Reasearch Note/Note de recherche

Population-Output Linkages: A National and Regional Perspective

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Real output growth in an economy, over the medium-term, can be thought of as a combination of labour force growth, which reflects population growth, and productivity growth in that economy. Employed labour and productivity are the most important factors in output generation and, consequently, the output potential of an economy is largely determined by employment and productivity potential. Employment potential, in turn, is determined by the labour force and a "full-employment" unemployment rate. Finally, the labour force is determined by the size of the source population (for example, 15 years and over) and a "full-employment" labour force participation rate. This linkage of population growth to real output growth is a well-established feature of most macroeconomic models.

National population growth is determined by births, deaths, immigration and emigration. Since only immigration is subject to policy control in Canada, medium-term real output growth can be potentially raised by increases in im-

This paper was originally presented at the "Conference on the Gap Between Actual and Potential Output", hosted by the Policy and Economic Analysis Program, University of Toronto, August, 1994. The authors thank Miles Corak and other conference participants for helpful comments.

ISSN: 0705-4580 Printed in Canada/Imprimé au Canada

migration although, as noted by the Economic Council (1991) and others, the connection is far from direct.

Of particular importance in these calculations is the choice of the "full-employment" unemployment rate since it determines participation rates, the level of employment and productivity and, hence, the output potential of the economy. A key ingredient in the choice of the "full employment" unemployment rate is not only the potential trade-offs with other macroeconomic variables of importance (such as inflation, exchange and interest rates), but also the extent which regional dimensions impact on the determination of unemployment and productivity growth in the country.

This paper focuses on many of these linkages. It examines historical data to review the past performance of the Canadian economy from a labour market perspective and then uses these results to assess potential growth for the Canadian economy. It shows that, primarily due to the "unique" age structure of the Canadian population, medium-term potential real output growth has been declining for some time, in spite of the recent increases in immigration levels. Second, it argues that a regional perspective is also essential in fully understanding the future growth potential of the Canadian economy. Third, both the age structures of the population and regional issues can impact productivity change. These important dimensions -- age structure, regional and productivity issues -- are often missing from most macroeconomic analyses of economic growth potential.

Methodological Framework

The standard framework for analyzing the impacts of population growth on real output growth is summarized in Figure 1. Clearly, the components of population growth lead directly to real output growth, given the labour force participation, unemployment rates, productivity growth and the "other" exogenous factors in the production process. The dashed lines in Figure 1 capture the possible feedback effects of the unemployment rate on the components of population growth, the participation rate, productivity growth rate and, perhaps, on the utilization rates of capital and the "other" factors in the production process. Since all variables depend on the unemployment rate, the central feature of the unemployment rate in the calculations is illustrated in Figure 1.

While this is the relevant linkage for medium-term analysis, many short-term macroeconomic models reverse the arrows on the right-hand side of Figure 1, using output to determine employment (via an "inverted" production function). In this way, the unemployment rate is determined as a residual difference between labour supply (the labour force) and labour demand (employment). This is the essential difference between short-term forecasting and medium-term analysis -- the former focusing on the dominant role of the demand side of the economy, while the latter focuses on the dominant role of

