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**Communiqué**

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# *Canadian regional economic disparities will persist, says C.D. Howe Institute study*

Fiscal federalism has helped to remove many of the regional imbalances in per capita income among the provinces since the early 1950s, but given current institutional and political realities, the remaining disparities will persist, concludes a C.D. Howe Institute Commentary released today.

The study, *Economic Growth and Provincial Disparity: A New View of an Old Canadian Problem*, was written by Serge Coulombe, Professor of Economics at the University of Ottawa.

Coulombe notes that, despite Canada's huge size and geographic diversity, many disparities between rich and poor regions were gradually removed between 1950 and the mid-1980s through the "convergence phenomenon," whereby human and physical capital tend to accumulate more quickly in regions where they are relatively scarce. Interregional transfers, Coulombe argues, played their part by helping to finance improvements (in the form of better education and training) in human capital in the poorer regions, especially Atlantic Canada. This, in turn, helped to attract financial and physical capital into those areas.

Since the mid-1980s, however, the catch-up process generated by the convergence of capital seems to have exhausted its effects, and the disparities that persist reflect not only the industrial structure of the regions but also the institutional and political context. The downside of fiscal federalism, Coulombe argues, is that, by financing the delivery of health care, education, and income support by the poorer provinces at levels comparable to those found in richer provinces, it encourages Canadians to remain in low-productivity regions. Individuals who cannot find work in their home province need not, therefore, move to benefit from adequate public services.

In the future, Coulombe says, the regional distribution of Canada's economy will be affected by the relative decline of the manufacturing sector, the westward shift of the economic center of gravity, and the continuing development of north-south patterns of trade in place of more traditional east-west patterns. These stresses could undermine Canadians' support for interregional redistribution. Yet, Coulombe argues, a transfer system more adequate than the

current Canada Health and Social Transfer will be required in order to eradicate the underfunding of postsecondary education and improve the stock of human capital in the poorer provinces. Such an improvement would eventually make the poorer provinces richer by raising their level of economic independence.

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*Economic Growth and Provincial Disparity: A New View of an Old Canadian Problem*, Commentary 122, by Serge Coulombe (C.D. Howe Institute, Toronto, March 1999). 36 pp.; $9.00 (prepaid, plus postage & handling and GST — please contact the Institute for details). ISBN 0-88806-451-9.

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# *Communiqué*

**Embargo : à diffuser le *mardi* 9 mars 1999**

# *Les disparités économiques régionales du Canada persisteront, affirme une étude de l'Institut C.D. Howe*

Le fédéralisme fiscal a permis d'éliminer de nombreux déséquilibres régionaux du revenu par habitant entre les provinces depuis le début des années 50, mais compte tenu des réalités institutionnelles et politiques d'aujourd'hui, les disparités qui existent encore persisteront. Telle est la conclusion d'un *Commentaire* de l'Institut C. D. Howe publié aujourd'hui.

L'étude, intitulée *Economic Growth and Provincial Disparity: A New View of an Old Canadian Problem (Croissance économique et disparité provinciale : un nouvel aperçu d'un vieux problème canadien),* est rédigée par Serge Coulombe, professeur d'économique à l'Université d'Ottawa.

M. Coulombe indique qu'en dépit de l'énorme taille et de la diversité géographique qui caractérisent le Canada, de nombreuses disparités qui existaient entre les régions nanties et les régions démunies ont été progressivement éliminées entre 1950 et le milieu des années 80, grâce au « phénomène de la convergence », en vertu duquel le capital humain et physique a tendance à s'accumuler plus rapidement dans les régions où il se fait relativement rare. Selon l'auteur, les transferts interrégionaux ont fait leur part en permettant de financer les améliorations du capital humain (sous la forme d'une meilleure éducation et d'une meilleure formation) dans les régions démunies, et tout particulièrement dans les provinces de l'Atlantique. Cette amélioration a fait en sorte d'attirer à son tour le capital humain et financier dans ces régions.

Cependant, depuis le milieu des années 80, le processus de rattrapage issu de la convergence des capitaux ne semble plus avoir d'effet et les disparités qui persistent encore témoignent non seulement de la structure industrielle des régions, mais également du contexte institutionnel et politique. M. Coulombe explique que l'inconvénient du fédéralisme fiscal, c'est qu'en finançant la prestation des soins de santé, de l'éducation et de soutien du revenu dans les provinces démunies à un niveau comparable à celui des provinces nanties, il encourage les Canadiens à demeurer dans les régions à faible productivité. Les particuliers qui ne parviennent pas à décrocher un emploi dans la province où ils sont domiciliés, ne se retrouvent donc pas obligés de déménager pour bénéficier de services publics adéquats.

