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CHANGES IN CANADA'S MULTIREGIONAL
POPULATION DYNAMICS: FROM THE
1960s TO THE 1970s

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FOREWORD

The evolution of human populations over time and space has been a central concern of many scholars in the Human Settlements and Services Area at IIASA during the past several years. From 1975 through 1978 some of this interest was manifested in the work of the Migration and Settlement Task, which was formally concluded in November 1978. Since then, attention has turned to disseminating the Task's results, to concluding its comparative study, and to exploring possible future activities that might apply the mathematical methodology to other research topics.

This paper is part of the Task's dissemination effort. It should be viewed as a follow-up on *Migration and Settlement: 6. Canada*, published by IIASA as part of its international comparative study on Migration and Settlement. This new analysis of Canada's spatial population dynamics covers a more recent period (1971-1976 instead of 1966-1971), thus allowing for the consideration of some important changes in the demographic behavior of the Canadian population.

Selected publications summarizing the work of the Migration and Settlement Task are listed at the back.

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of the Human Settlements
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INTRODUCTION

Interest in multiregional population dynamics has grown considerably in the 1970's in Canada. In recent years, and particularly since the debate on Canada's constitutional future has been revived following Quebec's 1976 elections, hundreds of books, papers and articles have been published on the country's population growth and on the future of each province's demographic weight within the Confederation. It is obvious indeed that in this debate on the future of Canada, the demographic share of each province is a prime factor. The constitutional debate has thus also become a demographic debate so much so that one of the leading Canadian newspapers could entitle one of its front page articles «The Demographer becomes king», and write : «...demography... is at the core of the debate over Quebec's future. For almost 20 years, Francophones have been haunted by the spectre of collective disappearance as shown in frightening dotted lines of projected population trends. While the spectre was certainly not new... it now had the ominous authority of the sophisticated tools of social science. Thus, what was once a dry, little-known branch of anthropology and statistics, and involves the dry, tedious and painstaking task of sifting through census data, birth and death statistics, and migration figures to project the variations into long-term trends, is now the most politicized of the social sciences» (Graham Fraser, in The Gazette, 20 January 1979).

This considerable interest shown by policy-makers and mass-media for Canada's demographic growth and population redistribution, is of course not the only justification for this report. The 1970's are indeed characterized by two important demographic phenomena which, as such, justify the updating of previous research, namely the considerable drop in fertility experienced in all provinces

and the remarkable reversal in interprovincial migration flows in favour of the provinces which, since decades, were losing population by migration. These changes in fertility and interprovincial migration are so considerable that many conclusions drawn from previous data have most likely become invalidated.

This report contains four parts. After discussing (in Chapter 1) the data, we describe (in Chapter 2) the 1971-1976 pattern of spatial population growth and compare with the one observed in 1966-1971 and used in our previous study (Termote, 1980). Chapter 3 is devoted to the multiregional life table and to spatial life and reproduction expectancies for the 1971-1976 period; again, results are compared with those obtained from the 1966-1971 data. In Chapter 4, we analyse the results of the population projections and the stable population equivalent. This discussion of population projections will include a comparison with previous population projections.

CHAPTER 1 - THE DATA

The multiregional life table and its related measures (Chapter 3) as well as the stable equivalent to the initial population (Chapter 4) are dependent only on the characteristics of the period they refer to and not on the situation before. Moreover, simulation exercises have shown how sensitive the results are with respect to the data used¹. This is why it is highly important to know precisely what data were used, how they were obtained, what kind of errors they are subjected to, and the impact of these errors on the final results.

Almost all basic data used in this report are of the same kind as those used in our previous analysis. This is why we will not repeat the lengthy discussion previously made on these data. Let us however recall that the spatial units are the ten provinces of Canada, that the choice of the period is determined by the date of the census, the only age-sex disaggregated migration data available being those obtained from the census question on the individual's place of residence five years earlier; that the number of births and deaths are obtained from the population registers, and that the provincial population data (by age and sex) used for obtaining the rates and probabilities are derived from the 1971 and 1976 censuses.

There are however some small differences in the source and the quality of the data used in this report, covering the 1971-1976 period, as compared with the 1966-1971 data used in our previous

1. This kind of simulation exercise may help the policy-maker decide about priorities in data collection, for instance whether to invest in an improvement of birth data or into a more reliable system of migration data collecting.

analysis. Because these differences in the data sources could affect the comparison between the two periods, we will discuss them in some detail.

1.1 Births

As in our previous analysis, vital statistics data on the number of births by sex and by age of the mother were used². The same procedures for translating these data (available on a civil year basis) into census period data, and for disaggregating (by age of mother) the total number of births in Newfoundland were adopted.

Even in such a so-called «highly developed» country as Canada, data on births may reserve some unpleasant surprises and should be used with caution, mainly for two reasons. First, there are each year a few hundred births for which the age of the mother is unknown. This represent of course a negligible percentage of the total number of births in Canada, but the problem is that these births are mainly concentrated in one province (Quebec) and that their number significantly increased in recent years. In 1966-1971, these births with unknown age of mother represented only 0,2 % of the total number of births in Canada, but in 1975, this percentage reached 0,7 % (0,6 % in 1976). Quebec alone was responsible for 90 % of these births in 1966-1971 and for 95 % in 1971-1976; these births with unknown age of mother represented 0,6 % of Quebec's births in 1966-1971, but 1,2 % in 1971-1976. Besides these registered births for which the age of mother is unknown, there is also some under-registration of births, which in

2. Note that, as previously, stillbirths are excluded and births are classified by province of reported residence of the mother, so that, for instance, events occurring in the United States to Canadian residents are included, but events occurring in Canada to residents of the United States are excluded.

some cases may be quite sizable. For instance, in 1978 Statistics Canada corrected for «under-registration» the total number of births in Newfoundland and Quebec previously published for 1974 : in total more than 5 000 births were added, representing respectively 11 % and 4 % of the total number of births in these provinces. These «post-registered» births, as well as those registered with unknown age of mother, were disaggregated among the different «age of mother five-year age groups», according to the known distribution. This could of course introduce some errors, but these may reasonably be considered as negligible, even in the case of Newfoundland and Quebec, because the 1974 correction for under-registration represents only a very small percentage of the total number of births over the 1971-1976 period.

1.2 Deaths

The same problem of under-registration or incomplete registration just discussed for births arises also for deaths, and again the phenomenon seems concentrated in Quebec.

Until 1975, there seemed to be no problem with mortality data, but this was maybe due to a lack of control in the registration procedure. While in 1974 there were only 2 deaths in Quebec for which age was not specified, this number suddenly reached 205 in 1975 and 372 in 1976; this represents about 90 % of Canada's «deaths for which age was not specified». Moreover, the total number of deaths in Quebec had to be corrected for 228 «not reported» deaths in 1975 and 166 in 1976 (these «not reported deaths» concern mainly the 0-1 age group, so that the correction was easy in this case). In total, Quebec's «not reported» and «age unknown» deaths represent about 1 % of the total number of deaths during those two years. Again, when needed, deaths for

which age was unknown were disaggregated proportionately to the known distribution³.

1.3 Migration

The main problem with census data on internal migration rests not only in their well-known weaknesses related to sample size, under-enumeration, incomplete response, multiple migration, return migration, emigration and mortality among migrants, but also in the fact that the bias introduced by these limitations changes from one census to another. We will not discuss here the problem related to multiple migration (including return migration) and the emigration and mortality among migrants, because they do not affect our results : we are indeed concerned only by the situation at some moments in time, and not by what happened during the period.

The migration data derived from the 1976 census were collected on a 33 1/3 % sample basis, instead of the 30 % sample used in the 1971 census : we may thus make the reasonable assumption that, from this point of view, the 1971-1976 data are comparable to the 1966-1971 data. No correction was made for under-enumeration of interprovincial migrants, because no information is available on the rate of under-enumeration by age group and sex for each province. The same problem arose with the 1966-1971 data, so that, for the purpose of comparison, we have to assume that age-sex specific rates of enumeration remained constant in each province; at the national level the rate of under-enumeration of interprovincial migrants was 5,0 % in 1971, and has been estimated to be 5,2 % in 1976. It should however be mentioned that these

3. Note that, as for births, stillbirths are excluded and deaths are classified by area of reported residence.

rates of under-enumeration over-estimate the actual level of under-enumeration introduced into our analysis. Our study is indeed based on rates, that is our under-enumerated migration figure is divided by a population figure which itself is under-enumerated. This neutralization is however only partial, because population is under-enumerated at a lower rate than internal migration.

Moreover, besides under-enumerated migrants, there are enumerated migrants whose response to the migration question was incomplete. Indeed, about 4 % of internal migrants declared only their migrant status, without specifying their previous municipality of residence. Those who did not provide any information at all on their previous province of residence were distributed proportionately to the number of known interprovincial migrants.

This is one of the three factors which explain why the total number of interprovincial migrants (1 011 853) used in our analysis, differs from the figure published by Statistics Canada (catalogue 92-828, table 35, page 1). According to this publication, the total number of interprovincial migrants aged five years and over was 915 120 (this figure included 19 250 interprovincial migrants, imputed because they gave enough information to establish their province of residence five years earlier)⁴. To this 915 120 figure, we added 24 238 «unknown» interprovincial migrants (which were disaggregated according to the known distribution of interprovincial migration flows) and 86 615 migrants aged between 0 and 4 years; by subtracting the 14 120 migrants who had left either Yukon or the Northwest

4. The 19 250 figure is obtained by comparing in catalogue 92-828 of Statistics Canada, the total number of interprovincial immigrants in table 40, page 1, to the number of interprovincial migrants given in table 41, page 1.

Territories (which, because of small and unreliable numbers, are excluded from our study), we obtain a total number of interprovincial migrants equal to 1 011 853.

The 24 238 «unknown» interprovincial migrants represent 12,4 % of the total number of migrants (195 420) for which no information on their previous place of residence was available. Note that the 195 420 figure represents only 4,2 % of the total number of internal migrants in Canada, compared to 7,2 % for the 1971 census. The number of unknown migrants who had to be disaggregated according to the known flows represents thus a much smaller percentage in 1976 than in 1971, so that, from this point of view, the 1976 migration data are better than the 1971 data : only 2,4 % of the total number of interprovincial migrants in 1976 (compared to 5,4 % in 1971) are concerned.

The second main difference between our total number of interprovincial migrants and the figure published by Statistics Canada refers to the migrants aged between 0 and 4 years. In this respect our 1976 data are probably more disputable than those used for the previous period. The 0-4 migration data for the 1966-1971 period were obtained from the question on the place of birth : those residing in 1971 in one province and born between 1966 and 1971 in another province are by definition migrants. Such an information was not available to us at the moment this report was prepared. We had therefore to rely on an indirect way of estimating those 0-4 migrants.

The ratio between the number of 0-4 migrants (obtained by comparing place of birth and place of residence) and the number of 15-34 female migrants, as observed from the 1971 census, was applied to the number of 15-34 female migrants as obtained from the 1976 census (the implicit assumption being that 0-4 children

migrate with their mother). This way of estimating the number of 0-4 migrants for the 1971-1976 period is based on the assumption that 15-34 females who migrated between 1971 and 1976 «brought» as many 0-4 children with them as the cohort of 15-34 females who migrated between 1966 and 1971. This obviously is disputable in view of the significant decline in fertility experienced in all provinces. This is why the so estimated number of 0-4 migrants was further adjusted for the change in the number of births between 1966-1971 and 1971-1976.

The last problem we had to consider with respect to the 1971-1976 migration data was related to the disaggregation of some age groups. In our previous study, based on the 1966-1971 data, we were able to obtain from Statistics Canada the results of a special tabulation where all interprovincial flows were disaggregated into five-year age groups (and sex), except for the 65 years and over age group. The same disaggregation was unfortunately not available for the 1976 census, so that we had to rely on the published migration data⁵, which in some cases are not disaggregated into five-year age groups : actually, only migrants aged between 15 and 34 years were distributed in five-years age groups, the other groups being 5-14, 35-44, 45-64 and 65 and over. In order to obtain five-year age groups for the latter categories, we applied the age distribution as observed from the previous census; for instance, the number of 1971-1976 migrants aged 45-49 was obtained by applying to the 45-64 total, the share of the 45-49 age group in the total number of 1966-1971 migrants aged between 45 and 64. The 65 and over age group was disaggregated into five-year age groups in the same way as the one adopted for the 1966-1971 data, using a linear extrapolation within the

5. Statistics Canada, 1976 Census of Canada, catalogue 92-828, table 36.

65 years and over age group : if x represents the total number of enumerated migrants in this group, then the number of migrants in the 65-69 age group is estimated to be equal to $5x/15$, the number for the 70-74 age group equal to $4\frac{x}{15}$ etc., the number for the 85 years and over age group being therefore equal $x/15$.