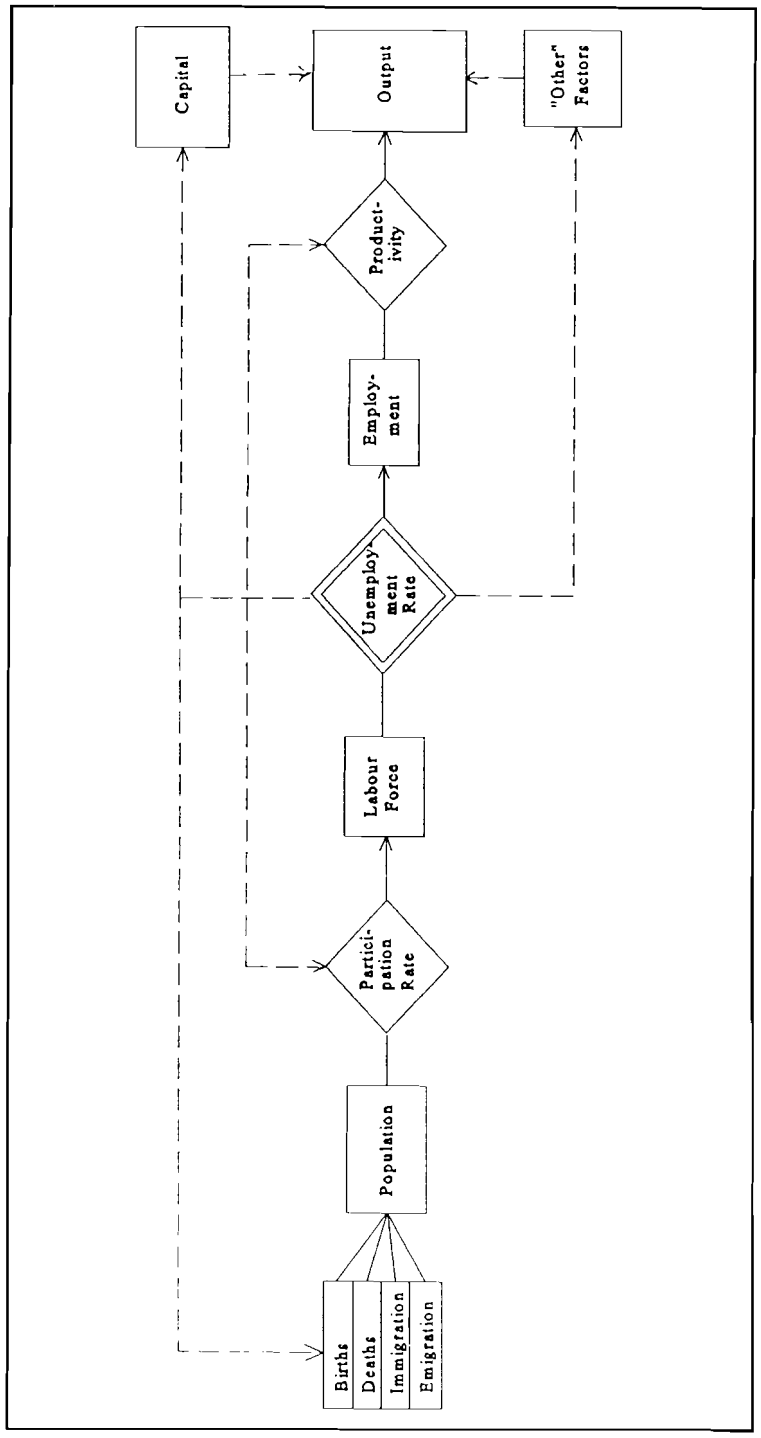

FIGURE 1 The Standard Population-Output Linkage

the supply side of the economy.

Not surprisingly, there are many shortcomings of the schematic represented in Figure 1. Traditional government policy variables, such as government expenditures, the money supply and, perhaps, interest and exchange rates apparently are excluded. Yet these can be viewed as being "off" the right-hand side of the figure and are primarily relevant for short-term forecasting. More importantly, age (and gender) and regional structures are excluded from Figure 1. Not only are these relevant for both short-term forecasting and medium-term analysis, they are also especially important considerations in analysis of the Canadian economy.

The next two sections outline the importance of these two influences -- demographic and regional structures -- on potential output in Canada. The fourth section considers productivity growth and the possible influences of age structure and regional issues on productivity growth. Full appreciation of the role of these impacts is essential in assessing the gap between actual and potential output in the Canadian economy and, hence, for the choice of policy mix in guiding the economy along its medium-term potential output path.

Age Structure Impacts on Potential

Table 1 summarizes real output growth in Canada over the four decades of the 1950s to the 1980s. It clearly shows that real output growth averaged over 5 per cent per annum over the 1960s and 4.6 per cent per annum over the 1950s and 1970s. The striking feature of this column is the reduction of real output growth over the 1980s to under 3 per cent per annum -- a reduction of 2.3 percentage points compared to the 1960s and 1.7 percentage points compared to the 1950s and 1970s. Why did this occur?

The clues are also to be found in Table 1. Population growth has been declining throughout the period, reaching its lowest level of 1.2 per cent per annum over the 1980s. While this helps to account for the lower output growth of the 1980s, it does not account for the pattern in the previous three decades. To get a better picture, it is necessary to examine the growth of the population aged 15 years and over -- commonly referred to as the source population for the labour force. Here annual growth rates in excess of 2 per cent were experienced over the 1950s, 1960s and 1970s, with a noticeable reduction of a full percentage point over the 1980s. This better helps to account for the real output growth pattern and, especially, the noticeable decline in output growth over the 1980s.

However, the output decline is even better accounted for by examining the labour force growth profile where annual growth rates in excess of 3 per cent were experienced over the 1960s and 1970s. In the 1980s, annual labour force growth averaged less than 2 per cent. In fact, **almost the entire decline in real output growth over the 1980s can be accounted for by the decline in**

TABLE 1 Demographic, Labour Force and Output Growth by Decade, Canada, 1950-90 (per cent per annum)

	Population	Source Population	Labour Force	Employment	Real GDP
1950-60	2.7	2.1	2.0	2.0	4.6
1960-70	1.8	2.3	3.0	2.3	5.2
1970-80	1.4	2.2	3.3	3.1	4.6
1980-90	1.2	1.2	1.7	1.6	2.9

Source: Department of Finance Canada, *Economic and Fiscal Reference Tables* and calculations by the authors.

labour force growth. This reflects both the decline in source population and in participation rate growth. Whereas the increasing labour force participation rate added a full percentage point to annual labour force growth over the 1960s and 1970s, its contribution over the 1980s was cut in half.