Dans l'avenir, affirme l'auteur, la distribution régionale de l'économie canadienne sera touchée par le déclin relatif du secteur manufacturier, le déplacement vers l'ouest du centre de

gravité économique et la progression de la structure commerciale nord-sud au lieu des tendances est-ouest plus traditionnelles. Ces tensions pourraient saper les efforts des Canadiens envers la redistribution interrégionale. Il faudra donc, de noter M. Coulombe, un système de transfert plus indiqué que le Transfert canadien en matière de santé et de programmes sociaux, afin d'éliminer le sous-financement de l'éducation postsecondaire et d'améliorer le stock du capital humain dans les provinces démunies. Or, une telle amélioration pourrait éventuellement enrichir les provinces démunies en haussant leur niveau d'indépendance économique.

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# Economic Growth and Provincial Disparity:

## A New View of an Old Canadian Problem

by

*Serge Coulombe*

By isolating persistent factors underlying regional disparities, modern growth theory can explain the postwar evolution of Canada's geographic and economic regions, and help policymakers predict changes and formulate economic policy.

Capital tends to accumulate faster in regions that have lacked it. But human capital — largely formed by education and training — often cannot be financed by the free market because students lack collateral; in turn, limits on human capital constrain the accumulation of physical capital.

Since the early 1950s, about half the regional imbalances in per capita income among the provinces have been eliminated, mainly due to the convergence of human capital, which has been partly financed by fiscal federalism. In the current institutional and political context, however, remaining per capita income and output disparities cannot be removed.

Fiscal federalism encourages Canadians to remain in low-productivity regions. This is because interregional redistribution allows poorer provinces to offer health care, education, and income support comparable to those found in richer provinces. Individ-uals who cannot find work in their home province are not, therefore, forced to move to benefit from adequate public services.

In the future, the regional distribution of Canada's economy will be affected by the relative decline of the manufacturing sector, the westward shift of the economic center of gravity, and the continuing development of north-south patterns of trade in place of more traditional east-west patterns. This evolution could undermine Canadians' support for interregional redistribution. Yet, only a transfer system more adequate than the current one can eradicate the under-funding of postsecondary education and improve the stock of human capital in the poorer provinces.

## *Main Findings of the Commentary*

- Provincial disparities in per capita gross domestic product (GDP), per capita income, and productivity have lessened since World War II, but they are still substantially larger than those among US states.
- The persistence of regional disparity in Canada is the result of the country's diversity and its model of fiscal federalism.
- Since 1961, interprovincial migration has resulted in much redistribution of population, caused by the relative decline of manufacturing and the increase in farm productivity.
- Various economic indicators — per capita income, earned income, output, labor productivity, and the labor force participation rate — have grown faster in the poor provinces than in the rich ones since World War II. But disparities in unemployment rates have not lessened.
- Disparities in human capital can largely explain the level and changes of provincial disparities in per capita income and output. Measuring human capital is difficult, but logical proxies such as measures of schooling, especially postsecondary schooling, suggest that the provincial distribution of human capital is indeed moving toward a national average.
- Federal government financing of university education in the poor regions can improve the Canadian social optimum. Without that funding, the poor provinces would tend to underinvest in postsecondary education. Since 1977, however, Ottawa's contribution to postsecondary education has been part of block grants not tied to identifiable spending in the provinces. That arrangement may be leading to underinvestment in eduation, especially in the poor provinces.
- Modeling suggests that the current level of provincial disparities has reached a steady state that reflects the industrial structure of the regions and the institutional and political context. Of course, regional economies will continue to be subject to unpredictable localized shocks, as with the effects of the failure of the Atlantic groundfishery.
- Nevertheless, disparities in Canada's per capita output are still a problem because of their size — about 50 percent higher than that of the disparities among US border states. This situation results from the fact that, because of Canadian policies on labor and employment insurance (EI), Canadians are inclined to remain in areas of low productivity and high EI-benefit eligibility, even if they do not work. and they need not move to benefit from adequate public services.

Canada's regional diversity has resulted in great disparities in provincial economies, but should this fact concern anyone except, perhaps, residents of the worst-off provinces?

If Canada were a unitary state occupying a homogenous land mass — say, a vast extension of the plains of North Dakota — economic policymakers would have little reason for real concern about regional differences. But Canada is not just a vast North Dakota, and policymakers must be interested in its contrasts for at least four reasons.