Because of these problems of age group disaggregation and of the estimation of the 0-4 migration, the 1971-1976 migration data are obviously not strictly comparable to the 1966-1971 data. It should however be emphasized that no disaggregation problem exists for the 15-34 age groups which represent almost half of the total number of migrants; that for the 65 and over age group the same disaggregation problem arose with the 1966-1971 data; and that in two cases out of three, disaggregation into two five-year age groups had to be made from ten-year age-groups (5-14 and 35-44). Moreover, as will be discussed later (in Chapter 2), the age profile of the 1971-1976 migrants obtained after these various disaggregation and estimation procedures, seems quite consistent. Comparability with the 1966-1971 migration data seems therefore justified.

1.4 Population

The 1971 and 1976 census data on population were used. The census figures are available for each of the 10 provinces by five-year age groups, and were averaged in order to obtain the necessary estimates of the population figure at mid-period. No correction was made for under-enumeration, for the following reasons. First, no estimates of the rate of under-enumeration by age and sex are available on a provincial basis. Second, the rates of under enumeration are in most cases relatively small (except for the 20-24 age group) and the differences from one census to another are negligible (for instance, the total rate of under-enumeration

was 1,9 % in 1971 and 2,0 % in 1976). And finally, it may be shown that in long run projections, all age groups will converge to a unique value of «under-projection». This is the result of the fact that the ultimate age distribution will be the same, whether the base population is corrected for under-enumeration or not, because this ultimate «stable» age distribution is a function only of the fertility, migration and mortality schedules, and does not depend on the base population.

Of course, there still remains the problem of the correct calculation of the rates : all rates are necessarily biased because of under-enumeration of the population used in the denominator. However, this figure in the denominator being usually very large compared to the figure in the numerator, the resulting rate is not significantly affected by a 1 % or 2 % change in the denominator. Only in the case of the 20-24 age group could a problem arise; if we accept that the rate of under-enumeration is 5 % (average between the estimated rate of under-enumeration for this age group in the 1971 and 1976 censuses), then the yearly migration rate is affected if we use more than 3 decimals; the migration rate is 0,01425 if no correction is made for under-enumeration of the base population, but is 0,01354 after correction. Considering that in most cases errors due to under-enumeration are negligible, and in view of the fact that some errors are partially cancelling each other (for instance, in the calculation of migration rates under-enumeration of the base population is partially neutralized by under-enumeration of the number of migrants), we prefer not to make any correction for under-enumeration of population.

CHAPTER 2 - THE 1971-1976 REGIONAL GROWTH PATTERN

The purpose of this section is to describe the 1971-1976 pattern of each of the various components of multiregional demographic growth as well as the resultant age and sex structure, and to compare with the pattern observed in the 1960's, particularly with the 1966-1971 pattern on which our previous multiregional analysis was based⁶. But first, the relative importance of each component of growth should be investigated.

2.1 Relative importance of components of regional growth

Table 1 presents the decomposition for each province of the total increase in population between 1966 and 1971 and between 1971 and 1976, into its three components : natural growth, net interprovincial migration and net international migration (obtained as a residual). These data suggest the following comments.

a) The share of each province in Canada's total increase markedly changed between 1966-1971 and 1971-1976. Ontario's share in the total growth, which was equal to 48 % in 1966-1971, is reduced to 40 % in 1971-1976, still significantly above its share in Canada's total population (36 % in 1971). British Columbia and Alberta, which in 1971 contained respectively 8 % and 10 % of Canada's total population, took respectively 20 % (same as in 1966-1971) and 15 % (up from 11 %) of the total increase, while Quebec, with a share in total population of 28 %, had only 15 % of the total increase (down from 16 % in 1966-1971).

6. Note that the whole 1966-1971 and 1971-1976 periods are considered, and not the evolution over these five-year spans.

Table 1 - Components of multiregional demographic growth 1966-1971 and 1971-1976

	Total increase		Natural growth		Net interprovincial migration		Net international migration	
	1966-1971	1971-1976	1966-1971	1971-1976	1966-1971	1971-1976	1966-1971	1971-1976
Newfoundland	28 708	35 621	49 096	43 386	- 17 589	- 6 745	- 2 799	- 1 020
Prince-Edward-Island	3 106	6 588	5 211	4 509	- 1 114	2 675	- 991	- 596
Nova Scotia	32 921	39 611	37 411	32 141	- 8 745	6 688	4 255	782
New Brunswick	17 769	42 692	35 233	32 909	- 8 804	11 628	- 8 660	- 1 845
Quebec	246 919	206 681	288 727	229 321	- 78 144	- 62 221	36 336	39 581
Ontario	742 236	561 359	373 072	325 549	60 792	- 63 498	308 372	299 308
Manitoba	25 181	33 259	49 259	44 866	- 34 240	- 28 592	10 162	16 985
Saskatchewan	- 29 102	- 4 919	50 868	38 156	- 78 369	- 32 323	- 1 601	- 10 752
Alberta	164 671	210 163	105 295	95 851	27 453	67 651	31 923	46 661
British Columbia	310 947	281 987	88 494	82 830	138 760	104 737	83 693	94 420
TOTAL	1 543 356	1 413 042	1 082 666	929 518	----	----	460 690	483 524

These figures provide a first indication of the important changes in the regional growth pattern which happened between 1966-1971 and 1971-1976. Canada's demographic five-year growth rate dropped from 7,76 % to 6,55 % (with an absolute increase of 1,41 million over five years instead of the previous 1,54 million), but the changes in the growth rate were markedly different from one province to another. All four Atlantic provinces and all three Prairie provinces experienced an increase in their five-year growth rate (particularly Prince-Edward-Island, from 2,86 % to 5,90 %, New Brunswick, from 2,88 % to 6,73 %, and Saskatchewan, from -3,05 % to -0,005 %) while the two centrally located provinces, Quebec and Ontario, registered a marked decline in their growth rate (from 4,27 % to 3,43 % and from 10,66 % to 7,29 % respectively); British Columbia's rate which was the highest rate in the previous census period (16,60 %), also dropped significantly, but is still, with Alberta's, the highest one (12,1 %).

If we thus consider only the total growth rate, it is clear that the new regional growth pattern is characterized by an important decline in the «demographic power» of the two central provinces (Quebec and Ontario) which until the 1960's together took up most of Canada's demographic picture. Today, both provinces represent only 54 % of Canada's total increase (down from 64 % in the previous five-year period), this reversal being obviously in favour of the four eastern «Atlantic» provinces and of the four western provinces (the three Prairie provinces plus British Columbia). The difference between Quebec and Ontario, in this respect, resides in the fact that Ontario's decline is quite recent, while Quebec's decline is mainly the continuation of a long-term process.

One may thus wonder whether the new pattern is only an accidental, exceptional phenomenon, or whether it is the beginning of a new trend, which would be marked by a demographic revival in the East and a continuation of a population polarization in the West, Ontario's decline being thus a new expression of the westward shift of Canada's population, and Quebec becoming a kind of demographic «no man's land» between the eastern and the western provinces. One of the purposes of this study is precisely to investigate to what extent this new pattern is an «accidental» or a structural phenomenon, and to look for the long run implications of this reversal.

b) The relative contribution of each component of growth differs considerably among provinces and from one period to another. In 1966-1971, natural growth was the only source of growth in each of the four Atlantic provinces (except for Nova Scotia, which benefited also from international migration), but in 1971-1976, three of these provinces had also a positive net interprovincial migration (only Newfoundland is still losing population by interprovincial migration, but by a relatively small amount). While in the previous period, all four Atlantic provinces had a natural growth which was larger than their total growth, now only Newfoundland is in this situation; in all three other provinces natural growth represents between 70 % and 80 % of total growth. In 1966-1971 Manitoba and Saskatchewan were in a situation close to the one observed in the Atlantic provinces (with Manitoba benefiting however from a positive international migration balance), and still in 1971-1976 natural growth remains their main source of growth. It should nevertheless be emphasized that Saskatchewan's negative interprovincial migration balance was reduced by 60 %, so that this province's decline in total population is now very small.

Quebec's natural growth declined by more than 20 %; as the negative interprovincial migration balance declined by only a relatively small amount (16 000 units, compared to the 60 000 drop in natural growth), and as the positive international migration balance remained fairly stable, the result was a sizable decline in total growth. Contrary to Quebec, the sharp decline in Ontario's total growth (a 181 000 drop, representing a 24 % decrease) is however due only for a small part to the decline in natural growth, which dropped by 12 % (47 000 units), but is mainly due to the complete reversal in its interprovincial migration balance : a gain of 60 000 units in 1966-1971 became a loss of 63 000 units in 1971-1976; net international migration remained at the same level, so that it now represents almost as much as natural growth. Finally, if we except Nova Scotia, which had a negligible gain due to international migration, there are now only two provinces which benefit from all three sources of growth, namely Alberta and British Columbia (in the previous period, Ontario was a member of this group). But in the case of Alberta, a remarkable increase (actually a doubling) in the gains from migration, joined to only a small decline in natural growth, led to a sizable increase in total growth, while in British Columbia, a sharp decline in the gains from interprovincial migration (which decreased by 34 000 units, a 25 % drop) was the main factor for a decline of total growth.

The main conclusion which may be derived from these changes is that interprovincial migration, by being more 'balanced' (i.e. improvement in regions of net outmigration, decline in regions which previously had a positive net immigration), has now a smaller contribution to total growth than before, while net international migration, by remaining more or less stable, becomes relatively more important with a declining natural growth.

c) All provinces experienced between 1966-1971 and 1971-1976 a decline in natural growth, but the rate of decrease varied considerably between provinces : the decrease was more than 20 % in Quebec and Saskatchewan, but less than 7 % in New Brunswick and British Columbia. On the whole, however, the share of each province in the total natural growth remains very close to its share in total population, except for Quebec (which got only 25 % of Canada's natural growth while representing 28 % of the 1971 total population), Newfoundland (which had 4,7 % of total natural growth but contained only 2,4 % of Canada's population) and Alberta (for which the figures are respectively 10,3 % and 7,6 %).

Like in 1966-1971, more than 80 % of the gains from international migration are concentrated in two provinces : Ontario (62 %) and British Columbia (20 %); all other 8 provinces have to share the remaining 18 %. On the whole, there were not many changes in the distribution of Canada's net international migration between provinces. But the changes in the distribution of interprovincial migration gains were remarkable.

In 1966-1971, the distribution pattern of net interprovincial migration was much closer to the distribution pattern of net international migration than in 1971-1976. Indeed, in the previous period, most provinces gaining (losing) from interprovincial migration also gained (lost) from international migration. Now, 5 out of the 10 provinces have a different sign for each migration balance. Contrarily to the 1966-1971 pattern, the province which is now the main loser from interprovincial migration (Ontario) is also the main beneficiary from international migration, and the Atlantic provinces are now gaining from interprovincial migration while still losing (but much less) from international migration.

The main beneficiaries of the new situation are the two most western provinces, Alberta and British Columbia, which now take 89 % of the gains from interprovincial migration (instead of 73 %) before). On the loser's side, Ontario is now the main loser (while before it had the second largest gain), its deficit being even larger than Quebec's and Saskatchewan's, two traditional big losers; the latter two provinces represented 69 % of total losses in 1966-1971, but only 49 % in 1971-1976.

The main picture which may be derived from this important reversal in interprovincial migration is thus one of a more «balanced» pattern : there are now an equal number of losers and gainers, and their migration balance is smaller, i.e. losers lose less and gainers gain less.

d) Table 2 summarizes our discussion in a way which allows for a first indication on the impact each component of growth may have on population redistribution between provinces. On one hand, there are two facts. First, Canada's natural increase is distributed among provinces more or less proportionately to each province's share in the total population; and second, Canada's interprovincial migration flows are remarkably balanced, leading in most cases to a very small rate of increase (decrease) : in half the provinces, the five-year rate of population change due to interprovincial migration is below 2 %, and the highest rate is 4,8 %, less than 1 % per year. On the other hand, as shown in the last column of Table 2, net international migration is highly concentrated, with two provinces receiving 80 % of Canada's international migration balance. The result is that if natural growth were continuing to decline (which is highly probable, because the effects of the post-war baby-boom on the number of females in age of child-bearing will disappear in the next decade), and if interprovincial migration flows keep the more or

Table 2

The role of each component of demographic growth on population redistribution.
Some rough indicators. 1971-1976

	Share in Total 1971 Population (%)	Share in Total 1971- 1976 Natural Growth (%)	Net Interprovin- cial Migration divided by 1971 population (%)	Share in Net International Migration (%)
Newfoundland	2,4	4,7	- 1,29	- 0,2
Prince Edward Island	0,5	0,5	2,40	- 0,1
Nova Scotia	3,7	3,5	0,85	0,2
New Brunswick	2,9	3,5	1,83	- 0,4
Quebec	28,0	24,7	- 1,03	8,2
Ontario	35,8	35,0	- 0,82	61,9
Manitoba	4,6	4,8	- 2,89	3,5
Saskatchewan	4,3	4,1	- 3,49	- 2,2
Alberta	7,6	10,3	4,16	9,7
British Columbia	10,2	8,9	4,79	19,4
Total	100,0	100,0	-	100,0

less balanced pattern they have shown in the first half of the 1970's, then international migration will have an increasing impact on the population redistribution between Canadian provinces. This is of course too sketchy a picture : the analysis should be made in terms of flows (births and deaths, immigration and outmigration, immigration and emigration) and in terms of age-sex structure. This will be done in the next sections of this chapter.