Finally, these data also reflect the secular rise in unemployment rates in Canada. Despite the enviable job creation record in Canada over the 1960s and 1970s when employment growth averaged 3 per cent per annum, it still did not match labour force growth over the period and, hence, the unemployment rate drifted upward. This, of course, is partly due to the changing age structure of the population. Moreover, even though labour force growth declined noticeably over the 1980s, so did employment growth which still did not match the growth in the labour force, with the resultant continuation of the secular increase in the unemployment rate over the 1980s, but at a slower pace.

What accounts for these facts? First, the secular decline in population growth is primarily attributable to the declining numbers of births, especially over the 1960s and 1970s as a result of the decline in fertility reflecting, in part, the introduction of the birth-control pill and women entering the labour market. Over this period, immigration averaged slightly over 140,000 persons a year, whereas over the 1980s this level dropped to 126,000 persons a year. Consequently, although births rose slightly over the 1980s as a result of the baby boomers having children, immigration fell which further exacerbated the decline in population growth.

Second, the noticeable difference between population and source population growth is attributable to the entry of the "baby-boom" generation -- born in Canada between 1947 and 1966 -- into the labour force source population between 1962 and 1981; that is, over the 1960s and 1970s. Those born into the smaller cohorts of the subsequent "baby-bust" generation of the late 1960s and 1970s have been entering the labour force over the 1980s and, hence, source population growth declined noticeably.

Third, the difference between labour force and source population growth is attributable to rising participation rates, especially female participation rates,

over the 1960s and 1970s. For example, while the male participation rate increased slightly from 77.8 to 78.4 per cent between 1970 and 1980, the female participation rate increased from 38.3 per cent to 50.4 per cent. Over the 1980s, the female participation rate continued to climb, but not at such a rapid rate, reaching 58.4 per cent by 1990, whereas the male participation rate declined to 75.9 per cent by 1990. Consequently, more slowly growing female participation rates (especially in the youth ages) and declining male participation rates over the 1980s reduced the contribution of participation rate growth to labour force growth by over one-half compared to the previous decades. In addition, a slightly lower proportion of immigrants were destined to the labour force over the 1980s compared to the previous two decades -- 47 percent compared to 49 per cent -- and this further compounded the above trends.

Fourth, the difference between employment growth and labour force growth in large part reflects the performance of the Canadian economy. For three decades, but moreso over the 1970s when the bulk of the boomers entered the labour force, employment growth did not match labour force growth, resulting in increases in the unemployment rate. While this increase may be attributable to a multitude of factors, such as changing demographics, shifts in industrial and regional structures and so on, it nonetheless suggests an endemic problem in need of correction. A secularly rising unemployment rate over three decades does not suggest an economy fully utilizing its available resources; that is, operating near its potential.

What does the future hold? To a large extent this depends on the path of immigration policy. By 1993, the annual immigration intake has moved to in excess of 250,000 persons. While a stated policy of both the previous Conservative government and its Liberal successor, current levels greatly exceed the average over the previous three decades of approximately 135,000 persons per year. An often mentioned immigration policy of one per cent of the Canadian population would further raise this level to approximately 280,000 persons per year. Obviously, such historically high levels contribute positively to population and, hence, labour force growth, especially since most immigrants are of labour force age.

The most recent population projections from Statistics Canada are summarized in Table 2. A return to historically comparable levels of immigration in the 1990s and the first decade of the next century (the "low" projection), combined with lower fertility, shows population growth below one per cent per annum and source population growth slightly above one per cent per annum and comparable to the experience of the 1980s. Continuation of recent (1993) levels of immigration and fertility (the "medium" projection) shows both population and source population growth slightly above the 1980s growth rates. Higher immigration and fertility levels (the "high" projection) suggest population growth rates comparable to the 1970s but source population growth of approximately 1.6 per cent per annum. In all cases, source population growth continues to exceed population growth because most immigrants are of labour

TABLE 2 Projected Population Growth, Canada, 1990-2010 (per cent per annum)

	Characteristics		Population		Source Population	
	Fertility	Immigration	1990-2000	2000-10	1990-2000	2000-10
High	1.9	330,000	1.4	1.4	1.7	1.6
Medium	1.7	250,000	1.3	1.1	1.6	1.3
Low	1.5	150,000	1.1	0.7	1.5	1.0

Source: Statistics Canada and calculations by the authors.

force age, but not by much. The most likely outcome is, probably, somewhere between the low and medium scenarios, suggesting that both population and labour force source population growth over the 1990s and 2000s will further decline from 1980s levels.