The first is the diversity of the country's settlement patterns, which is obvious during a trans-Canada flight on a clear day. In Atlantic Canada, urban centers are small and much of the population lives in rural areas (in Newfoundland, more than half). Moving west, feverish economic activity is concentrated around the St. Lawrence valley and the Great Lakes. Ontario and Quebec, where 62 percent of Canadians reside — more than three-quarters of them in urban areas[1] — are also home to 71 percent of the manufacturing jobs, and the Toronto- Windsor corridor connects with a broad industrial core on the US side of the Great Lakes.

Westward, the picture changes again. In Manitoba and Saskatchewan, much of the land is used for farming, and a third or more of the population is rural. In Alberta, however, three-quarters of the people are urban dwellers. In British Columbia, that figure rises to almost 85 percent (only a shade less than that in Ontario), although most city dwellers are concentrated in Vancouver, the rest of the province being mountainous with scattered economic activity. Across northern Canada, a land of boreal forest giving way to alpine and arctic tundra, the population is extremely sparse.

This diversity of land-settlement patterns is not surprising, given that Canada is the second-largest country in the world, that its population is concentrated along the southern border in a strip only a few hundred kilometers wide, that it is bounded by three oceans, and that it is richly endowed with natural resources. The implication of this diversity is that Canada's various regions can follow different lines of development, that their economic cycles are not necessarily correlated, and that one industrial policy formula cannot be applied uniformly across the country.

The second reason for interest in regional issues is the persistence of major economic disparities, which have been noted ever since Confederation. Although one can say that interprovincial disparities in per capita gross domestic product (GDP), per capita income, and productivity have tended to diminish since World War II — a phenomenon known as *convergence* — these differences are still substantially larger than those among US states. Their existence and persistence raise the problem of equity. They also greatly complicate the achievement of vertical and horizontal equilibrium in the finances of governments of a highly decentralized federation in which provincial and local administrations provide a large proportion of public services such as health care, education, and social security. The issue of substantial economic disparities is entangled with fiscal federalism. Indeed, Canada has traveled further down the road of interregional redistribution than almost any other federation (Courchene 1994).

This approach took shape mainly in the late 1950s and coincided with the birth of the welfare state. With the aim of promoting the introduction of national programs, Ottawa began to finance various provincial expenditures in health, postsecondary education, and social security. It set up an equalization program to ensure that provinces were able to offer public services of comparable quality without unduly increasing their tax burden, and the principle of equalization was entrenched in the 1982 Constitution. Yet interregional redistribution is not an intrinsic characteristic of a fed-

eral system. In the United States, for example, the federal government redistributes a smaller proportion of resources through transfers to municipalities and states, and this redistribution is not driven by the goal of equalizing fiscal capacity across local governments. Other federations, such as Germany, are in an intermediate position between the United States and Canada.

Thus, interregional redistribution is a third reason for concern about regional issues. High debt and interest rates have tightened the efficiency constraint on public spending programs. Even though many disparities in per capita GDP have been removed over the past 40 years, government expenditure must still undergo fundamental re-evaluation because of its increased opportunity cost.

The 1996 outcry provoked by Ottawa's granting of a generous settlement so that two Atlantic provinces could harmonize the goods and services tax (GST) with their own sales taxes is a good illustration that Canadians are prepared to move quickly to adopt a watchdog role when the public purse is at stake. It is their quite justified impression that they are no longer getting their money's worth for the taxes they pay. In this context, public support for interregional redistribution is likely to soften.

The last reason to be concerned about regional diversity is probably the most important. Study of Canada's regions is the best starting point for understanding the changing conditions and growth pattern of the country in general. Whether or not a whole is simply the sum of its parts, the diversity of those parts means that one has to study the components in order to understand the overall structure.

## The Plan of the Study

The purpose of this *Commentary* is to take stock of regional issues in Canada and to provide a perspective that permits an understanding of the country's regional economic structure. A diagnosis of the evolution of regional disparities can enable analysts to make considerable headway in forecasting the future. Given both the economic structure of Canada's regions and their growth patterns since the 1950s, I demonstrate why regional disparities have finally achieved long-run equilibrium. I focus particularly on labor market issues because, at first glance, it appears that the lack of adjustment in these markets is the source of many problems of regional development. I conclude on the point that Canada's regional disparities are the result of both its diversity and its model of fiscal federalism. Given their geographic and human resources, Canadians have probably opted for the only feasible way to build this country.