2.2 Regional fertility differentials

Between 1966-1971 and 1971-1976, fertility rates declined in all provinces and for all age groups⁷, so that the gross reproduction rate dropped considerably. During the same period, the crude birth rate declined also, but in a less marked way, and both the observed and the pure (i.e. of schedule) mean age dropped by about an half year.

From Table 3, it is seen that the Canadian population does not reproduce itself anymore, and that only three provinces have still a gross reproduction rate which implies that the population is reproducing itself, namely Newfoundland, Prince-Edward-Island and Saskatchewan (if we had considered end-of-period data, only Newfoundland would have shown a gross reproduction rate significantly above reproduction level). On the whole, provinces which had the highest gross reproduction rates in 1966-1971 experienced the sharpest decline in fertility. This however does

7. Except for the 15-19 age group in Manitoba, Newfoundland, and Prince-Edward-Island. In the latter case, the numbers involved are very small. Moreover, it should be remembered that in the case of Newfoundland age-specific fertility rates had to be estimated, and that the age profile of Prince-Edward-Island's fertility was used for this estimation. We may therefore conclude that these two exceptions may be disregarded.

not mean that fertility conditions are now much more homogeneous between provinces : in 1971-1976, 9 out of the 10 provinces had a gross reproduction rate in the 0,9 - 1,2 range, while in 1966-1971 these same 9 regions had a rate in the 1,1 - 1,5 range. In other words, it is mainly because Newfoundland experienced an above average drop in fertility (its total over-fertility is now 40 % instead of the previous 60 %) that one may conclude to a spatial uniformization of fertility conditions. It should be noted that despite the fact that Newfoundland's gross reproduction rate decreased by 26 %, this province experienced only a relatively small decline in its crude birth rate (from 25,5 % to 22,2 %, i.e. a 13 % decline); this is of course due to its «favorable» age structure.

Quebec is still the province with the lowest fertility, but it is now joined by British Columbia. The age profile is however quite different. Quebec's low fertility is almost exclusively due to the two younger age groups (15-19 and 20-24), its «older» age groups having an about average fertility level. The reverse is true for British Columbia. From this, it may be concluded that there is still some room for a decline in fertility : if for each age group, each province adopted the lowest existing provincial fertility rate, then Canada's gross reproduction rate would be 0,8 instead of 1,0.

As expected, the decline in fertility is concomitant with a reduction in the effective child-bearing age span. The percentage of births from mothers in the 20-24 age group is now 68 % instead of 63 % in the previous period. Child-bearing above 35 years of age has become negligible (the 35-39 and 40-44 age groups are also those for which the fertility rate experienced the largest decline between 1966-1971 and 1971-1976). The (by far) smallest decrease in the fertility rate was in the 25-29 age group, so that this age

Table 3

Provincial fertility differentials, 1966-1971 and 1971-1976

	Age - specific fertility rates (%)						Gross repro- duction rate	Crude birth rate (0/00)	Mean age of mother	
	15-19	20-24	25-29	30-34	35-39	40-44			Observed	Calculated from fertil- ity schedule
Newfoundland	3,0 (2,8)	8,5 (11,4)	9,1 (10,9)	4,9 (6,7)	2,3 (4,3)	0,6 (1,7)	1,4 (1,9)	22,2 (25,5)	25,6 (26,5)	27,0 (28,1)
Prince Edward Island	2,4 (2,2)	7,1 (8,8)	7,4 (8,6)	4,0 (5,5)	1,9 (3,5)	0,5 (1,4)	1,2 (1,5)	17,0 (18,7)	25,7 (26,8)	27,0 (28,1)
Nova Scotia	2,6 (2,8)	6,5 (8,4)	6,6 (7,5)	3,2 (4,4)	1,4 (2,5)	0,4 (0,9)	1,0 (1,3)	16,4 (18,3)	25,3 (26,0)	26,4 (27,1)
New Brunswick	2,7 (2,7)	7,4 (8,7)	6,9 (7,9)	3,4 (4,8)	1,4 (2,9)	0,5 (1,0)	1,1 (1,4)	17,8 (19,1)	25,1 (26,1)	26,3 (27,5)
Quebec	0,9 (1,1)	4,9 (6,5)	6,6 (7,0)	3,4 (4,2)	1,3 (2,4)	0,3 (0,8)	0,9 (1,1)	14,4 (16,5)	26,9 (27,3)	27,6 (28,2)
Ontario	1,9 (2,5)	5,9 (7,7)	6,7 (7,4)	3,4 (4,2)	1,2 (2,0)	0,3 (0,6)	1,0 (1,2)	15,6 (17,8)	26,0 (26,4)	26,7 (27,0)
Manitoba	2,6 (2,4)	6,6 (8,0)	7,3 (8,2)	3,7 (4,7)	1,5 (2,4)	0,4 (0,7)	1,1 (1,3)	17,2 (18,2)	25,6 (26,4)	26,7 (27,3)
Saskatchewan	2,6 (2,7)	7,4 (9,5)	7,5 (8,6)	3,7 (5,0)	1,5 (2,8)	0,5 (0,9)	1,2 (1,5)	16,6 (18,7)	25,3 (26,3)	26,5 (27,3)
Alberta	2,4 (2,9)	6,7 (9,1)	6,9 (8,0)	3,2 (4,4)	1,1 (2,2)	0,3 (0,7)	1,0 (1,4)	17,4 (20,0)	25,4 (26,0)	26,3 (26,8)
British Columbia	2,1 (2,8)	6,1 (7,8)	6,3 (7,1)	3,0 (3,8)	1,0 (1,7)	0,2 (0,5)	0,9 (1,2)	15,1 (17,0)	25,6 (25,9)	26,3 (26,5)
Total	1,8 (2,2)	5,9 (7,7)	6,8 (7,5)	3,4 (4,3)	1,3 (2,2)	0,3 (0,7)	1,0 (1,2)	15,8 (17,8)	26,0 (26,5)	26,8 (27,3)

Note : Figures between brackets refer to 1966-1971.

group has now in all provinces but one (New Brunswick) the highest rate, while in 1966-1971 this was the case in only two provinces (Quebec and Manitoba) : the decline in the overall fertility level has been accompanied by a shift to the right of the age profile, the apex of the age-specific fertility curve being now at the 25-29 age group instead of the 20-24 age group. Consequently, the decline in fertility after the 25-29 age group is now much sharper : the rate of the 35-39 age group is now only one fifth of the 25-29 rate, while in the previous period it was one third.

It is mainly this considerable decrease of the fertility level among those in the 35 and over age group that explains the decline in the mean age of fertility (in 1966-1971, 10,4 % of births still were in this age group, but in 1971-1976, this percentage was only 5,9 %). All provinces experienced a decline in the mean age of fertility, as well in the observed mean age as in the mean age of the schedule. Quebec still has the highest mean age, while New Brunswick replaces British Columbia at the other extreme.

2.3 Regional mortality differentials

Some significant changes occurred as far as mortality is concerned, a field where it is often believed not much new may arise.

Between 1966-1971 and 1971-1976, thus over a five-year period, life expectancy of Canadian females increased by one year (from 76,1 to 77,1), while males gained only 4/10 of a year (from 69,3 to 69,7). As a result, the gap between both expectancies has increased by an half year, and represents now 7,4 years in favor of females.

At least for males, these does not seem to be much relation between the importance of the gains made in life expectancy and the level previously reached. Indeed, the four provinces who had in 1966-1971 a below average life expectancy, did perform poorly as far as life expectancy gains are concerned : all made gains significantly below average. Quebec, which had the lowest life expectancy in 1966-1971 had also one of the lowest gains, while Ontario which had an about average life expectancy, showed the highest gain. At the other extreme, the two provinces with the highest life expectancies (Alberta and Saskatchewan) also experienced very small gains (Alberta even did not show any gains at all). On the whole, regional mortality differentials (measured by the difference between the extreme values) which had considerably been reduced over the last decades, remained stable.

The picture is different as far as female mortality differentials is concerned. All four provinces which had below average life expectancy showed above average gains, and all (except Prince-Edward-Island) those which had above average life expectancy experienced a below average increase in life expectancy, so that, as a result, regional disparity in life expectancy at birth has decreased for females.

It would obviously be rather fastidious to analyze all death rates, for all age groups and for all provinces. This would moreover also not be very useful, because mortality differences among provinces are rather small for most age groups. This is why our discussion will be centered on some age groups and on the most significant changes which occurred between 1966-1971 and 1971-1976.

At the national level, the mortality rate for males increased in 4 out of 18 five-year age groups, more precisely in the three groups

of the 15-29 age span and in the 70-74 age group. Of course, mortality rates are low for the 15-29 group, but it should be noted that the increase is quite general (9 provinces experienced an increase of the 15-19 rate, 7 for the 20-24 rate, 5 for the 25-29 rate, 8 for the 70-74 rate) and for most cases is significant. It seems worthwhile to note that the increase for the 15-24 age group is concentrated in the six non-Atlantic provinces (Quebec, Ontario, the three Prairie provinces and British Columbia), while all Atlantic provinces plus Quebec experienced an increase in the rates of the 65-69 and 70-74 age groups. In other words, there seems to be a tendency for the rise in the mortality rate among young adults to be related to the high level of economic development experienced in the central and western provinces (the prime cause of mortality in the 15-29 age group is car accidents which seems to be one of the by-products of economic «development»).

The national mortality rate for females increased in only two age groups, the 15-19 and the 20-24 age groups. But in these cases, the increase is much less general than for males (only 6 provinces experienced an increase in the 15-19 rate, and 4 in the 20-24 rate). Again however, the increase is concentrated in the non-Atlantic, economically more developed, provinces. Contrarily to male mortality, there does not seem to be a significant increase in mortality for any of the older age groups.

Mortality among children in the 0-4 age group decreased in all ten provinces, for males as well as for females. Considering the relatively high level still observed at the end of the 1960's, it is not surprising that the drop in mortality was quite significant : between 1966-1971 and 1971-1976, the national 0-4 rate declined by 18 %, for males as well as for females.

Table 4

Provincial mortality differentials, 1966-1971 and 1971-1976

	0-4 Death rate (per thousand)		60-64 Death rate (per thousand)		Gross death rate		Crude death rate (per thousand)		Life expectancy	
	M	F	M	F	M	F	M	F	M	F
Newfoundland	4,9 (6,5)	3,8 (5,0)	22,1 (21,1)	11,8 (11,8)	2,8 (2,8)	2,0 (2,1)	7,2 (7,2)	5,0 (5,1)	69,9 (69,5)	76,5 (75,3)
Prince Edward Island	4,9 (6,2)	4,0 (4,1)	22,3 (22,8)	8,9 (10,1)	2,6 (2,7)	1,7 (1,8)	10,6 (10,6)	7,7 (7,8)	69,3 (69,1)	77,7 (76,5)
Nova Scotia	4,0 (5,1)	3,4 (3,9)	24,5 (23,9)	11,6 (12,4)	2,8 (2,8)	1,9 (2,0)	9,9 (9,9)	7,0 (7,3)	68,9 (68,6)	76,9 (75,7)
New Brunswick	4,3 (5,2)	3,3 (4,2)	23,3 (22,5)	10,6 (11,6)	2,7 (2,8)	1,9 (2,0)	9,0 (9,0)	6,5 (6,6)	69,3 (69,1)	76,9 (75,8)
Quebec	4,2 (5,0)	3,2 (4,1)	25,6 (25,8)	12,3 (12,8)	3,0 (3,0)	2,0 (2,2)	8,2 (7,8)	5,8 (5,6)	68,6 (68,4)	76,1 (75,0)
Ontario	3,7 (4,5)	3,0 (3,5)	23,2 (24,7)	11,1 (11,6)	2,8 (2,9)	1,8 (2,0)	8,5 (8,7)	6,5 (6,5)	70,0 (69,3)	77,3 (76,4)
Manitoba	4,5 (5,4)	3,7 (4,0)	20,1 (20,0)	10,6 (10,4)	2,6 (2,6)	1,8 (1,9)	9,6 (9,5)	6,9 (6,6)	70,3 (70,1)	77,5 (76,8)
Saskatchewan	5,1 (5,9)	3,9 (4,6)	17,3 (17,5)	8,5 (9,1)	2,5 (2,5)	1,7 (1,7)	10,0 (9,6)	6,5 (6,1)	71,0 (70,8)	78,3 (77,5)
Alberta	4,3 (4,9)	3,2 (3,9)	19,5 (19,1)	9,3 (9,7)	2,6 (2,5)	1,7 (1,8)	7,7 (7,8)	5,0 (5,0)	70,7 (70,7)	78,0 (77,2)
British Columbia	4,5 (5,0)	3,4 (3,9)	20,4 (21,6)	10,0 (10,6)	2,6 (2,7)	1,7 (1,8)	9,4 (9,8)	6,6 (6,7)	70,0 (69,7)	77,6 (76,8)
Total	4,1 (5,0)	3,2 (3,9)	22,8 (23,4)	11,0 (11,5)	2,8 (2,8)	1,8 (2,0)	8,6 (8,6)	6,2 (6,1)	69,7 (69,3)	77,1 (76,1)

Note : Figures between brackets refer to 1966-1971.