Labour force projections require participation rate projections. Assuming that the pre-recession (1990) or the more recent lower (1993) national participation rates by age and gender remain unchanged, labour force growth is no longer above source population growth over the 1990s, and declines further to around one per cent over the first decade of the next century (see Table 3). This suggests a further loss of output growth potential of another 0.2 to 0.4 per cent annually, bringing medium-term potential real GDP growth closer to 2.5 per cent per annum.

Of course if, as suggested above, current macroeconomic operating rates are substantially below potential, higher real growth rates can probably be sustained through the mid-1990s to get the country back to its potential output growth path. To assess the potential impacts of this effect, Table 4 presents labour force growth rates based on a return to the peak participation rates of 1990 between 1995 and 2000. These calculations, in comparison to Table 3, indicate that an additional 0.5 per cent per annum average labour force growth is possible given the current demographics from an increase in labour force participation rates. Thereafter, however, Canada must be satisfied with growth potential targets well below postwar historical experience if it is to be successful at managing the macroeconomy. Labour force growth in the first decade of the twentieth century will likely fall further to around one per cent per annum unless labour force participation continues to increase.

Regional Impacts on Potential

The macroeconomic impacts of labour force growth are not likely to be evenly spread over the nation. Noticeable regional differences in demography will result in different labour force growth rates in the different provinces. If these differences are substantial, macroeconomic policies will need to reflect and respond to the regional differences. This section of the paper considers re-

TABLE 3 Projected Labour Force Growth, Constant Participation Rates, Canada, 1990-2000 (per cent per annum)

	1993 rates[a]		1990 rates[a]	
	1990-95	1995-2000	1990-95	1995-2000
High	0.9	1.5	1.4	1.5
Medium	0.9	1.4	1.4	1.4
Low	0.9	1.2	1.4	1.2

Source: Calculations by the authors.

a. Using gender specific participation rates for seven age groups (15-19, 20-24, 25-34, 35-44, 45-54, 55-64, 65+ years).

TABLE 4 Projected Labour Force Growth, Increasing Participation Rates[a], Canada, 1995-2000 (per cent per annum)

	1995-2000
High	2.0
Medium	1.8
Low	1.7

Source: Calculations by the authors.

a. Calculated using the lower 1993 participation rates for 1995 and the higher 1990 participation rates for 2000.

gional labour force growth and its components, both historically and into the future. The important role of productivity growth across regions is considered in the following section.

Figure 2 sets out the growth rates of selected provincial labour forces over the period 1979-93. There has been a substantial variation in labour force growth rates across the provinces over the 1980s. The age structure of the population, in combination with participation rates, has much to do with labour force growth, as was discussed in the previous section. But a detailed understanding of regional labour force growth requires an examination of the role of interprovincial migration. Data on interprovincial migration rates for the 1980s are shown in Table 5.

Not surprisingly, there is a clear correlation between these interprovincial migration rates and regional labour force growth rates. Some examples will illustrate the point:

- in Ontario, the high labour force growth rates coincide with the strong economic growth in the province and the resulting net in-migration;
- the very high growth rates of the labour force in British Columbia at the end of the period match periods of very high in-migration