The first section presents a succinct profile of the regional economies, featuring descriptive elements that play an important role in the perspective adopted for this study. The theoretical foundations of my approach are briefly described in the second section (and further explained in an appendix).

The following section deals with the evolution of regional disparities and reviews the literature on the subject, paying special attention to the issue of convergence and human capital. I show that the gradual elimination of many regional disparities since 1950 has resulted from a step-by-step process of redistribution of human capital. In the fourth section, the analysis attempts to build a framework that can provide some glimpses of the future evolution of regional disparities.

Over the past four decades, Canadian economists have acquired the habit of taking stock of regional trends every ten years.[2] This study cannot claim to rival its predecessors in scope, so I have opted for a single approach to examining a vast array of problems. This perspective emerges from modern models of economic growth. It addresses the historical, geographic, and demographic analyses in the context of a capital accumulation model in

**Table 1:** ***Average Annual Growth Rates by Province, 1961–96***

| | Nfld | PEI | NS | NB | Que. | Ont. | Man. | Sask. | Alta | BC | Can. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *(percent)* | | | | | |
| Population | 0.63 | 0.76 | 0.70 | 0.70 | 0.97 | 1.69 | 0.62 | 0.29 | 2.11 | 2.46 | 1.42 |
| Real GDP[a] | 3.51 | 4.09 | 3.24 | 3.66 | 3.31 | 3.64 | 2.79 | 3.08 | 4.67 | 4.44 | 3.70 |
| Real GDP per capita[a] | 2.97 | 3.38 | 2.58 | 3.02 | 2.40 | 2.00 | 2.21 | 2.80 | 2.59 | 1.96 | 2.28 |
| Employment[b] | 1.45 | 1.80 | 1.59 | 1.73 | 1.54 | 2.24 | 1.34 | 1.14 | 3.12 | 3.24 | 2.12 |

[a] GDP at factor cost.

[b] CANSIM data on provincial employment start only in 1966.

Source: Author's calculations from Statistics Canada, CANSIM series.

which *capital* is used in the broad sense of physical and human capital and "social" infrastructure; the location of economic activity results from the interaction of economies of scale, transportation costs, and natural resources. The merit of this approach is that it permits a new look at numerous facets of an old problem, reconsideration of historical developments, and diagnosis of the current state of the problem.

## A Profile of Canada's Regional Economies

This section focuses on a few facts and figures that sketch out a profile of Canada's regional economies.[3] In the sections that follow, I gradually transform this profile into a perspective on those economies. I then present other data as statistical facts and deep-seated trends in order to support the different elements of Canada's regional jigsaw puzzle.

### Population Movement

Changes in the relative importance of the regional economies are uncovered in Tables 1 and 2.

The first striking point is that, since 1961, the proportion of Canadians living east of Ontario has declined considerably, from 39.2 percent to 32.7 percent of the total. Saskatchewan and Manitoba have also seen their population share diminish (from 10.2 to 7.2 percent) and, since 1961, have recorded the lowest population growth rate.

A small portion of this major redistribution of population is attributable to birth rates in Quebec and the Atlantic provinces (except Prince Edward Island) that have averaged slightly lower than those in the rest of Canada.[4] Most of the population redistribution, however, occurs through interprovincial migration. In other words, since 1961, migration flows have resulted in a major redistribution of population among the provinces.

Two distinct factors, one for the East and the other for the West, are at the origin of this redistribution. In the East, the low relative growth in population stems from the fact that the five provinces were, and still are, poorer than the national average. This population adjustment is related to the phenomenon of convergence that has played an important role in regional growth dynamics in postwar Canada.

The decline in the population shares of Manitoba and Saskatchewan is attributable to the predominance of agriculture in their economic structure. Sustained growth in agricultural productivity accounts for the decreasing proportion of population remaining in the farming regions, a phenomenon which has been observed in Canada since the 1930s. (The share of Canada's population living in Manitoba and