The drop of the 0-4 rate for males was particularly considerable (between 21 % and 25 %) in the three most eastern provinces (Newfoundland, Prince-Edward-Island and Nova Scotia), but was relatively small (between 10 % and 14 %) in the three most western provinces (Saskatchewan, Alberta and British Columbia). As a result, Saskatchewan has now the highest 0-4 rate (5,1⁰/00), while Ontario still has the lowest (3,7⁰/00). The female 0-4 rate evolved along a different pattern : the decrease was rapid (between 21 % and 24 %) in Newfoundland, New Brunswick and Quebec, but negligible in Manitoba (7 %) and Prince-Edward-Island (2 %) which has now the highest rate (4,0⁰/00), followed by Saskatchewan (3,9⁰/00), while Ontario still has the lowest rate (3,0⁰/00).

Again, as in 1966-1971, there seems to be a negative correlation between the 0-4 rate and the 60-64 rate : the four most western provinces, plus Newfoundland and Prince-Edward-Island have all above average death rates for the 0-4 age group, but below average death rates for the 60-64 age group. This is valid for males as well as for females (except for Newfoundland's 60-64 rate for females). This could be explained by the fact that in less industrialized regions, infant mortality is higher but those who survive benefit from a healthier environment.

It is not surprising to verify that in regions where the age structure is relatively young, either because of previous high fertility levels (Newfoundland and Quebec) or because of immigration (Alberta), the crude death rate is below average, while this rate is above average in regions where the age structure is older, either because of outmigration (Prince-Edward-Island, Nova Scotia, Manitoba and Saskatchewan) or because of low fertility (British Columbia, which because of its relatively mild climate, also receives many old age immigrants).

If one wants to summarize the mortality regime of a particular region while eliminating the effect of the age structure, one may consider the gross death rates (i.e. the sum of the age specific rates multiplied by five, the width of the age groups). The figures in Table 4 corroborate that Quebec has the «worst» mortality conditions, while the three most western provinces, plus Prince-Edward-Island, have the «best» ones. In this respect, not much has changed since the end of the 1960's.

Finally, let us consider the mean age of death. Table 5 presents these mean ages. On the average, Canadian males now die one year later (at 63,4 instead of 62,5) than in the previous five-year period, and Canadian females two years later (at 68,5 instead of 66,6). The increase in the observed mean age was particularly important in Quebec, Saskatchewan, and, above all, in Newfoundland where the increase represents about 3 years. In British Columbia the mean age of death decreased by more than an half year. Despite Newfoundland's considerable increase, this province has still the lowest observed mean age of death, while Saskatchewan has still the highest for males and Prince-Edward-Island the highest for females. Once the effects of the age structure are eliminated, i.e. when one considers the age structure of the mortality schedule, then most of the interprovincial disparities disappear : the range of the mean age of the schedule extends from 77,1 (Prince-Edward-Island) to 77,8 (Newfoundland and Ontario) for males, and from 78,9 (British Columbia) to 79,4 (Newfoundland, Prince-Edward-Island and Ontario) for females, while the corresponding ranges were 60,7-66,4 and 64,7-71,7 for the observed mean age of death.

Table 5
Mean age of death, 1971-1976

	Observed		Calculated form mortality schedule	
	M	F	M	F
Newfoundland	60,7	64,7	77,8	79,4
Prince-Edward Island	65,4	71,7	77,1	79,4
Nova Scotia	64,5	69,9	77,2	79,1
New Brunswick	63,2	68,9	77,2	79,2
Quebec	61,3	66,7	77,4	79,3
Ontario	64,1	69,7	77,8	79,4
Manitoba	65,4	69,6	77,6	79,2
Saskatchewan	66,4	69,4	77,6	79,3
Alberta	62,7	66,2	77,7	79,2
British Columbia	64,3	69,0	77,3	78,9
Total	63,4	68,5	77,5	79,2

2.4 Regional migration differentials

Considering that the age and sex structure is rather similar for all migrations flows, it would be rather fastidious to analyse all migration rates, for all age groups and for both sexes. This is why in our discussion of migration rates, we will consider only total («crude») rates, i.e. for all ages and sexes. We will however present the age profile of all interprovincial migrants, i.e. without disaggregating by province of origine and by province of destination, as well as the mean age of each interprovincial migration stream.

Table 6 shows how much the annual «propensity» to outmigrate (here measured by the total outmigration rate) may vary from one province to another : the range goes from 5,4⁰/00 (Quebec) to 21,6⁰/00 (Saskatchewan). Compared to 1966-1971, this range has significantly been reduced (in the previous period, the lowest rate was 6,3⁰/00 in Quebec, and the highest 28,1⁰/00 in Saskatchewan). Let us recall that these rates refer to five-year (census) migrants, thus excluding multiple migration as well as emigration and mortality among migrants. From what is known about the ratio between migration and migrants over a five-year period in Canada, these rates should be multiplied by two in order to obtain an estimate of the annual rate of outmigration.

Just as for the 1966-1971 period, we may distinguish three groups of regions. A first group contains those provinces which have a below average (9,9⁰/00) rate of outmigration : there are now only two provinces in this group (Quebec and Ontario), which lost British Columbia. A second group contains those provinces which have middle-range outmigration rates (British Columbia, Newfoundland, New Brunswick, Nova Scotia and Alberta). Finally, three provinces have relatively high rates : Prince-Edward-Island,

Table 6 - Total ('crude') migration rates (per thousand) between provinces, 1971-1976 (Annual averages)

From :	To :	N.F.D.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sas.	Alb.	B.C.	Total 1971- 1976	Total 1966- 1971
Newfoundland		---	0,2	2,1	1,1	1,0	5,5	0,7	0,2	0,7	0,9	12,2	14,8
Prince Edward Island		0,8	---	5,1	3,3	0,7	5,2	0,8	0,3	2,2	1,4	19,7	22,2
Nova Scotia		1,0	0,7	---	2,9	1,2	5,5	0,6	0,3	1,5	1,7	15,2	18,1
New Brunswick		0,5	0,7	3,1	---	2,6	4,3	0,5	0,3	1,1	1,2	14,2	18,5
Quebec		0,1	0,0	0,3	0,4	---	3,4	0,2	0,1	0,4	0,6	5,4	6,3
Ontario		0,4	0,2	0,8	0,6	1,8	---	0,7	0,3	1,4	1,8	8,0	6,6
Manitoba		0,1	0,1	0,5	0,3	0,7	5,1	---	3,4	5,3	4,8	20,3	22,4
Saskatchewan		0,0	0,0	0,2	0,2	0,3	2,2	2,9	---	10,1	5,7	21,6	28,1
Alberta		0,1	0,1	0,4	0,2	0,5	2,5	1,1	2,4	---	8,6	15,8	16,8
British Columbia		0,1	0,0	0,4	0,2	0,5	2,5	0,9	1,0	4,9	---	10,5	8,9

Note : Migration rates are obtained by dividing one-fifth of the 1971-1976 migrants enumerated at the 1976 census by the arithmetic mean of the population enumerated in 1971 and 1976 in the province of origin. Because of rounding, the total outmigration rate does not necessarily equal the sum of the destination-specific rates.

Manitoba and Saskatchewan were already in this group in 1966-1971 and still are in 1971-1976.

Quebec's low rate is mainly due to cultural heterogeneity, while Ontario's is to be explained by its economic dominance. In 1966-1971, those two provinces had almost the same rate of outmigration (6,3⁰/00 and 6,6⁰/00 respectively), but between 1966-1971 and 1971-1976, Quebec's rate dropped slightly, while Ontario's increased significantly (from 6,6⁰/00 to 8,0⁰/00). British Columbia also experienced a marked increase of its outmigration rate (from 8,9⁰/00 to 10,5⁰/00).

The latter two provinces are the only provinces with an increasing outmigration rate. All eight other provinces experienced a decline in their overall «propensity» to outmigrate. This decline was particularly important in the case of Saskatchewan (from 28,1⁰/00 to 21,6⁰/00) and New Brunswick (from 18,5⁰/00 to 14,2⁰/00).

It seems worthwhile to investigate whether the change in the propensity to outmigrate from a specific province is due to a modification of a few particular migration flows, or whether it is a general phenomenon, i.e. experienced with respect to most of the regions of destination. Ontario experienced an increase in its outmigration rate to all provinces of destination (except Quebec, for which the rate remained stable); the increase was particularly marked with Alberta (from 0,8⁰/00 to 1,4⁰/00). British Columbia's increase seems less general; this province's rate of outmigration decreased in two cases (with respect to Quebec and Ontario); only the rate of outmigration to Alberta increased significantly (from 3,5⁰/00 to 4,9⁰/00). Not only did Ontario's rate of outmigration increase with respect to all provinces of destination, but also, all provinces of origin had a lower rate of

outmigration to Ontario; this decline in the propensity to outmigrate to Ontario was particularly important in the case of the Atlantic provinces (their rate dropped from 8⁰/00-9⁰/00 to 4⁰/00-5⁰/00). The slight decrease in Quebec's overall outmigration rate is due mainly to the drop in its outmigration rate to Ontario (from 4,2⁰/00 to 3,4⁰/00); all other outmigration rates from Quebec remained stable (in six cases) or changed only marginally. Finally, it should be mentioned that all provinces (except Saskatchewan) showed a higher propensity to migrate to Alberta; this should of course be related to the energy crisis which gave to this province, rich in oil and gas, a privileged position within the Canadian economic system.

It may be interesting to note how cultural heterogeneity may affect the orientation of migration flows. As mentioned, Quebec's overall outmigration is the lowest among all ten provinces (5,4⁰/00), but for 8 out of the 9 provinces of destination, the rate is negligible (between 0,0⁰/00 and 0,6⁰/00). Actually, the only sizable relation is with Ontario, which receives two third of Quebec's outmigrants. Of course, Ontario's economic dominance is responsible for this but it is undoubtedly not the only factor. One should indeed consider that in eastern Ontario, in a region contiguous to Quebec, lives an important French-speaking minority and that almost two-third of Quebec's outmigrants are English-speaking; for the latter linguistic group, there is, by definition no cultural (linguistic) barrier, while the French-speaking group may reduce this barrier by migrating just across the border. Moreover, it should be noted that Canada's capital city lies on the border between Ontario and Quebec, on Ontario's side, and that many migrants between Quebec and Ontario are actually intra-metropolitan migrants : Quebec's part of the Ottawa-Hull metropolitan area received almost one-fifth of all outmigrants from Ontario to Quebec. A not negligible part of the

interprovincial migration flows between Ontario and Quebec is merely related to the suburbanization process of the capital city and to the decentralization of many Federal Government services in the Quebec suburbs of Ottawa. In such a situation, the linguistic heterogeneity between Ontario and Quebec obviously is much less a barrier to migration.

Another example of the role of cultural heterogeneity may be seen when considering the outmigration rates from Prince-Edward-Island and Nova Scotia : residents of these provinces have a higher propensity to migrate to Ontario, Alberta and British Columbia than to Quebec; when they decide to leave their province, they tend to by-pass Quebec, not only because the latter province offers them less economic opportunities, but probably also because of the larger cultural distance.

The results of a recent econometric study (Termote and Fréchette, 1980) lead us to believe that the impact of physical distance on interprovincial migration rates, not only has markedly declined between 1961-1966 and 1971-1976, but is now also smaller than the impact of «cultural» distance (measured by a dummy variable representing the English-French dichotomy). In other words, in the Canada of the 1970's, people seem to be more sensitive to cultural distance than to physical distance, at least in their migration behavior.