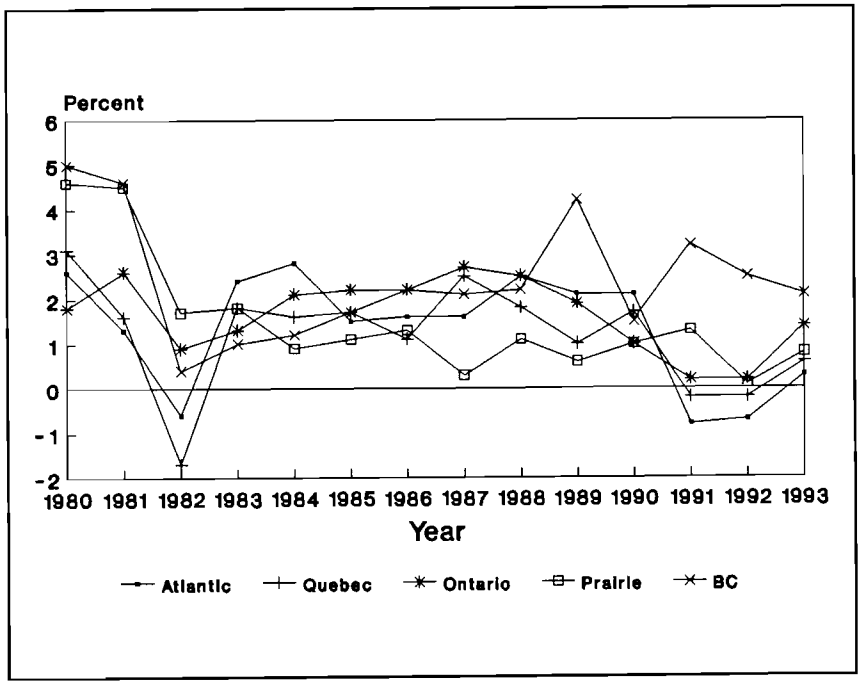

FIGURE 2 Labour Force Growth Rates, 1980-93

TABLE 5 Interprovincial Migration Rates by Region, 1980-90

	Atlantic	Quebec	Ontario	Prairies	B.C.
1980	-0.57	-0.36	-0.39	0.75	1.42
1981	-0.51	-0.40	-0.07	0.79	0.32
1982	0.44	-0.38	0.27	-0.13	-0.05
1983	0.19	-0.27	0.41	-0.67	0.24
1984	-0.06	-0.12	0.38	-0.52	-0.07
1985	-0.40	-0.08	0.37	-0.30	-0.16
1986	-0.34	-0.06	0.47	-0.85	0.26
1987	-0.30	-0.12	0.38	-0.92	0.73
1988	-0.06	-0.11	0.10	-0.62	0.93
1989	-0.10	-0.13	-0.06	-0.54	1.35
1990	-0.24	-0.18	-0.10	-0.28	1.29

Source: Statistics Canada.

Note: Computed as net migration in the region (or province) as percentage of that region's (or province's) population.

rates; and

- the energy boom in Alberta attracted migrants to that province and, consequently, kept the labour force growth rate high until energy prices fell early in the 1980s.

It is clear that these flows of interprovincial migrants must be considered in determining the potential growth of a province and, as will be argued later, the nation. Furthermore, as noted in the previous section, the role of international immigration is also having an effect on labour force growth and since these international migrants tend to locate in primarily three provinces, the consequences for potential growth in the provinces is clear.

An important characteristic of interprovincial migration is illustrated in Table 6, which shows the 1991 out-migration for the province of New Brunswick disaggregated by province of destination and by educational attainment. Since it is typically the better educated people that migrate, people with lower skills who are potentially less employable are the ones left behind. Using New Brunswick as an example, as the last column of Table 6 indicates, 36.2 per cent of out-migrants from New Brunswick (aged 15 years and over) had a university degree. Also, as this table shows, out of the university educated migrants, almost 38 per cent located in Ontario, 24.5 per cent in Nova Scotia and just under 15 per cent in Quebec. These data suggest that increasing education does not always benefit the province in which the education occurs, but may benefit other provinces in the nation in respect of labour force and potential output growth.

Next the role of differences in participation rates across provinces is considered. Table 7 presents provincial participation rates by age for 1993. In general, labour force participation rates are higher in the Western provinces than in the Eastern provinces and are higher for males than for females. Over the previous two decades, these participation rates have, on average, been falling for males (especially in the older age groups) and rising for females. Nonetheless, considerable regional variation is apparent from the data presented in Table 7. Note that, for example, participation rates for young males (aged 15-19) that were higher in Alberta than the other provinces during the energy boom period, fell to be in line with the other provinces after the fall in energy prices. Also, in comparing New Brunswick with other provinces during the boom of the 1980s, the discouraged worker effect was still in evidence in New Brunswick as shown by lower participation rates. All of this suggests that there is an important role for differences in participation rates in determining labour force growth, which in turn affects potential economic growth.

In summary, there is an important relationship between provincial labour force growth and interprovincial migration, and potential provincial (and, therefore, national) economic growth. There can be little doubt that the underlying determinants of interprovincial migration, the skills of the migrants and differences in participation rates have important regional implications. Moreover, since a nation is comprised of regional components, regional economic growth differences can and do effect national growth potential.

TABLE 6 Out-Migration from New Brunswick of Persons Aged 15 and Over, 1986-91

	Place of Residence in 1991										
	NF	PE	NS	QU	ON	MN	SK	AL	BC	TOTAL	Percent of Total Migration
Less than Grade 9	55	65	345	575	820	40	20	200	160	2280	6.5
Grades 9 and 10	90	120	670	650	1295	80	55	290	120	3370	9.5
Grades 11 to 13	60	70	485	360	1520	140	50	365	195	3245	9.2
Secondary School Certificate	85	165	850	755	1995	175	55	425	270	4775	13.5
Trade School Certificate	10	30	230	215	425	55	10	75	45	1095	3.1
Other, Non-University	220	195	1825	1130	2940	185	100	590	585	7770	22.0
University	415	375	3130	1910	4805	290	150	730	980	12785	36.2
Total	935	1020	7535	5595	13800	965	440	2675	2355	35320	
Migration of University-Level People as a Percent of Total	3.2	2.9	24.5	14.9	37.6	2.3	1.2	5.7	7.7		

Source: Statistics Canada, *Mobility and Migration*, Table 3, Catalogue 93-322.