**Table 2:** ***Growth Indicators by Province, 1961 and 1996***

| | Nfld | PEI | NS | NB | Que. | Ont. | Man. | Sask. | Alta | BC |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *(percentage of national average)* | | | | | |
| | | | | | *Population* | | | | | |
| 1961 | 2.51 | 0.58 | 4.04 | 3.28 | 28.84 | 34.19 | 5.06 | 5.07 | 7.30 | 8.93 |
| 1996 | 1.91 | 0.46 | 3.15 | 2.55 | 24.66 | 37.55 | 3.82 | 3.41 | 9.31 | 12.87 |
| | | | | | *Employment* | | | | | |
| 1966[a] | 1.70 | 0.48 | 3.30 | 2.57 | 27.99 | 37.49 | 4.85 | 4.52 | 7.66 | 9.44 |
| 1996 | 1.39 | 0.44 | 2.82 | 2.29 | 23.49 | 38.83 | 3.84 | 3.37 | 10.33 | 13.21 |
| | | | | | *GDP*[b] | | | | | |
| 1961 | 1.33 | 0.30 | 2.74 | 2.00 | 25.25 | 40.99 | 4.70 | 4.08 | 8.33 | 10.03 |
| 1996 | 1.24 | 0.34 | 2.33 | 1.98 | 22.01 | 40.09 | 3.42 | 3.28 | 11.69 | 13.01 |

[a] CANSIM data on provincial employment start only in 1966.

[b] GDP at factor cost.

Source: Author's calculations from Statistics Canada, CANSIM series.

Saskatchewan peaked at 15.7 percent in the 1931 census.[5])

The three provinces that have emerged as winners of the demographic redistribution, with substantial rises in their relative share of population since 1961, are British Columbia (+3.9 percent), Ontario (+3.4 percent), and Alberta (+2.0 percent). During the period under consideration, per capita income in all three provinces stayed above the national average .

## Basic Provincial Economies

Despite low population growth, Atlantic Canada as a whole has almost managed to maintain its roughly 6 percent relative share of national output since 1961, and the region's GDP per capita and per worker have moved closer to the provincial average. The situation differs in Quebec, Saskatchewan, and Manitoba, whose shares of national output have fallen considerably, and in Ontario, whose share has dropped slightly. British Columbia and Alberta have been the big winners of the economic redistribution: their proportion of national output has risen from 18.4 percent to 24.7 percent.

So, while people were moving from the East and two prairie provinces to Ontario, Alberta, and British Columbia, production was shifting from the center of the country (Saskatchewan, Manitoba, Ontario, and Quebec) to the West (Alberta and British Columbia).

For an explanation of the relative weakness of economic growth in central Canada, one must consider the decline of the manufacturing sector, as well as the increase in farm productivity. The decline in the proportion of jobs in Canada's manufacturing sector is a long-run trend, falling from 20.3 percent in 1976 to 15.6 percent in 1997.[6] Ontario and Quebec are the only provinces with an above-average share of jobs in the manufacturing sector. One can conclude that the relative decline of the manufacturing sector is causing a decentralization of Canada's economic structure.

Consider the economic structure of Alberta and British Columbia, which have become the main areas of economic growth in Canada.

The boom in Alberta, where the share of national output peaked at 15.7 percent in 1982,

was related to favorable changes in oil and natural gas prices between 1975 and 1985. Prices dropped in the mid-1980s, however, and the province's proportion of output quickly fell to 10.9 percent in 1988. Since then, however, the Alberta economy has more than held its own, thanks to a major increase in the production of oil and natural gas following the deregulation of the markets for these commodities. While income per unit of output has dropped, the reduction has been more than offset by the increase in production.

Opportunities for exporting natural gas to California and the US Great Lakes states have continued to expand since deregulation, and Alberta has joined Saskatchewan as a front-runner among the provinces that post a trade surplus with the rest of the world. Changes in oil and natural gas prices did not have the same effect on Saskatchewan and Manitoba, since their oil and gas industries are much smaller in scale than Alberta's.

British Columbia has emerged as Canada's most dynamic and diversified regional growth area. It is rich in natural resources (mines, lumber, natural gas), and it is well-positioned to trade with the Orient and the western United States. However, its economic boom has not been tied to expansion of the manufactured exports that might flow from that strategic geographic position. Indeed, manufacturing is in relative decline in British Columbia (as in the rest of Canada), and the province's export sector has not expanded as quickly as those of the other western provinces, Ontario, or Quebec. In the past ten years, sectors that have experienced strong growth are insurance, real estate, and construction, as well as personal, community, corporate, and financial services.

Moreover, at the beginning of this decade, China's imminent annexation of Hong Kong generated substantial immigration to British Columbia, accompanied by equally substantial flows of capital. A capital account surplus was quick to develop, leading to a trade deficit for the province of nearly 10 percent of GDP between 1990 and 1996. Not surprisingly, however, British Columbia was the first to be hard hit by the international financial crisis that originated in the emerging Asian economies.