Migration, just as fertility, is a recurrent phenomenon. Similarly to the gross reproduction rate, we may thus calculate the gross migraproduction rate, by summing the age-specific migration rates and multiplying this sum by five (the width of the age-groups). This gross migraproduction rate (GMR) shows thus the expected number of interprovincial outmigrations per person (in the absence of death) if during his life, this person is exposed

to the age-specific 'propensities' to migrate as observed for a particular period (in this case, 1971-1976). This rate has thus exactly the same conceptual meaning as the gross reproduction rate, which shows the expected number of births per person (in the absence of death) if during his life, this person is exposed to the age-specific 'propensities' to give birth as observed for a particular period. This kind of measure does not pretend to predict the actual number of migrations that will be made by an 'average' person, but may be considered as an useful way to summarize the present level of migration expressed from the point of view of its frequency. Table 7 presents for each migration flow and for the total outmigration of each province, the result of these calculations.

These results clearly show that despite the reversal in the traditional migration pattern, and more precisely, despite the increasing propensity of Ontario's population to outmigrate, this province still occupies a dominant position in the interprovincial migration system. Indeed, its GMR to each province of destination is always much lower than that of the corresponding counterflow. And despite the remarkable decline in the propensity to outmigrate from the four Atlantic provinces, these provinces still have in most cases (for Prince-Edward-Island, in each case) their destination-specific GMRs larger than that of the corresponding counterflow.

The GMRs produced in Table 7 also demonstrate the high geographical mobility of the Canadian population, and this despite the considerable distances separating the provinces. There has however been a general decline in these GMRs. All provinces (except Ontario and British Columbia) have a lower total GMR in 1971-1976 than in 1966-1971, and the decrease has been particularly rapid for Saskatchewan, New Brunswick and

Table 7 - Gross migration rates between provinces, 1971-1976

From :	To :	N.F.D.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sas.	Alb.	B.C.	Total 1971- 1976	Total 1966- 1971
Newfoundland		---	0,01	0,15	0,07	0,07	0,38	0,04	0,01	0,05	0,07	0,84	1,03
Prince Edward Island		0,05	---	0,38	0,23	0,06	0,37	0,05	0,02	0,14	0,10	1,42	1,61
Nova Scotia		0,07	0,05	---	0,20	0,09	0,39	0,04	0,02	0,10	0,12	1,07	1,28
New Brunswick		0,04	0,05	0,22	---	0,18	0,30	0,03	0,02	0,07	0,08	1,00	1,33
Quebec		0,01	0,00	0,02	0,03	---	0,27	0,01	0,00	0,03	0,05	0,43	0,49
Ontario		0,03	0,01	0,06	0,04	0,14	---	0,05	0,02	0,09	0,14	0,58	0,48
Manitoba		0,01	0,01	0,03	0,02	0,06	0,46	---	0,24	0,37	0,39	1,59	1,70
Saskatchewan		0,00	0,00	0,01	0,01	0,02	0,16	0,22	---	0,73	0,48	1,65	2,14
Alberta		0,01	0,00	0,02	0,02	0,03	0,17	0,08	0,16	---	0,70	1,20	1,33
British Columbia		0,00	0,00	0,03	0,01	0,04	0,18	0,07	0,08	0,36	---	0,77	0,66

Newfoundland. But even in this period of lower mobility, the Canadian GMRs are still much larger than the ones observed in other countries. For instance, the lowest Canadian GMR (0,43, in Quebec) is of the same magnitude as the two highest GMRs observed in Bulgaria (D. Philipov, p. 28), even though the interregional distances in Canada are very much larger.

This high geographical mobility of the Canadian population is a characteristic of most provinces. In six out of the ten provinces, the «average» individual born in 1971-1976 is «expected» to make at least one migration out of his province during his lifetime. But, as the destination-specific rates show, only a few provinces will receive these «expected» migrants. If we take 0,25 as a threshold (that is, we need four individuals to get one «expected» migrant), thus almost nobody is expected to outmigrate from any of the ten provinces to Newfoundland, Prince-Edward-Island, New Brunswick, Quebec, Manitoba and Saskatchewan. At the other extreme, Ontario is expected to be quite attractive for individuals leaving each of the five provinces east of it, plus contiguous Manitoba, while the expected number of migrations made over their lifetime by individuals from the three most western provinces to Alberta and British Columbia is also relatively high. As far as these gross migraproduction rates is concerned, the general interprovincial pattern thus remains very similar to the one observed for the previous period (1966-1971), despite the fact that the level of these rates has significantly changed, dropping markedly in the case of migration flows to Ontario, Quebec and British Columbia, increasing slightly in the case of the streams directed to the Atlantic provinces, and more sharply in the case of those directed to Alberta.

It may also be worthwhile to mention that each of the four Atlantic provinces show an higher migraproduction rate with respect to

Ontario than to Quebec, which however is closer. Even with respect to British Columbia is this rate significantly larger (except from New Brunswick). This illustrates once more the fact that, at least in the case of Canada, physical distance does not play a dominant role in migration behaviour. Once the decision has been made to move over a large distance (and in Canada, distances between provinces are in most cases very large...), the distance itself becomes less important, because the marginal cost of large distance migrations is relatively small. But these results also show the impact of cultural distance : migrants from the English speaking Atlantic provinces tend to by-pass the predominantly French speaking province of Quebec.

Until now, our analysis did not take into account the age dimension. For the sake of briefness, we will have to limit the analysis of the age profile to an investigation of the mean age of each interprovincial flow and of the age-specific rates for all interprovincial migrants. Table 8 presents the mean age of the migrants for each origin-destination pair. If we compare the mean age computed for the 1966-1971 period with the one calculated for 1971-1976, we may conclude that not much has changed from this point of view. Outmigrants from the Atlantic provinces still have the lowest mean age. This remain valid even when we take into account the differences in the age structure of the population, i.e. when we compute the mean age of the migrants using the mobility schedule. In interpreting the figures produced in Table 8, it should be remembered that those mean ages refer to census migrants, that is to the mean age at the time of the census, not the mean age at the moment of migration. In other words, if we assume that the number of people migrating has a uniform distribution over the census period, about 2,5 years

Table 8

Mean age of interprovincial migrants 1971-1976

To :		N.F.D.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sas.	Alb.	B.C.	Total Total 1971- 1966- 1976 1971
From :												
Newfoundland	-	23 (34)	22 (33)	21 (28)	25 (32)	22 (33)	19 (25)	23 (33)	23 (30)	23 (32)	22 (31)	
Prince Edward Island	22 (26)	-	24 (31)	23 (29)	26 (32)	24 (29)	20 (24)	22 (30)	21 (24)	23 (29)	22 (29)	
Nova Scotia	22 (26)	24 (32)	-	23 (30)	22 (29)	24 (30)	22 (25)	22 (28)	23 (27)	24 (30)	22 (29)	
New Brunswick	21 (26)	24 (33)	24 (32)	-	23 (30)	23 (30)	22 (28)	21 (27)	22 (28)	23 (29)	22 (31)	
Quebec	23 (32)	27 (39)	26 (36)	26 (40)	-	27 (38)	26 (35)	24 (32)	24 (31)	28 (40)	25 (37)	
Ontario	21 (26)	24 (32)	23 (29)	23 (29)	24 (32)	-	25 (32)	24 (30)	24 (28)	27 (35)	24 (33)	
Manitoba	22 (28)	20 (23)	22 (27)	23 (29)	25 (33)	30 (43)	-	22 (27)	24 (29)	29 (39)	25 (34)	
Saskatchewan	24 (29)	20 (28)	23 (29)	22 (28)	25 (31)	24 (31)	24 (31)	-	24 (29)	29 (39)	24 (32)	
Alberta	23 (31)	21 (26)	23 (29)	23 (28)	24 (31)	23 (30)	22 (30)	22 (29)	-	27 (40)	25 (38)	
British Columbia	22 (27)	24 (28)	22 (27)	25 (31)	25 (29)	25 (32)	25 (33)	24 (32)	24 (31)	-	24 (31)	

Note : Figures between parentheses refer to mean age calculated using the mobility schedule, thus excluding the effect of the age structure.

should be subtracted, and thus the observed mean age at migration would be below 20 years for migrants leaving the Atlantic provinces, and between 21 and 24 for migrants from the other provinces, with very similar figures for both census periods.

This stability over time is to be observed not only for the mean age of all outmigrants from a given province, but also for most origin-destination flows. If we consider as significant only those changes of at least two years with respect to the mean age observed in 1966-1971, then for three flows out of four, we may conclude that there has been no modification (compare Table 8 in the present report with Table 9 in Termote, 1980). For most flows where a change may be observed, the modification implies only a slight increase in the mean age of observed migrants, and these flows usually contain only a small number of migrants, so that these changes probably do not represent a basic phenomenon.

The same could be said if we consider the age profile of the migrants. The just mentioned remarkable stability of the mean age for each interprovincial migration stream, plus the fact that these mean ages do not much differ between most specific origin-destination flows, constitute good reasons for limiting our analysis of the age structure to the total of all interprovincial migrants. Figure 1 shows this age profile for both the 1966-1971 and 1971-1976 census periods. It may be seen that, on the whole, the age structure is quite constant overtime, and does correspond to the profile usually observed in other countries. There are however three age groups for which we may notice a marked modification in the migration rate, namely the two extreme age groups (0-4 and 85 and plus) and the 20-24 age group. In the case of the first two cases, we should be very careful in making

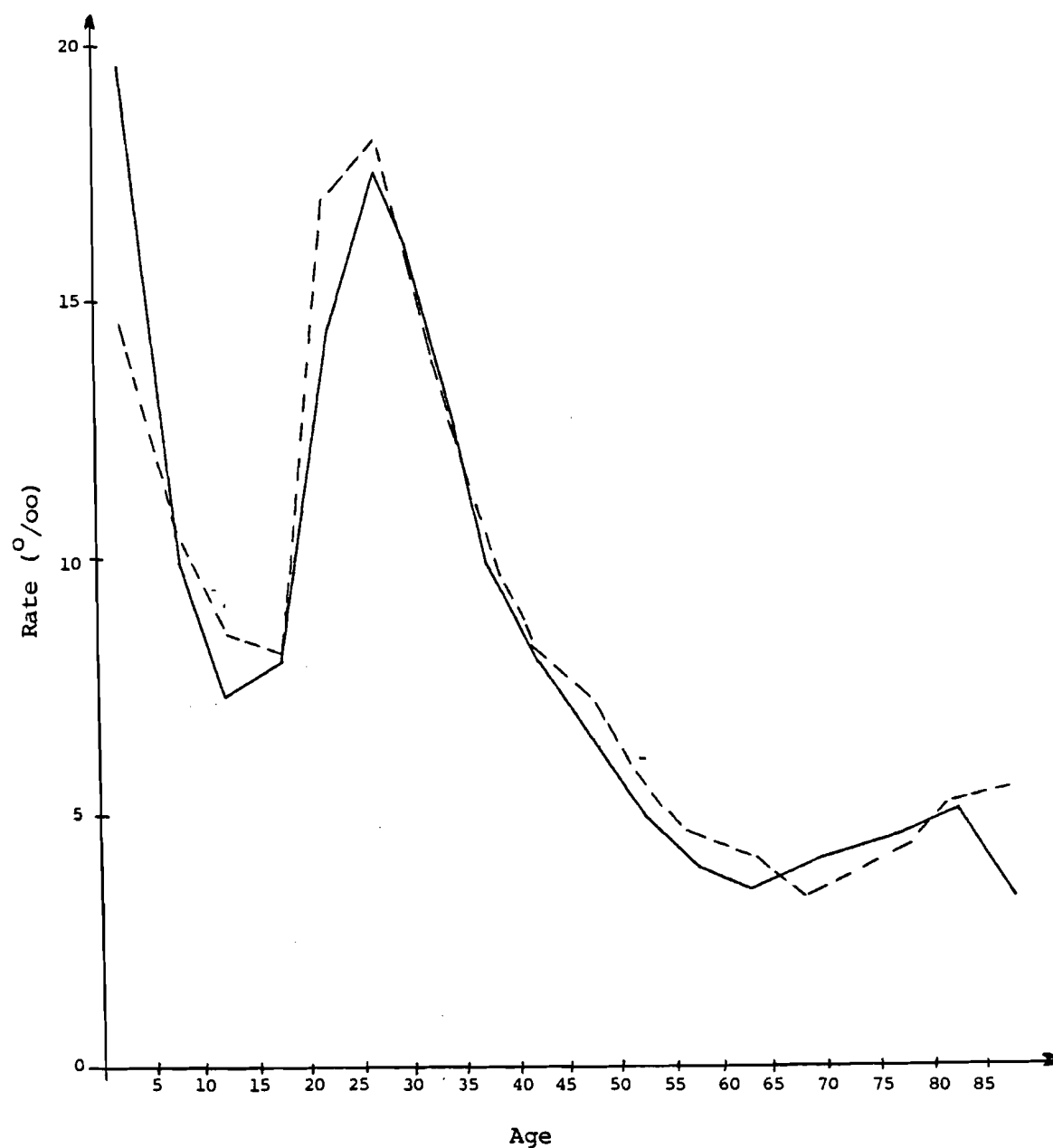


Figure 1. Age schedule of interprovincial migrants (rates in ‰):
Canada 1966-1971 and 1971-1976.

comparisons, because, as explained before (section 1.3), the figures for those extreme age groups had to be estimated (moreover, in the case of the 85 and plus age group, the number of interprovincial migrants is very small, so that the law of large numbers does not apply). The only case where we may observe a significant modification in the interprovincial migration rate, concerns the 20-24 age group : the rate for this age group dropped from 16,9⁰/00 to 14,3⁰/00, a 15 % drop in the migration «propensity» for this group.