Looking into the future, there are two critical underlying assumptions: first, assumptions about demographics (in particular the age-gender composition of the population) and second, assumptions about labour force participation rates. As previously noted, the first of these assumptions is made easy, since demographic assumptions are available on a provincial basis. In the labour force projections, the three variants noted in Table 2 are used. However, in these provincial projections, the assumptions made with respect to internal migration are also important. In this regard, the first two projections assume "medium" internal migration (whereby there is net in-migration to both western and central Canada) while the high scenario assumes that Ontario is the main destination for migrants.

The second assumption is more difficult since the participation rates do vary significantly by province and, particularly, for some demographic groups, with the business cycle. The labour force projection in Table 8 assumes that these provincial age-gender specific participation rates remain at their 1993 values as given in Table 7.

Table 8 sets out projected labour force for the year 2000 and its growth over 1995-2000 by province. As this table indicates, there is not a significant

TABLE 7 Labour Force Participation Rates by Age, Gender and Province, Annual Averages, 1993 (per cent)

	NF	PE	NS	NB	PQ	ON	MN	SK	AB	BC	CAN
MALES											
15-19	28.6	43.8	42.7	44.9	44.2	53.0	58.5	56.9	58.5	55.5	50.7
20-24	64.8	78.5	79.6	73.7	76.8	79.7	84.3	81.2	82.1	85.1	79.6
25-34	76.3	89.8	88.9	85.3	89.2	93.4	93.4	92.9	93.9	93.3	91.7
35-44	81.9	93.4	90.6	88.1	90.7	94.3	94.4	95.2	95.4	94.5	93.0
45-54	78.3	88.5	83.6	82.1	87.7	91.0	91.2	92.4	92.5	92.0	89.7
55-64	44.7	50.8	49.1	52.4	55.1	64.1	66.9	71.4	66.8	61.6	60.9
65+	10.2	10.2	10.2	10.2	8.0	10.5	13.2	22.9	15.9	7.7	10.2
TOTAL	59.9	71.3	67.7	66.3	71.1	74.7	74.5	74.8	78.9	73.7	73.3
FEMALES											
15-19	27.6	45.7	46.4	44.9	42.4	52.4	53.7	50.2	56.9	50.6	49.0
20-24	57.0	80.4	71.6	69.7	69.3	73.8	78.8	71.3	74.0	75.2	72.5
25-34	65.2	81.8	74.8	71.9	73.4	77.2	77.6	77.1	77.8	75.2	75.6
35-44	63.7	80.9	74.3	71.2	75.5	80.2	82.2	84.7	82.6	79.6	78.6
45-54	54.1	73.9	60.8	64.5	65.0	75.4	79.8	80.1	78.0	74.2	71.8
55-64	21.2	28.3	28.3	28.2	29.3	39.8	39.7	47.1	43.6	38.3	36.4
65+	3.7	3.7	3.7	3.7	2.0	4.6	4.5	6.1	5.2	3.6	3.7
TOTAL	46.0	59.5	52.5	52.0	53.7	59.5	59.0	58.7	64.2	57.9	57.5

TABLE 8 Projected Labour Force (2000) and Growth (1995-2000) by Province[a]

	NF	PE	NS	NB	PQ	ON	MN	SK	AL	BC	CAN
LABOUR						(millions)					
High	234.8	65.6	432.0	341.0	3647.1	6130.9	577.6	508.7	1531.3	2003.8	15472.8
Medium	241.3	66.9	435.0	346.5	3608.8	6039.3	566.9	490.8	1554.1	2017.2	15366.5
Low	240.7	66.8	433.7	345.8	3585.3	5976.3	563.8	489.2	1544.7	2004.5	15250.8
GROWTH						(per cent per annum)					
High	-0.02	0.51	0.38	0.23	0.43	2.04	1.02	1.08	1.37	2.12	1.53
Medium	0.21	0.76	0.47	0.46	0.82	1.77	0.70	0.52	1.60	2.18	1.40
Low	0.16	0.74	0.41	0.42	0.69	1.56	0.59	0.46	1.48	2.05	1.24

Source: Calculations by the authors.
a. Using 1993 participation rates (Table 7) and Table 3.

difference between applying the provincial age-gender specific participation rates to the provincial population projections and summing to obtain the national totals or directly computing the national labour force by applying age-gender specific rates to the national population projections. However, while the national totals are consistent, this does not mean that there are not significantly different effects in individual provinces.

Table 9 presents growth rates by age groups and gender for the "medium" projection for the provinces. These growth rates highlight the differences that can occur in potential economic growth across the provinces. For example, Newfoundland and New Brunswick exhibit negative labour force growth in the 2000-2010 period, due to negative growth rates of the labour force under the age of 45. This is in marked contrast to Ontario, Alberta and British Columbia where there are positive growth rates of labour force under the age of 35. This is a clear case where uniform national labour market policies are likely to be misguided in the sense of having undesirable impacts in some provinces while assisting others and, hence, where provincial (or at least regional) policies are appropriate.