## More Considerations

Three other key factors have had an impact on the recent evolution of regional economies in Canada. First, despite the relative decline of the manufacturing sector, there has been a notable increase in goods and services trade between Ontario and the United States in recent years, particularly of vehicles, auto parts, and manufactured products. Indeed, both Ontario and Alberta have experienced a real boom in exports over the past decade.

Second, Quebec has been a poor cousin in terms of regional growth since 1961. The relative decline of the manufacturing sector partly explains this trend in the country's second-largest province. Moreover, since World War II, a portion of Quebec's anglophone elite has followed the westward shift of Canada's center of economic activity. Anglophone Quebecers face no language barrier elsewhere in Canada, so they are more mobile than the rest of the province's population. As well, this group is particularly well endowed in physical and human capital, so its outflow has had a harmful effect on capital accumulation (in the broad sense) in Quebec. As we will see in more detail later, this factor has had an important impact on regional growth patterns in Canada during the postwar period.

Outmigration picked up in the late 1970s and again recently with the rise of Quebec nationalism and the threat of secession. Uncertainty surrounding the province's future in Confederation complicates predictive analysis of regional growth patterns in Canada. Although the secession of Quebec could provoke a reconfiguration of the dynamic forces that have shaped regional growth, it is beyond the scope of this analysis to investigate the possi-

ble growth impacts of such a significant structural change.

The final point concerns the worrying decline in Atlantic fish stocks in recent years. A key component of the economic structure of the Atlantic provinces and eastern Quebec has always been fishing and fish processing. In 1990, more than 104,000 eastern Canadians were working in the industry, including 44,000 in Newfoundland and 28,000 in Nova Scotia. Since then, the industry has gone through the worst crisis in its history (Grafton 1996).

The magnitude of the disaster is well illustrated by the case of northern cod, which alone accounted for 80 percent of the value of Newfoundland's catches before the 1992 moratorium on fishing that species. Bishop et al. (1993) estimate that the spawning biomass of northern cod plummeted from 1.6 million tonnes in 1962 to 22,000 tonnes in 1992. The crisis has since spread to numerous other species.

The dramatic decline of many groundfish species is causing major economic policy problems with respect to stock management. Clearly, Ottawa must thoroughly revise its strategy for managing stocks of marine species in future. Furthermore, the Atlantic fisheries' crisis has generated uncertainty about the continuation of traditional ways of life in many coastal communities. Although the fate of eastern Canada's economy depends strongly on the future evolution of the fish stocks, the complexity of the dynamics that govern changes to these stocks prevents all medium- and long-term forecasts.

## The Theoretical Framework

The dominant paradigm for dealing with the issue of regional disparities has changed considerably in recent years. Analysis of development, underdevelopment, and lagged development between countries and between regions of the same country is today approached via growth models, whereas in the 1970s it was based on the neoclassical general equilibrium model, international trade theory, the hypothesis of constant returns to scale, and the theory of comparative advantage.[7] The appendix to this paper presents summaries of the various theories against the background of Canadian regional economic analysis. Here I offer, for the reader's convenience, simplified explanations of the key concepts in the new growth theory.[8]

The resurgence of economic growth analysis in the late 1980s stemmed from the development of endogenous growth models. The key feature of these models is that accumulation of physical and human capital, ideas, and knowledge is the ultimate source of long-run growth in per capita economic indicators. In the neoclassical growth model — the benchmark model since the 1950s — long-run growth has to rely on exogenous technical progress since the accumulation of the stock of variable productive factors faces decreasing returns (since some factors, such as labor or land, are fixed).

The conflicting predictions of the two alternative theoretical frameworks have given rise to an explosion of empirical studies since the beginning of this decade. At the core of the research agenda has been the notion of convergence across national and regional economies. If decreasing returns apply, capital should accumulate faster in regions where it is relatively scarce since its rate of return is higher there. Poor economies should catch up with the rich. If constant returns to capital accumulation are observed, the poor stay poor relative to the rich.

The other bone of the neoclassical skeleton seriously scrutinized in recent studies is the hypothesis of constant returns to scale. Theories were developed to explain the allocation of economic activity based on the assumption of economies of scale and agglomeration effects. Constant returns to scale apply when economic activities can be duplicated, at the same production costs, in another location.

Both the endogenous growth models and the new location theory help us to understand

why history leaves traces in regional development. But the neoclassical framework explains part of the reality too, since convergence has been a well-accepted stylized fact for most developed countries since the 1950s.