2.5 Regional differences in the age-sex structure

It is often believed that the ageing of a population and the changing in the age structure of this population is a very slow process, almost not noticeable over the short run. Yet, if we consider Canada's population, one may observe between 1966-1971 and 1971-1976, thus over a five-year period, some very clear and important modifications in the age structure and in the mean age.

As shown in Table 9, over this five-year period, the mean age of the Canadian population has increased by 6/10 of a year. All provinces have experienced a marked increase in the mean age of their population, but in some provinces (Newfoundland, New Brunswick, Quebec and Saskatchewan), this increase has even exceeded one year. If we except Newfoundland, which, due to its traditional high fertility level, has a particularly low mean age (27,4), the Canadian population has a mean age which is relatively uniform all over the country, varying from 30,0 years in Alberta to 32,7 years in British Columbia.

The most striking change is however to be found not so much in the level of the mean age, as in the profile of the age structure. It is of course not possible to analyze, for each of the ten

Table 9
Age structure and mean age of the population of each province.
1966-1971 and 1971-1976

	0-19 %		20-64 %		65 + %		Mean age
Newfoundland	47	(50)	47	(44)	6	(6)	27,4 (26,4)
Prince Edward Island	41	(43)	48	(46)	11	(11)	31,8 (31,0)
Nova Scotia	39	(42)	52	(49)	9	(9)	31,5 (30,6)
New Brunswick	41	(45)	50	(47)	9	(8)	30,5 (29,4)
Quebec	38	(42)	55	(52)	7	(6)	30,8 (29,2)
Ontario	36	(39)	55	(53)	9	(8)	31,9 (31,0)
Manitoba	37	(40)	53	(51)	10	(9)	32,3 (31,5)
Saskatchewan	39	(42)	50	(48)	11	(10)	32,5 (31,3)
Alberta	40	(43)	53	(50)	7	(7)	30,0 (29,2)
British Columbia	35	(38)	55	(53)	10	(9)	32,7 (31,9)
Total	38	(41)	54	(51)	8	(8)	31,4 (30,8)

Note : Figures between parentheses refer to the 1966-1971 period.

provinces, the age structure at a very detailed level of disaggregation. Only three main age groups will be considered : 0-19, 20-64 and 65 and over. Table 9 shows the percentage of each of these age groups in the total population of each province, for the 1966-1971 period as well as for the 1971-1976 period. As may be seen from the figures produced in this Table, the ageing of the Canadian population has not yet led to an increase in the part of the «old» age group (65 and over), except a very slight increase in a few provinces. But a significant decrease in the young age group (and a corresponding increase in the 20-64 group) may be observed. This is of course related to the continuation of the fertility decline, and it concerns all provinces to the same extent, so that the grouping of the provinces in «young» and «old» remains the same over the whole period. Newfoundland is still, by far, the youngest province, followed by New Brunswick and Alberta, while Manitoba, Saskatchewan and British Columbia are still the three oldest provinces.

No significant regional differences in the «rate of masculinity» (percentage of males in total population) are to be found. This rate varies between 50 % and 51 % for each province. This allows us to limit this analysis of the structure of the Canadian population to the sole age dimension.

CHAPTER 3 - MULTIREGIONAL POPULATION ANALYSIS

The main feature of a multiregional demographic model is that it allows us to take into account simultaneously all interdependencies between the three basic phenomena (fertility, migration and mortality) and between all regions. In other words, the multiregional model allows us to summarize the impact of a change in demographic behavior across the multiregional demographic system.

In this chapter, we will successively analyze the two main regional interdependencies between the three basic demographic phenomena : the relation between migration and mortality (section 3.1) and the relation between migration and fertility (section 3.2). It should be emphasized that these relations are not considered here from the point of view of the individual. One does not try to analyze to what extent the fertility behavior and the probability to survive for an individual may be affected by his geographic mobility. Only the «macro» point of view is considered, that is one tries to estimate the impact of migration on the «average» number of years to be lived, or on the number of births expected in a region.

3.1 Migration and mortality : the multiregional life table

To what extent did the important reversal in the migration pattern described in the previous chapter, affect the number of years expected to be lived in each region ? In order to answer this question, we begin by analyzing the probabilities of surviving (to some exact age) in the region of birth. That is, we summarize in one figure the propensities to outmigrate and survive, as they are observed for a given period (1966-1971 and 1971-1976). Table 10 gives these combined probabilities, for each of the 10 provinces,

Table 10- Probabilities (in %) of surviving at each ages 20, 35 and 65
in the province of birth. 1966-1971 and 1971-1976.

	At age 20		At age 35		At age 65	
	Males	Females	Males	Females	Males	Females
Newfoundland	77 (74)	78 (75)	55 (46)	56 (49)	34 (27)	40 (33)
Prince Edward Island	65 (61)	65 (63)	35 (29)	35 (31)	19 (15)	23 (19)
Nova Scotia	70 (67)	70 (66)	46 (40)	48 (40)	26 (22)	33 (26)
New Brunswick	72 (67)	73 (67)	49 (39)	50 (40)	29 (21)	35 (26)
Quebec	86 (85)	87 (86)	75 (73)	77 (75)	49 (46)	59 (56)
Ontario	81 (84)	82 (85)	67 (72)	69 (75)	45 (48)	54 (59)
Manitoba	62 (60)	63 (60)	38 (35)	40 (36)	20 (18)	25 (21)
Saskatchewan	62 (55)	61 (54)	36 (24)	34 (24)	20 (13)	22 (15)
Alberta	69 (69)	71 (70)	53 (50)	54 (51)	31 (28)	36 (33)
British Columbia	75 (80)	77 (81)	60 (64)	63 (66)	41 (44)	50 (53)

Note : Figures between parentheses refer to the 1966-1971 period.

by sex. In this table we show the probabilities that an individual born in a particular province will still be there at exact ages 20, 35, and 65. These ages were chosen to represent the three most significant stages in a working lifetime : entry into the labor market, mid-term job mobility, and retirement. Thus it is possible to see, for example, whether a boy born in a given province is likely to spend most of his working life in the province of his birth.

The data reproduced in Table 10 show that, despite the important reversal in Canada's interprovincial migration flows, not much has changed between 1966-1971 and 1971-1976 as far as the capacity of each province to retain its own natives is concerned. Some provinces (Saskatchewan, Manitoba, and Prince-Edward Island) will have lost from one-third to 40 percent of their potential labor force before this potential will arrive at working age. Things get even worse for these provinces when these cohorts go through the 20-35 age span; between one-third and one-half of those who remained until the age of 20 will leave before reaching 35. And finally, only about 20 percent of those born in these provinces will still be there at the age of 65. At the other extreme, Quebec, Ontario, and British Columbia are able to retain about 50 percent of their natives until age 65.

It is not surprising to observe that the probability of surviving in its region of birth is (almost) always higher for females than for males. This mainly reflects the higher life expectancy for females, because, as far as interprovincial migration is concerned, sexual disparities in the propensity to move are not important. The differences are particularly marked in the case of Ontario, Quebec and British Columbia. Among the many hypotheses which may be considered for explaining these differences, there are two which merit to be stressed. The first one refers to the

labor market : the economic structure of these three provinces is more service-oriented, and thus offers more job opportunities for women. The second hypothesis refers to the «marriage market» : as we have seen before (section 2.1), these three provinces receive the main bulk of international immigrants, where single males are over-represented, so that in these provinces the probability for a woman to find a partner without leaving her province of birth is increased.

The next step is to consider the impact of migration on life expectancies, more precisely, to disaggregate these expectancies by province of residence while assuming that immigrants are exposed to the probabilities of dying and outmigrating that exist in the region of immigration. Table 11 shows the evolution, between 1966-1971 and 1971-1976, of the life expectancies at birth with and without migration, and presents the percentage of total life expectancy spent in the province of birth.

As expected, the range of life expectancies is narrower with migration than without. The difference between the extreme values is 1,3 (for males as well as females) in the first case and about 2,3 in the second case. On the whole however, taking migration into account only slightly affects life expectancies, except for provinces with high life expectancy and heavy outmigration (see for instance Saskatchewan, where male life expectancy drops by almost one year when migration is taken into consideration). Note that for most provinces, gains (between 1966-1971 and 1971-1976) in male life expectancy were much higher when migration was accounted for than when no migration was considered. The reverse is true for female life expectancy.

Table 11- Life expectancies at birth, with and without migration
1966-1971 and 1971-1976

	Life expectancy of males					
	With migration (multiregion)		Without migration («single region»)		Percentage spent in province of birth	
	1966-1971	1971-1976	1966-1971	1971-1976	1966-1971	1971-1976
Newfoundland	69,1	69,8	69,5	69,9	58	64
Prince Edward Island	68,8	69,3	69,1	69,3	44	48
Nova Scotia	68,9	69,5	68,6	68,9	52	56
New Brunswick	69,0	69,4	69,1	69,3	51	59
Quebec	68,7	69,0	68,4	68,6	79	81
Ontario	69,5	70,1	69,3	70,0	79	74
Manitoba	69,7	70,2	70,1	70,3	46	48
Saskatchewan	69,7	70,2	70,8	71,0	38	47
Alberta	70,0	70,3	70,7	70,7	58	60
British Columbia	69,7	69,9	69,7	70,0	73	69

	Life expectancy of females					
	With migration (multiregion)		Without migration («single region»)		Percentage spent in province of birth	
	1966-1971	1971-1976	1966-1971	1971-1976	1966-1971	1971-1976
Newfoundland	75,7	76,8	75,3	76,5	57	64
Prince Edward Island	76,2	77,1	76,5	77,7	42	48
Nova Scotia	76,1	77,0	75,7	76,9	49	56
New Brunswick	75,9	77,0	75,8	76,9	49	59
Quebec	75,4	76,4	75,0	76,1	79	81
Ontario	76,4	77,3	76,4	77,3	79	74
Manitoba	76,6	77,4	76,8	77,5	44	48
Saskatchewan	76,6	77,6	77,5	78,3	36	47
Alberta	76,8	77,7	77,2	78,0	57	60
British Columbia	76,7	77,5	76,8	77,6	73	69

If the number of years a new-born baby may expect to live is not significantly dependent upon the province of birth, however the total number of years that this baby may expect to live in his or her province of birth varies considerably. A boy born in 1971-1976 in Prince-Edward-Island or Saskatchewan may expect to live only 33 years in his province of birth, whereas a boy born in Quebec may expect to live 56 years in Quebec. For females the corresponding figures are 34 and 61 years. Actually, migration propensities observed in 1971-1976 imply that the average individual born in 7 of the 10 provinces will spend more than one-third of his or her life outside the province of birth. When 1966-1971 propensities are considered, the percentage of life expectancy spent in the province of birth is in most cases even lower. But the most (less) «absorbing» provinces in 1971-1976 were also the most (less) absorbing ones in the previous period. Again, the reversal in migration flows does not significantly affect the hierarchy of the provinces in their capacity of retaining their natives.