Of particular importance is that, over the projection period, the major source of growth in all provinces is from the 45 and over age group. Again, this reflects a major theme of this paper -- with an aging population, the effect on the labour force growth and, consequently, potential economic growth of older workers is dramatic. That is, over the next 15 years, there are few gains to be made in labour force growth from young entrants to the labour market.

Productivity Impacts on Potential

The impact of the age and regional structure on potential economic growth has been indicated above but, in addition, these factors can have additional effects through their impacts on productivity which in turn can affect potential output growth. Following the theme of this paper, in this section, two potential impacts on productivity are considered: changing demographics (an aging population) and regional structures.

Consider first the impact of the age structure. An aging population has an advantage of providing an experienced workforce. But, at the same time, it is young entrants to the labour market who are likely to be more educated, flexible, innovative and receptive to the introduction of new ideas and practices in the workplace with respect to choice of occupation, industry and region; therefore, young entrants provide the most productivity improvements. However, it is difficult to determine which of these impacts will dominate. As Lazear (1989: 308) notes, there are a number of possibilities:

TABLE 9 Projected Labour Force Growth by Age, Gender and Province, Medium Scenario, 1995-2010 (per cent per annum)

	NF	PE	NS	NB	QU	ON	MN	SK	AL	BC	CAN
GROWTH RATES — 1995-2000											
MALES											
15-19	-2.20	-0.81	-0.12	-1.34	-0.09	2.16	0.70	0.51	2.06	2.70	1.27
20-24	-4.25	-1.65	-1.59	-2.45	1.65	0.42	-0.88	0.86	1.11	1.71	0.65
25-34	-1.15	-0.80	-1.78	-1.62	-2.31	-0.98	-1.57	-2.20	-1.70	-0.28	-1.38
35-44	0.17	1.76	1.38	0.95	1.44	3.07	1.29	0.21	1.43	2.13	2.06
45-54	3.71	2.80	2.95	3.23	2.95	3.66	3.09	3.97	4.88	4.34	3.62
55-64	2.90	1.73	2.53	2.96	2.89	2.36	1.72	0.78	2.80	2.93	2.56
65+	1.60	0.53	1.39	1.18	2.33	2.48	0.88	0.25	2.90	2.61	2.24
TOTAL	0.28	0.71	0.63	0.49	0.93	1.77	0.73	0.53	1.53	2.10	1.40
FEMALES											
15-19	-1.84	0.43	-0.06	-0.77	-0.05	2.17	0.47	0.60	2.05	2.87	1.33
20-24	-3.69	-0.89	-1.55	-2.09	1.29	0.30	-0.78	0.18	0.97	1.32	0.47
25-34	-1.47	-1.23	-2.33	-1.90	-2.42	-0.81	-1.66	-2.56	-1.53	-0.08	-1.34
35-44	0.17	1.52	0.93	0.76	1.13	2.68	0.93	0.48	1.88	2.30	1.88
45-54	4.08	3.02	3.44	3.91	2.99	3.97	3.44	3.77	5.04	4.80	3.87
55-64	3.17	2.06	2.42	2.43	2.59	2.53	1.92	0.81	3.14	3.28	2.62
65+	1.64	1.15	1.12	1.17	2.16	2.10	0.49	0.73	2.75	2.32	2.00
TOTAL	-0.07	0.78	0.28	0.31	0.59	1.74	0.67	0.44	1.69	2.24	1.31
GROWTH RATES — 2000-2010											
MALES											
15-19	-1.90	-0.21	-0.41	-0.89	0.64	1.54	0.22	-1.09	0.22	1.07	0.82
20-24	-2.55	-0.22	-0.16	-1.10	-0.06	1.82	0.56	-0.03	1.26	1.56	0.98
25-34	-2.99	-0.53	-0.92	-1.52	0.39	0.69	-0.07	0.57	0.88	0.97	0.48
35-44	-1.21	-0.77	-1.55	-1.52	-1.59	-0.11	-1.22	-2.14	-1.28	-0.09	-0.76
45-54	0.51	1.51	1.51	1.13	1.78	2.40	1.69	1.39	2.47	2.36	2.09
55-64	4.44	3.85	3.79	4.14	3.71	4.19	3.66	3.88	5.04	4.73	4.18
65+	2.14	1.46	1.82	1.85	2.34	2.30	1.09	0.35	2.69	2.42	2.21
TOTAL	-0.59	0.38	0.21	-0.07	0.61	1.47	0.58	0.35	1.18	1.53	1.06
FEMALES											
15-19	-2.14	-0.21	-0.53	-1.03	0.53	1.41	0.18	-1.21	0.50	0.97	0.74
20-24	-2.36	0.00	-0.13	-0.91	-0.08	1.77	0.57	0.03	1.32	1.59	0.98
25-34	-2.73	-0.55	-1.01	-1.34	0.23	0.60	-0.06	0.27	0.79	0.85	0.39
35-44	-1.57	-1.15	-1.87	-1.72	-1.80	-0.02	-1.26	-2.25	-1.08	-0.20	-0.79
45-54	0.63	1.49	1.37	1.16	1.62	2.65	1.44	1.59	2.80	2.52	2.20
55-64	4.64	4.25	4.08	4.52	3.62	4.34	3.79	3.73	5.06	4.97	4.26
65+	1.85	1.47	1.35	1.31	1.90	2.00	0.75	0.40	2.55	2.11	1.88
TOTAL	-1.04	0.19	-0.14	-0.31	0.23	1.41	0.45	0.15	1.16	1.39	0.91