## Regional Disparities: Evolution of the Problem

In the 1960s and 1970s, the first wave of studies on regional disparities in Canada presented a pessimistic diagnosis of the problem's evolution and magnitude. Williamson (1965), for example, shows that Canada's regional disparity rates were higher than those of the five other richest industrialized countries at the time (Australia, Britain, New Zealand, Sweden, and the United States) and that it was the only one in which regional economic disparities had not decreased significantly in the postwar period.

As late as the mid-1980s, Mansell and Copithorne begin their overview of regional disparities by noting:

> In terms of many measures of regional inequality, the situation today is not significantly different from that of the period immediately following World War II. (1986, 1.)

Recent studies on regional convergence in Canada have taken a new look at the evolution of disparities and have offered new diagnoses. However, certain statistical facts highlighted in the first wave of studies continue to be revealing. For example, Chernick (1966), McInnis (1968), and Green (1971) point out that per capita income disparities were highly variable between 1926 and the beginning of the 1960s but exhibited no downward trend. In addition, indicators of interprovincial variability were higher for earned income than for total personal income, even though the relative ranking of the provinces did not change.

Mansell and Copithorne (1986) show that, over the 1970–82 period, indicators of income disparities dropped despite the oil price shocks (which otherwise contributed significantly to changes in the distribution of economic activity and population in the country). Attributing this success to policies implemented during the 1970s, Mansell and Copithorne conclude that interregional unemployment disparities did not trend downward between 1966 and 1983. They also demonstrate that, except for British Columbia, the provinces that were richest in per capita income were those that tended to have the lowest unemployment rates and the poorest were those that had the highest unemployment rates.

Numerous studies have attempted to explain the factors that underlie unemployment disparities. For example, Beaudry (1977) shows that, between 1953 and 1975, seasonal unemployment was much higher in the prairies and the Atlantic provinces than in the rest of Canada because these two regions had a poorly diversified industrial structure based on primary production. He also notes that the relative position of the Atlantic region worsened in this respect during the 1965–75 period. Figures 1 and 2 track the standard deviation of unemployment rates and labor force participation rates for the ten provinces between 1966 and 1996. The dispersion index of the unemployment rate rose significantly in the early 1970s, and since then it has been about twice what it was in the 1960s (Figure 1). This finding confirms the pessimistic diagnosis of Mansell and Copithorne (1986) that Canada is showing no downward trend in regional unemployment disparities; on the contrary, things seem to have deteriorated over the past 20 years. The situation is slightly different for disparities in labor force participation rates (Figure 2), which have fallen about 30 percent since 1981.

The evolution of these two key variables plays an important role in the prospective analysis presented in a later section of this *Commentary*. As I show, what really matters is not so much the dispersion index of these two vari-

**Figure 1:** ***Changes in the Dispersion of Provincial Unemployment Rates, Canada, 1966–96***


Source: Author's calculations from Statistics Canada, CANSIM database series.

ables but the correlation among productivity, the participation rate, and unemployment.

## *The New Wave of Regional Studies*

In this decade, a new wave of studies has focused on the evolution of Canada's regional disparities within the context of the neoclassical convergence process.[9]

One of these studies' most important findings is that a variety of economic indicators (labor productivity, and per capita income, earned income, and output) have grown faster in the poor provinces than in the rich ones since World War II.[10] This phenomenon refers to the concept of *beta convergence*, whereby the poorest economies tend to move faster than the richer ones in the transitory process to steady state. Beta convergence has been confirmed for the provinces by studies using very different methodologies (cross-section, time series, panel data).

Recent Canadian studies (Coulombe and Lee 1993; 1998; Helliwell 1994) also show that regional disparities in income and output per capita and in labor productivity (output per unit of labor) have tended to diminish since the World War II. This is the concept of *sigma convergence*, whereby the dispersion of economic indicators shows a tendency to decrease over time.

Table 3 sets out provincial economic indicators that clearly illustrate the phenomenon of convergence over the 1961–96 period. Generally, per capita output and labor productivity indicators have tended to converge on the all-province average, from below for the Atlantic provinces and from above for Ontario and British Columbia. Some convergence has also occurred for labor force participation rates; the same is not true, however, for unemployment rates.

In the neoclassical growth model, these findings can be interpreted in the following way. When World War II ended, Canada's regional disparities were greater than their steady-state level. Since then, redistribution of physical and human capital among the provinces (beta convergence) has occurred fast enough to more than offset the impact of regional shocks. This has served to reduce the dispersion indexes of a variety of income and output indicators (sigma convergence).