A more detailed view of the distribution of regional life expectancies is given in Table 12, which provides for each province of birth, and by sex, the number of years expected to be lived in each province of residence according to the 1971-1976 migration and mortality regime. It is worth noting that a baby born in one of the four Atlantic provinces or in Manitoba may expect to spend about 10 years in Ontario. And a baby born in another Canadian province outside Ontario may expect to live no less than 6 years in the latter province. The socio-economic and demographic consequences of such a phenomenon obviously are considerable, for the province of birth as well as for the province of immigration. When 1966-1971 migration propensities are taken into account, the corresponding figures are even higher : between 15 and 19 years instead of about 10 years for

Table 12A - Life expectancies at birth, by region of residence 1971-1976 - Males

Province of birth	N.F.D.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alb.	B.C.	Total without migration
Newfoundland	44,8	0,3	3,3	1,9	2,4	10,5	1,2	0,5	2,0	2,9	69,8 69,9
Prince Edward Island	1,5	33,3	6,5	5,2	2,1	10,6	1,4	0,9	4,0	3,9	69,3 69,3
Nova Scotia	1,7	0,9	39,2	4,3	3,2	10,6	1,1	0,8	3,4	4,3	69,5 68,9
New Brunswick	1,1	0,9	4,4	40,7	5,3	9,1	1,0	0,7	2,7	3,4	69,4 69,3
Quebec	0,3	0,1	0,7	0,9	56,1	7,2	0,4	0,3	1,2	1,9	69,0 68,6
Ontario	0,9	0,3	1,6	1,4	4,2	51,8	1,2	0,8	3,3	4,6	70,1 70,0
Manitoba	0,3	0,2	1,0	0,7	1,9	8,8	34,0	4,6	9,2	9,3	70,2 70,3
Saskatchewan	0,2	0,1	0,6	0,5	1,1	5,6	3,6	33,1	14,2	11,1	70,2 71,0
Alberta	0,2	0,2	0,8	0,6	1,4	5,8	2,0	3,4	42,1	13,6	70,3 70,7
British Columbia	0,2	0,1	0,9	0,5	1,6	5,8	1,7	2,1	8,8	48,1	69,9 70,0
TOTAL	51,2	36,4	59,0	56,7	79,3	125,8	47,6	47,2	90,9	103,1	

Table 12B - Life expectancies at birth, by region of residence 1971-1976 - Females

Province of residence	N.F.D.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alb.	B.C.	Total without migration
<u>Province of birth</u>											
Newfoundland	48,1	0,4	3,8	2,3	2,8	12,0	1,3	0,5	2,2	3,3	76,8 76,5
Prince Edward Island	1,6	34,6	7,8	5,2	2,8	11,9	1,7	1,0	5,1	5,4	77,1 77,7
Nova Scotia	2,0	1,1	42,1	5,2	3,6	12,4	1,3	0,8	3,5	5,1	77,0 76,9
New Brunswick	1,1	1,1	5,4	44,0	6,0	10,6	1,0	0,7	2,9	4,0	77,0 76,9
Quebec	0,2	0,1	0,7	1,0	61,4	8,7	0,5	0,3	1,3	2,2	76,4 76,1
Ontario	0,9	0,3	1,8	1,5	4,8	57,3	1,4	0,8	3,4	5,1	77,3 77,3
Manitoba	0,3	0,2	1,2	0,7	2,2	10,4	36,2	5,0	10,0	11,1	77,4 77,5
Saskatchewan	0,2	0,1	0,8	0,5	1,3	6,6	4,4	33,9	16,2	13,5	77,6 78,3
Alberta	0,2	0,1	0,9	0,6	1,5	6,8	2,2	3,7	45,3	16,3	77,7 78,0
British Columbia	0,2	0,1	0,9	0,6	1,8	6,8	1,8	2,1	9,7	53,4	77,5 77,6
TOTAL	54,8	38,1	65,4	61,6	88,2	143,5	51,8	48,8	99,6	119,4	

Note: Because of rounding, totals not necessarily equal the sum over the provinces.

natives from the Atlantic provinces (see Termote, 1980, page 34). Life expectancy by region of residence thus captures the important decline in Ontario's attractiveness, and more generally (as may be seen from the last two columns of Table 11, the variation in the capacity of a region to retain its natives).

Another way to consider the impact of migration on the number of years lived in a region is to look not to the number of years «exported» to the other regions, but to the number of years «imported» from the rest of the country. Let us randomly choose 10 boys, one in each province, born in 1971-1976. Their life expectancy would be about 70 years. But, when one adds to the number of years the boy born in Ontario may expect to live in his province of birth, the number of years the boys born outside Ontario may expect to live in the latter province, then we obtain a total of 126 years, that is almost two complete life expectancies. At the other extreme, Prince-Edward-Island may expect to retain only during 33 years the boy born in this province, and the 9 boys born outside this province are expected to spend only about 3 years altogether in Prince-Edward-Island, so that these 10 births will provide to the latter province only about the half of one «average» life expectancy.

3.2 Migration and reproduction : spatial reproduction rates

If migration - in its direct impact - may be viewed as a «death» for the region of outmigration, it may also be considered in its indirect consequences, from the point of view of «births». The ages of highest mobility are also the ages of highest fertility. It may thus be interesting to calculate the number of babies expected to be born from an individual born in a given region according to the region of residence of this individual. The question we thus now ask is : To what extent did the changes in

migration behavior, combined with the drop in fertility (and mortality) affect the reproduction rate of each province? Table 13 presents for 1966-1971 and 1971-1976 the net reproduction rates for each province of birth (of the parents) as well as the percentage of births expected in the province of birth of the parent, and compares the rates obtained when migration is accounted for with the traditional single-region rates.

Again, as for life expectancies, migration reduces the range of net reproduction rates (NRR). In the case of Canada, this is true mainly because of Newfoundland, which being a region of high fertility experiences a significant drop in its NRR when migration is taken into account. For all other provinces, however, the difference between the spatial and the single-region NRRs is marginal. But the capacity for a region to reproduce itself with its own (native) population is markedly affected. Indeed, for some provinces, an important percentage of the expected births actually will take place outside the province of birth of the parents, because of migration.

Once migration is taken into account, there is not a single Canadian provincial population that is able, according to the demographic behavior observed in 1971-1976, to reproduce itself with only the fertility of its own native population (see last column of Table 13). The most striking situations are, of course, to be found in regions of (relatively) high fertility and high mobility, namely in the four Atlantic provinces and in Manitoba and Saskatchewan. In Newfoundland, the NRR without migration is 1,4; with migration it drops to 1,2 but its local NRR (i.e., the reproduction of its natives) is only 0,9. In the case of the five other provinces just mentioned, the NRR drops from 1,0-1,1 without migration to 0,6-0,7 (local NRR). Of course, when the 1966-1971 demographic behavior is considered, the impact of migration is

Table 13 - Net reproduction rates, with and without migration,
1966-1971 and 1971-1976

	Net reproduction rate					
	With migration (multiregional)		Without migration (single-region)		In province of birth of parents	
	1966- 1971	1971- 1976	1966- 1971	1971- 1976	1966- 1971	1971- 1976
Newfoundland	1,5	1,2	1,8	1,4	1,1	0,9
Prince Edward Island	1,3	1,0	1,4	1,1	0,6	0,6
Nova Scotia	1,2	1,0	1,3	1,0	0,7	0,6
New Brunswick	1,3	1,0	1,3	1,1	0,7	0,7
Quebec	1,1	0,8	1,1	0,8	0,9	0,7
Ontario	1,2	0,9	1,2	0,9	1,0	0,7
Manitoba	1,2	1,0	1,3	1,1	0,6	0,6
Saskatchewan	1,3	1,0	1,4	1,1	0,6	0,6
Alberta	1,3	1,0	1,3	1,0	0,8	0,7
British Columbia	1,2	0,9	1,1	0,9	0,9	0,7

even higher, because the previous period is characterized by higher fertility and mobility levels. the decline in the local NRR is particularly impressive in the case of Ontario and British Columbia, which cumulated a declining fertility with an increasing propensity to outmigrate. In the other provinces, these local NRRs dropped only slightly, because a lower propensity to outmigrate from these regions, partly neutralized the decline in the fertility level.

The values in Table 13 also show that, whereas Quebec and Ontario may count on retaining about 80 percent of the births expected from the cohorts born in these provinces in 1966-1976, some other provinces, like Prince-Edward-Island, Saskatchewan, and Manitoba may count on keeping only about half of them. Of course, if there are «missing» births in some provinces, there also will be «imported» births in others. In order to analyze spatial reproduction rates from this point of view, let us consider the figures of Table 14, which produces, for each province of birth (of the parents), the number of births expected in each of the province of residence (of these parents), according to the demographic behavior observed in 1971-1976.

These figures demonstrate that «imported» births may represent as much as 40 to 50 percent of total expected births in provinces like Ontario, Alberta, and British Columbia, while Newfoundland and Prince-Edward-Island, for example, can depend on less than 10 percent of these imported births. Again, despite the important changes in migration behavior between the 1960s and 1970s, the provincial hierarchy in terms of ability to retain expected births and of dependency upon imported births has not been noticeably modified.

Table 14 - Spatial net reproduction rates 1971-1976

Region of birth of parent	Region of residence of parent and region of birth of child										Single region n.r.r.
	N.F.D.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sas.	Alb.	B.C.	Total
Newfoundland	0,93	0,00	0,04	0,03	0,02	0,13	0,02	0,01	0,02	0,03	1,24 1,37
Prince Edward Island	0,03	0,57	0,10	0,08	0,02	0,13	0,02	0,01	0,06	0,04	1,05 1,12
Nova Scotia	0,03	0,01	0,62	0,07	0,03	0,13	0,02	0,01	0,04	0,04	1,01 1,01
New Brunswick	0,02	0,01	0,06	0,69	0,06	0,11	0,01	0,01	0,03	0,03	1,04 1,07
Quebec	0,00	0,00	0,01	0,01	0,71	0,08	0,01	0,00	0,01	0,02	0,85 0,84
Ontario	0,02	0,00	0,02	0,02	0,05	0,73	0,02	0,01	0,04	0,04	0,95 0,94
Manitoba	0,00	0,00	0,01	0,01	0,02	0,10	0,57	0,07	0,12	0,10	1,02 1,06
Saskatchewan	0,00	0,00	0,01	0,01	0,01	0,06	0,06	0,56	0,21	0,12	1,04 1,11
Alberta	0,00	0,00	0,01	0,01	0,01	0,06	0,03	0,05	0,65	0,15	0,98 1,00
British Columbia	0,00	0,00	0,01	0,01	0,02	0,07	0,02	0,03	0,12	0,65	0,93 0,90
Total	1,03	0,59	0,89	0,94	0,95	1,60	0,78	0,76	1,30	1,22	---

The induced impact of migration on the number of expected births is particularly important in the case of Ontario. The figures of Table 14 show that the latter province will receive from 6 to 13 % of the births expected from natives of other provinces, while the population of Ontario itself will have only a relatively small number of children in another province. The strongest induced impact of migration on natality is to be observed between Saskatchewan and Alberta : 20 percent of the number of births expected from a native of Saskatchewan will be born in Alberta.

Let us again consider ten identical cohorts (of 100 individuals, for example), one in each province. The average of their net reproduction rate is 1,01 in 1971-1976. But, because of migration and interprovincial differences in fertility (and mortality), each province will not receive 101 offsprings from each of the cohorts of 100 people. Natives from a given province will generate in their own province of birth only between 56 offsprings (in the case of Saskatchewan) and 93 (in the case of Newfoundland). If one adds to these offsprings born in the province of birth of their parents, the offsprings born from parents born in the other provinces, one obtains an estimate of the extent to which the reproduction of a regional population depends upon the behavior of the population of the other regions. One may observe that, among the six provinces of which the native population does reproduce itself (be it in the province of birth or in another province), only one (Newfoundland) is able, despite a large number of births «lost» by migration, but thanks to a small number of births induced by immigration, to keep a net reproduction rate which is larger than one. At the same time, among the four provinces of which the native population does not reproduce itself, three are able, thanks to an important excess of imported births above exported births, to reach a reproduction level markedly larger than one (the only exception being Quebec).

One may thus verify once more the often observed pattern according to which high (low) fertility regions are also out-(in-) migration regions. But this pattern is now more complete and more precise : these migration flows are such that, at least in Canada, regions where the native population shows a high fertility level are not able to reproduce their population level, while provinces where the native population demonstrate a low fertility level, are however able to reproduce their population level thanks to an «imported reproduction».

CHAPTER 4 - CONFRONTING POPULATION PROJECTIONS AND STABILITY

The demographic growth model is, as such, not a forecasting model. It is interesting, however, to extrapolate the present demographic behavior of a population in order to look for medium and long-term implications. Table 15 presents the following characteristics of the projected population : total population in absolute numbers and provincial distribution, rate of growth, mean age, percentage under 20 years of age, and percentage aged 65 years and over.