> "..older workers may be better teachers, and previous productivity may have been lower because of fewer qualified teachers. One possibility is that older workers have a large amount of obsolete skills. Another is that they are the creators of skills in younger workers."

Alternatively, as noted by Welch (1989), productivity of mid-aged workers can be increased by increased numbers of younger workers, while a reduced inflow of younger workers will probably reduce older workers' productivity. At any rate, what is clear is that an aging population can have effects on productivity performance.

The regional structure influences productivity through different participation rates, different skills acquired by the labour market participants, different industrial structures, and so on. While it is difficult to assess the net impact of these various changes on productivity growth, they should not be ignored.

One example of regional policies will help illustrate the point. Consider, for example, the unemployment insurance policies that affect the labour market. Corak (1993) notes that repeated use of unemployment insurance by individuals is heavily influenced by seasonal, regional and industry specific determinants. If there are parts of the unemployment program that make attachment to the labour market more or less likely, this may have a negative effect on productivity and these effects may vary by province or region.

In addition, Johnson and Kneebone (1991) show that structural factors, such as unemployment insurance generosity and relative minimum wages, play an important role in determining "full employment" rates of unemployment across the Canadian provinces. Furthermore, the effects of these structural variables have a more important impact in the traditionally high-unemployment provinces. They suggest, therefore, that there is an important role for government labour market policies to reduce the "full employment" rate of unemployment. Indeed, some provinces, like New Brunswick, have been experimenting with policies to remove disincentives that cause people to lose attachment to the labour market. Again, this effect on participation has important implications for labour force and, hence, potential economic growth in the provinces.

Furthermore, as Leiser and Milne (1994) point out, in the final analysis it is increases in total factor productivity (TFP) growth that holds out the most opportunity for increasing potential economic growth, especially in the lagging regions. Their results suggest that there are some variables that are determinants of TFP growth which are within the control of government and in some cases directly determined by government -- for example, expenditures on transportation and communications, or through improved education opportunities and quality. With respect to education, their results suggest that while the growth of technical workers may slightly reduce TFP growth initially, the larger stocks of technical workers will enhance TFP growth in the future. There is, therefore, a link between the educational attainment of the labour force and its productivity growth. The other variables of importance are the

age structure of the population and the proportion of urbanized population. As noted throughout this paper, there can be little doubt of the pervasive importance of demographic trends in influencing potential economic growth.

Conclusion

There are a number of additional issues in the relationship between population and output growth that have not been considered in this paper. First, the mix of full- and part-time employment can impact output growth. Obviously, increased use of part-time employees at the expense of full-time employees reduces output growth and, conversely, the return to full-time employment by many of these employees will potentially increase output growth without increasing measured employment growth. Second, the duration of unemployment can have an impact on the ability of an economy to reabsorb employees back into employment. Corak (1993) has shown that, indeed, unemployment durations in Canada have increased and this leads to an increasing problem of how to deal with the long-term unemployed and the consequent effect on potential economic growth. Third, Foot and Venne (1990) have argued that an aging labour force is driving both organizational and career path changes in the economy. An aging baby boom-dominated labour force is driving a flattening of corporate structures which are associated with "spiral" career paths characterized by a number of occupational changes over and employee's lifetime. This implies greater opportunities for "generalist" employees with good generic skills that are transferrable across occupations. The impacts of these changes on productivity and output growth remain speculative at best. While all of these issues are important for both individuals and policy formulation, they are unlikely to affect the general macroeconomic conclusions drawn in this paper.

The major focus of this paper has been on the important role of demographic, especially age structure, and regional influences, and their effects on productivity growth in determining the potential real output growth rate of the Canadian economy. The impact of age structure on potential growth implies that growth rates evidenced in the 1960s and 1970s cannot be maintained in the medium-term future. The impact of the regional structure of the economy suggests that the nation-wide labour market policies that do not respect regional differences in labour force growth may serve to limit regional and, hence, national economic growth potential. Finally, the combined effect of age and regional structure is likely to influence productivity growth, but the net effects are far from certain. All of these impacts imply that potential real economic growth in Canada will slow down further in the 1990s and beyond. Future macroeconomic, fiscal and labour market policies should be designed to recognize these largely inevitable trends.

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