter century mean falling numbers of new labour force entrants, and consequently fewer young, recently trained, more adaptable, but less experienced workers. That situation will probably continue for many decades to come. The rate of labour force growth is likely to decline, and the average age of the working population to rise. A remaining question is what will happen to labour productivity as a result of the change in the proportions of younger and older workers.

Migration of course provides an alternative source of labour force growth, and one with effects that are more or less immediate, since migrants tend to be concentrated in the younger adult ages. However, the Atlantic Region has received only a small share of immigration to Canada in recent decades, and it has had a deficit in its exchange of population with the rest of the country. Circumstances vary from province to province, but overall it seems unlikely that the labour force of the region will expand to any considerable extent as a consequence of migration. Indeed, it is more likely to contract from migration if the recent outflows from Newfoundland continue. Thus neither natural increase nor migration can be expected to provide much of a stimulus on the supply side of the economy, or to be a significant source of growth in the region's productive capacity. A question, then, is to what extent technological advances and capital investment will offset the slow growth and likely eventual decline of the labour force.

Turning to the demand side of the economy, new household formation is also determined by births, with a lag of two decades or more, and by migration. Standard economic life cycle theory tells us that households save during their working years and dissave in old age. There are many qualifications to that, and there is evidence that for many households saving continues well after retirement. Of course, the presence of children also alters a household's saving/consumption pattern, as does a spell of unemployment. The main point, though, is that the age distribution of its population can have an important bearing on a society's patterns of saving and spending, and on the types of consumption goods that are purchased. The demand for new housing is related directly to the rate of household formation; the demand for food, clothing, and recreation to average household size and composition; the demand for educational services to the numbers and age distribution of children; and so on.

Population-related changes in rates of saving have a bearing on the financial resources available for investment. Changes in consumption patterns affect the demand for the products of different industries, inducing some to expand, others to contract. Rates and types of investment are thus influenced—investment in residential and nonresidential building construction, in machinery and equipment, in roads, sewage systems, and infrastructure generally. The demand for imports may be affected too, both in size and composition. Changes in the fortunes of individual industries have implications for employment, and for the availability of jobs in particular parts of the economy: some areas and occupations may prosper, others suffer. In short, the economic effects of population change can be important, varied, and pervasive.

The effects will be felt in both the private and public sectors of the economy. Public-sector effects include changes in the tax base, on the one hand, and in the demands for program expenditures, on the other. Some of the expenditure effects are obvious: expansion of educational facilities following a rise in the birth rate, retrenchment and coping with excess capacity following a decline; increased requirements for hospital beds and health care personnel as the population ages; increased pension commitments as larger numbers of people cross the retirement threshold. But other types of public expenditure are affected too. We have carried out detailed studies of the effects of population change on government budgets at the federal level, and for the Province of Ontario (Denton and Spencer, 1978,1985,1995). The studies have identified those types of expenditure that are insensitive, or relatively insensitive, to changes in the population (defence expenditure is a good example at the federal level), and those that are highly sensitive. Similar studies would be possible for other provinces. They would identify those areas of public expenditure in which demographic change indicates that contraction might be appropriate and those in which increases would be required if service levels were to be maintained.

Health care is an area of concern to provincial governments across the country. Expenditures on health care have risen sharply, and controlling them has become one of the most prominent (and controversial) aspects of public policy. A widespread belief is that the increases are largely a consequence of population aging. That is not correct; the collective aging process is much too slow to account for the recent increases, and one must seek the causes elsewhere.[2] Nevertheless, the aging process continues, slowly but inexorably, and it will put increasing pressure on health care systems as time passes. An understanding and anticipation of the effects of population change in that area of public policy will be extremely important, given that health care programs represent such large fractions of overall government spending.

With our colleague Amiram Gafni we have developed a detailed model of the health care system in Ontario—SHARP, as it has been named ("System for Health Area Resource Planning"). SHARP encompasses submodels of health care requirements and resource

[2] For example, between 1966 and 1995 provincial expenditures on health care in Atlantic Canada increased more than 350 per cent (after allowing for price increases) while the population increased by only 20 per cent; even the older population (which uses relatively more health care services) increased less than one-quarter as rapidly as expenditures. We note also that during that same period education expenditures increased more than three-fold, even though the population under the age of 20 declined by almost 30 per cent.

availability, including the availability of hospital beds and physicians, nurses, and other practitioners. It allows one to explore the implications of alternative health care delivery systems by computer simulation and to compare the future requirements of the population with the future availability of resources. (For description and applications of SHARP, see Denton, Gafni, and Spencer, 1992, 1993, 1994, 1995a, 1995b.)

The development of SHARP required the assembly of data from a variety of sources, and the fitting of the data into a consistent framework representing the health care system as a whole. That exercise alone we found to be helpful as an aid to understanding how the system works, quite apart from the use of SHARP itself for simulation analysis. In developing SHARP we emphasized the importance of viewing health care as a comprehensive, integrated system, rather than looking at only one part of the system or another in isolation, and designing policies piecemeal. The model can be used to address many questions of policy relevance. What are the implications for personnel requirements, and for future enrolment in training programs? More specifically: how many physicians will be required, in each specialty, to serve the health care needs of the changing population? How many nurses and other health care providers? What about physical facilities? How many hospital bed days will be needed, and of those, how many in intensive care, rehabilitation, and so on? How many bed days in nursing homes? What difference would it make if more care were to be provided in "the community", less in institutions?