In interpreting the figures reproduced in Table 15, we emphasize that they should by no means be considered a forecast of the future evolution of the population of Canada and its provinces. However it may be interesting to compare our projections for 1981 with the results of the 1981 census. In making such a comparison, one should bear in mind that our projections do not take international migration into account. When due consideration is given to this form of migration, it appears that our projections based on the 1966-1971 demographic behavior have significantly overestimated the growth rate of the Canadian population in the 1970's. If we add to the projected total population (24 108 000) estimates of net international migration based on the data presented in Table 1, the total is well above the observed (enumerated) 24 274 000 figure. This over-projection is mainly due to the important drop in fertility during the 1970's. Since this decline in fertility was much more pronounced in the first half of the decade, a projection based on the 1971-1976 observed demographic behavior gives a total 1981 population close to the observed one. By adding to the projected 23 749 000 figure, half (because the projection starts with the population at mid-period) of the 1971-1976 net international migration figure (Table 1) and the 1976-1981 figure estimated by Statistics Canada (300 000), one obtains a total of 24 291 000, only 17 000 (0,07 percent) above

Table 15 - Projections of provincial populations and stable equivalents

	N.F.D.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sas.	Alb.	B.C.	TOTAL
Share (in %)											
(Number in											
1,000's for											
total)											
Obs. 66-71	2,5	0,5	3,8	3,0	28,4	35,3	4,7	4,6	7,5	9,7	20 743
Obs. 71-76	2,4	0,5	3,7	2,9	27,5	35,9	4,6	4,2	7,8	10,5	22 222
Obs. 1981	2,4	0,5	3,5	2,9	26,5	35,5	4,2	4,0	9,2	11,3	24 274
Proj. 1981 (I) ^a	2,5	0,5	3,6	3,0	27,2	35,9	4,3	3,7	8,1	11,2	24 018
Proj. 1981 (II)	2,5	0,5	3,7	3,0	27,0	35,4	4,3	4,0	8,4	11,1	23 749
Proj. 2001 (I)	2,7	0,5	3,5	2,9	25,0	36,6	3,9	2,8	8,9	13,2	29 508
Proj. 2001 (II)	2,9	0,6	3,8	3,4	25,2	33,9	4,0	3,7	9,9	12,6	27 016
Stable (I)	4,7	0,5	3,5	2,7	12,1	37,7	3,5	2,2	12,0	21,1	20 986
Stable (II)	9,3	0,8	5,2	4,8	10,7	27,2	4,2	4,2	15,1	18,5	20 221
Growth Rate											
(over 5 years)											
(in %)											
Obs. 1981	1,8	3,6	2,3	2,8	3,3	4,4	0,5	5,1	21,8	11,3	5,9
Proj. 1981 (I)	7,5	5,1	5,1	5,5	4,3	6,8	2,7	-2,0	9,6	11,8	6,3
Proj. 1981 (II)	7,5	7,0	5,4	7,5	2,9	3,4	1,9	1,4	10,1	8,6	4,5
Proj. 2001 (I)	6,1	4,6	4,1	4,3	2,1	5,1	2,2	-1,2	6,6	8,4	4,5
Proj. 2001 (II)	5,2	4,8	3,4	4,5	0,2	1,1	0,8	0,8	5,6	5,2	2,1
Stable (I)	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8	3,8
Stable (II)	-0,0	-0,0	-0,0	-0,0	-0,0	-0,0	-0,0	-0,0	-0,0	-0,0	-0,0
Mean Age											
Obs. 1981	29,6	33,4	33,3	32,4	33,0	33,9	34,1	33,5	30,6	34,2	33,2
Proj. 1981 (I)	27,3	31,6	31,6	30,6	31,8	32,3	32,5	33,1	30,1	32,9	31,9
Proj. 1981 (II)	28,4	32,4	32,5	31,4	32,8	33,5	33,3	33,4	31,1	34,0	32,9
Proj. 2001 (I)	28,1	32,2	32,7	31,9	34,6	33,8	33,2	34,0	31,5	34,4	33,6
Proj. 2001 (II)	30,6	34,4	35,0	33,9	37,0	37,1	35,3	34,9	34,1	37,4	36,3
Stable (I)	29,1	33,6	33,9	33,3	35,5	35,0	33,8	33,7	33,2	36,4	34,7
Stable (II)	33,9	38,3	38,3	37,6	40,0	39,8	37,5	37,3	38,3	41,7	39,0
% < 20 years											
Obs. 1981	40,6	35,4	33,5	35,3	31,3	31,3	32,6	34,4	33,8	30,2	32,0
Proj. 1981 (I)	45,7	38,8	37,0	38,8	33,9	34,5	35,6	36,9	37,9	33,7	35,2
Proj. 1981 (II)	42,5	36,6	34,7	36,6	31,7	31,9	33,7	35,0	34,9	31,0	32,7
Proj. 2001 (I)	45,2	38,2	35,8	37,4	31,4	33,2	35,2	36,7	36,7	32,3	33,7
Proj. 2001 (II)	39,0	33,1	30,9	32,8	26,7	27,6	31,0	32,8	30,9	26,8	28,6
Stable (I)	43,9	36,6	34,5	35,9	30,6	32,0	34,3	36,5	35,1	30,5	32,8
Stable (II)	35,4	29,3	27,7	29,1	24,3	25,2	28,8	30,3	27,1	23,2	26,7
% > 65 years											
Obs. 1981	7,7	12,2	10,9	10,1	8,8	10,1	11,9	12,0	7,3	10,9	9,7
Proj. 1981 (I)	7,0	11,3	10,0	9,3	8,2	9,2	10,9	12,3	7,7	10,2	9,1
Proj. 1981 (II)	7,1	11,3	10,3	9,5	8,8	9,9	11,0	12,0	7,9	10,8	9,5
Proj. 2001 (I)	7,2	10,5	10,0	9,5	10,2	10,4	11,0	13,8	8,4	11,1	10,3
Proj. 2001 (II)	7,5	10,9	10,6	9,8	11,5	12,7	11,8	12,7	9,2	12,7	11,7
Stable (I)	8,7	12,7	11,9	11,6	12,3	12,3	11,8	12,9	11,0	14,4	12,4
Stable (II)	12,6	17,3	16,3	15,8	17,0	17,5	15,6	16,1	16,0	20,3	17,0

a. I represents projections and stable equivalents based on the 1966-1971 period, II the 1971-1976 period.

the observed figure. At the provincial level, a comparison between the results of the second projection (1971-1976 based) and the enumerated 1981 population shows that indeed the provinces for which there was under-projection (Ontario, Alberta, and British Columbia) are those that usually benefit the most from international migration.

On the whole, the provincial shares projected from the 1971-1976 behavior are close to the ones observed in 1981. There are only two exceptions. In Quebec, losses from interprovincial migration were much greater in 1976-1981 than could be anticipated from the 1971-1976 behavior, so that the observed share is markedly below the projected one. The reverse is true for Alberta. Note that if the multiregional behavior observed in 1971-1976 were to remain constant during the last quarter of the century, the latter province would represent about 10 percent of Canada's population in 2001 (up from 7,5 percent in 1966-1971) while British Columbia would contain close to 13 percent. Simultaneously, Quebec would pursue its decline, from 28,4 percent in 1966-1971 to about 25 percent in 2001, and Ontario would experience a slight decline in its share, decline which however is overprojected here because of the exclusion of international migration.

It is obvious, from the figures of Table 15, that projecting growth rates is much more difficult than projecting the evolution of total populations. For all provinces, there are important differences in the rate of growth observed between 1976 and 1981 and the projected rates. Even the projections based on the most recent period (1971-1976) produced growth rates far from reality. Mainly because of the persistent decline in fertility, the growth rate in each of the Atlantic provinces has been widely overprojected (with rates 2 to 4 times larger than the observed rates). On the other side of the continent, the three most

western provinces had observed rates significantly larger than the projected ones. The difference is particularly important for Saskatchewan and Alberta, mainly because of the considerable increase in the migration attractiveness of these provinces. If the demographic behavior observed in 1971-1976 were to continue during the next decades, then four provinces would experience a quasi zero-population growth by 2001, with Quebec growing at only about 0,04 percent per year.

It is no surprise that, whatever projection is considered, the population of Canada and of each of its provinces will be aging. But, mainly because of the unanticipated continuation of the decline in fertility, those projected rates of aging are lower than the observed ones in each province : the population of Canada and of its provinces has been aging at a much faster rate in 1976-1981 than could be projected on the basis of the 1971-1976 behavior. This is true for the mean age as well as for the percentages accounted for by the 0-19 and 65 and over age groups. But differences between observed and projected figures are particularly obvious when the share of the 0-19 age group is considered. This is quite normal because the unexpected drop in fertility does not (in the short run) so much affect the share of the older population as it does the share of the younger age groups.

In some provinces, the aging of the population will be particularly rapid. If the 1971-1976 behavior remains constant over the next decades, in 2001 Quebec would have only about 26 percent of its population in the 0-19 age group (down from 42 percent in 1966-1971) and 12 percent in the 65 and over group (up from 6,5 percent). The four Atlantic provinces, plus Manitoba and Saskatchewan, would age at a much lower rate than the other provinces. Alberta shows a particular pattern. The share of the

0-19 age group in this province is projected to drop by about 4 percentage points (similar to the national average), but the share of its 65 and over age group as well as the mean age is projected to increase only slightly. (Actually the 65-and-over share and the mean age observed in 1981 are lower than the projected figures). Such an evolution is obviously related to the age selectivity of migration, which showed its impact on the share of the older population and on the mean age, while the impact of the drop in fertility was more pronounced on the share of the younger age groups. On the basis of the 1971-1976 behavior, one could expect that Quebec, Ontario and British Columbia would be the oldest provinces at the end of this century, with Newfoundland remaining - by far - the youngest one.

Finally, let us consider the stable population figures. One way to interpret these figures is to see them as a measure of demographic «speed». Stable population characteristics are a way of summarizing the demographic behavior of a population during a given period. If, for instance, the stable share for a given province (as obtained from the 1971-1976 fertility, migration, and mortality rates) is smaller than the share observed during this period, as compared with the other provinces, its «demographic speed» is decreasing.

Before analyzing the provincial figures, however, a few comments on the national results are in order. The stable equivalent of the 1971-1976 Canadian population is 20,2 million, instead of the 22,2 million observed during the same period. This mainly reflects the below-replacement level of Canada's gross reproduction rate (1,00). On the basis of the 1966-1971 behavior, the total stable population was 21 million. We may conclude that for the whole of the 1966-1976 period, the Canadian behavior in

terms of fertility, interprovincial migration, and mortality implied a stable equivalent population somewhere between 20 and 21 million (ignoring international migration). But Canada's stable growth rate (and therefore also the provincial rates, necessarily all identical) is now slightly negative.

Probably the most important conclusion that may be inferred from this stable population analysis is related to the interprovincial redistribution of the Canadian population. Whatever projection is considered, it is clear that this redistribution is dominated by a centrifugal process. At the western end of the country, Alberta and British Columbia show a demographic speed much larger than the Canadian average, so that their stable share markedly exceeds their observed share; the latter was only 20 percent in 1981 (17 percent in 1966-1971), while their stable share was 33 percent. It is mainly because of their migration attractivity that these provinces show such a high «speed». At the other end of the country, the four Atlantic provinces not only are experiencing a higher speed than the Canadian average, but also they show an acceleration of their speed. These provinces contained only 9 percent of the total Canadian population in 1981, but, thanks to their above average fertility, their stable share based on 1966-1971 behavior was 11,4 percent. Between 1966-1971 and 1971-1976, because of the impressive increase in their migration attractivity, their stable share rose to 20 percent.

Correlatively to the «peripherization» of Canada's population, there is a clear lack of demographic dynamism in the central regions. Manitoba and Saskatchewan do not show an high speed, but a certain acceleration in recent years (primarily because of an increase in their migration attractivity) has allowed them to regain a stable share close to their present one. But their demographic weight in the Canadian system remains small. Finally,

there are two big losers : Quebec and Ontario, the two most centrally located provinces. The demographic behavior of these provinces is, however, chronologically quite different. In the 1960's, Ontario's behavior made it a winner, with a demographic speed slightly above average so that its stable share exceeded the observed share. But in the 1970's, a considerable lack in migration attractivity reduced Ontario's speed, so that its stable share is now only 24 percent (compared with an observed share of 36 percent). Quebec also has experienced a decrease in its demographic speed, but this speed already was so low that the deceleration is much less pronounced than in Ontario. Quebec's below-average fertility, combined with a lack of migration attractivity, implies that this province's stable share is only slightly above 10 percent, while its observed share is 27 percent. The two central provinces taken together contained 62 percent of Canada's population in 1981 (64 percent in 1966-1971), but the deceleration of their demographic speed is such that their total share in the stable population is reduced to 38 percent.

Stable population theory requires not only that each region should have a constant share in the total population and a constant and equal rate of growth, but also that the age structure should remain constant. The present demographic behavior implies that in Quebec, Ontario, and British Columbia, the 0-19 age group would - at stability - represent only between 23 and 25 percent (35 in Newfoundland), while the 65 and over age group would reach 17 to 20 percent (compared with 13 in Newfoundland). Correlatively, the stable mean age would noticeably increase, varying between 37 and 42 years, except for Newfoundland where it reaches only 34 years. The present multiregional demographic behavior thus implies considerable regional disparities in age structures and in the rate of aging.

CONCLUSION

The use of multiregional analysis has helped us to emphasize the importance of the changes that have taken place in the demographic behavior of the Canadian population and to make more apparent some significant long-term implications of these changes. The marked reversal in migration flows observed between 1966-1971 and 1971-1976 (and which seems to have continued at least until the end of the 1970's), combined with an unequally declining fertility, is characterized by strong centrifugal forces, particularly favoring the two most western provinces, but also benefiting the four most eastern provinces. This, along with a rapid aging of the population, obviously has many important implications, not only socioeconomic but also political. This is why one hopes that multiregional models will be increasingly applied, not only for analyzing the present demographic behavior and its short term evolution but also for studying the long-term policy implications of this evolution.

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