The need to anticipate demographic change is evident also for the education system. In each of the provinces in the region the school age population is likely to be much smaller in the years ahead than it is today. The numbers are quite striking. Based on our Projection A, for example, the decrease in the population of elementary school age will be roughly in the range one-tenth (Prince Edward Island) to one-third (Newfoundland) over the next two decades, and in a similar range in the following two decades. With obvious lags, the smaller numbers will work their way through the entire education system, affecting secondary and then post-secondary enrolment as well. The smaller numbers of students at each level suggest a reduction in the requirements for teachers. But how well will normal attrition through retirement and departures of teachers for other reasons match the anticipated reduction in student numbers? What are the implications for teacher training programs? What about the number of classrooms that will be required, and the associated implications for capital expenditures? In such matters there are obvious advantages in anticipating well in advance the consequences of demographic trends.

Summing Up

Let us take stock. The Atlantic Region has experienced considerable demographic growth. Nevertheless, its percentage of the Canadian population has declined continuously over the past half-century, and further declines seem likely. In large measure that can be attributed to the fact that the region, and each of its provinces, receive disproportionately small shares of immigrants to Canada. Like the rest of the country, the Atlantic Provinces experienced the postwar baby boom, and the subsequent bust, and in consequence their populations are now aging, in a collective sense. Within a little over a decade the first of the baby boomers will be "old" by conventional definition, and the percentages of population 65 and over will rise continuously in the decades that follow. If rates of fertility remain at or near their current low levels, population growth will eventually be replaced by decline. Net migration to and from the rest of Canada has been strongly negative in Newfoundland, and the population of that province has actually decreased in recent years. Even if a migration balance were to be restored the present outlook is for substantial further declines in Newfoundland as a result of its exceptionally low fertility rates. While slower growth and eventual declines are in prospect throughout the Atlantic Region, the trend is likely to be much more pronounced in Newfoundland.

As the rate of population growth diminishes in Atlantic Canada, so too does the rate of growth of the labour force. That, coupled with relatively low participation rates, has important implications for the future productive capacity of the region. Actual levels of production (and hence income) continue to be restricted by unemployment rates well above the national average. In some other respects, though, the labour force patterns of the region are quite similar to those of Canada as a whole. A notable similarity is in the increased participation of women.

The relationship between the working and nonworking components of the population can be captured in a simple way by calculating "dependency" ratios. We have calculated two types: (a) the ratio of the total population to the population 20 to 64 years of age, and (b) the ratio of the total population to the labour force. Both types reflect the "burden" of the age distribution at any given time. Our projections indicate that the "dependency burden" will rise in Atlantic Canada, as elsewhere in the country, and that it will continue to rise far into the future. One would expect that as the population ages. What is of particular interest, though, is that even by 2036, the end of our projection period, the "burden" will fall short

of what it was in the 1950s and 1960s. The dependent population will be predominantly elderly rather than youthful, as in those earlier decades, but the overall ratios will not be as high. In light of that we have suggested that issues of reallocation of resources will be the important ones, rather than the total "cost" of population aging.

We have focused mainly on a particular set of demographic projections, based on what we think are reasonable assumptions. Our projections, like all others, will be wrong; to state the obvious, no one can anticipate the future with certainty. However, alternative projections suggest that the main conclusions are unlikely to be affected much by changing the assumptions. Faster declines in mortality rates would have very little effect on the growth and age distribution of the population. There is nothing to suggest that fertility rates will increase sharply, but even if they were to increase, the age distribution would still shift toward the older end; population aging would still be a future fact of life. Changes in rates of migration would alter the rates of growth, of course, but they too would not reverse the collective aging process. Indeed, if out-migration were to remain at recent levels in the Atlantic Region as a whole, and especially in Newfoundland, the increases in the proportions of elderly people would generally be greater than what we have predicted, inasmuch as migrants tend to be concentrated in the younger adult ages.

Slower growth and aging affect the labour force, and hence a region's ability to generate output and income. But they affect virtually all other aspects of the economy too. They affect patterns of saving and household consumption, and hence investment. They have differential effects on sales, production, and investment levels in different industries, and their impact thus falls unevenly on different areas within a region. They affect the tax bases from which provincial governments must draw revenue, and they affect too the demands for government program expenditures. Work carried out in other contexts suggests the feasibility and importance of anticipating the effects of population change on government expenditures.

Education, pensions, and health care are major budgetary components with obvious sensitivity to population change, and they deserve special attention. However, other components can be affected also. In the case of health care, it is particularly important that the delivery system be viewed as just that—a system—in assessing the implications of population change, and that future resource availability be considered, as well as requirements. That is true of education and other government program areas, but it is especially important in the case of health care, where piecemeal and inconsistent policies are a greater risk.

We conclude with further observations concerning the relationships between prospective demographic change, on the one hand, and public expenditures, on the other. In each of the provinces in the Atlantic region economic planning should anticipate that the school age population will be much smaller in the years ahead than it is today. That is of major practical concern: How many teachers will be required in 10, 20, or 30 years in each of the provinces? How many will have to be hired, after taking into account the likely numbers of retirements, and departures for other reasons? What are the implications for teacher training programs? How much classroom space will be needed? At the other end of the age spectrum, planning should anticipate large increases in the numbers of elderly people. What health care and other services will be required to meet the needs of a rapidly aging population? How much of each type of service? And how will future needs for personnel and facilities compare with what are likely to be available? Only careful analysis can provide the information required to make well informed policy decisions and policies that take prospective demographic changes into account are likely to be better than those that ignore them. The case was put strongly in the April 1995 Notice of Motion establishing the Select Committee of the Legislature on Demographics in New Brunswick: "It is imperative for government to understand and assess the impact of our changing society in the context of our aging population and the demands and challenges this presents for the design and delivery of programs and services". (Province of New Brunswick, 1996).

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