**Figure 2:** ***Changes in the Dispersion of Provincial Labor Force Participation Rates, Canada, 1966–96***


Source: Author's calculations from Statistics Canada, CANSIM database series.

**Table 3:** ***Economic Indicators by Province, Selected Years 1961–96***

| | Nfld | PEI | NS | NB | Que. | Ont. | Man. | Sask. | Alta | BC |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *(ratio to all-province average of 100)* | | | | | |
| | | | | | *Nominal GDP per Capita*[a] | | | | | |
| 1961 | 63.08 | 61.15 | 80.62 | 72.73 | 104.15 | 142.62 | 110.63 | 95.73 | 135.65 | 133.64 |
| 1966 | 64.84 | 63.30 | 75.99 | 73.63 | 102.10 | 134.98 | 105.02 | 119.08 | 132.88 | 128.18 |
| 1971 | 69.47 | 63.31 | 81.05 | 77.24 | 103.23 | 137.58 | 108.34 | 103.23 | 132.35 | 124.20 |
| 1976 | 64.27 | 67.34 | 75.91 | 74.83 | 98.94 | 122.38 | 101.94 | 117.28 | 156.66 | 120.54 |
| 1981 | 66.65 | 63.86 | 76.42 | 72.85 | 94.63 | 110.48 | 96.86 | 114.87 | 181.74 | 121.64 |
| 1986 | 70.72 | 72.54 | 86.45 | 81.93 | 99.82 | 124.82 | 101.44 | 107.42 | 146.29 | 108.57 |
| 1991 | 73.46 | 77.81 | 88.46 | 83.88 | 102.29 | 123.82 | 98.86 | 101.73 | 135.36 | 114.33 |
| 1996 | 72.61 | 82.43 | 82.33 | 86.28 | 99.24 | 118.70 | 99.51 | 106.86 | 139.60 | 112.44 |
| | | | | | *Nominal GDP per Worker*[a] | | | | | |
| 1966 | 89.11 | 67.60 | 82.42 | 83.75 | 99.85 | 118.71 | 98.79 | 119.25 | 120.11 | 120.42 |
| 1971 | 95.67 | 67.44 | 88.23 | 88.07 | 101.91 | 121.29 | 99.81 | 100.68 | 120.04 | 116.87 |
| 1976 | 89.60 | 73.71 | 84.61 | 87.52 | 98.26 | 108.96 | 95.83 | 112.53 | 135.17 | 113.81 |
| 1981 | 90.75 | 71.75 | 86.75 | 86.28 | 96.46 | 97.91 | 92.65 | 112.85 | 152.53 | 112.06 |
| 1986 | 95.93 | 77.70 | 94.33 | 94.34 | 98.45 | 107.03 | 95.26 | 102.82 | 129.57 | 104.57 |
| 1991 | 92.27 | 84.54 | 93.46 | 92.99 | 102.75 | 113.00 | 95.60 | 98.23 | 119.99 | 107.18 |
| 1996 | 96.24 | 83.01 | 88.94 | 92.77 | 100.65 | 110.91 | 95.46 | 104.59 | 121.57 | 105.85 |
| | | | | | *Unemployment Rate* | | | | | |
| 1966 | 162.53 | 71.63 | 129.48 | 146.01 | 112.95 | 71.63 | 77.13 | 33.06 | 68.87 | 126.72 |
| 1971 | 139.77 | 61.56 | 116.47 | 101.50 | 121.46 | 89.85 | 94.84 | 58.24 | 94.84 | 121.46 |
| 1976 | 169.19 | 113.64 | 119.95 | 140.15 | 109.85 | 78.28 | 59.34 | 50.51 | 50.51 | 108.59 |
| 1981 | 162.57 | 133.33 | 119.30 | 135.67 | 122.81 | 77.19 | 70.18 | 54.97 | 45.61 | 78.36 |
| 1986 | 165.81 | 116.84 | 113.40 | 123.71 | 94.50 | 60.14 | 66.15 | 66.15 | 85.05 | 108.25 |
| 1991 | 157.35 | 147.03 | 103.18 | 110.06 | 103.18 | 82.55 | 76.53 | 62.77 | 71.37 | 85.98 |
| 1996 | 178.24 | 134.37 | 115.17 | 106.95 | 107.86 | 82.27 | 68.56 | 60.33 | 64.90 | 81.35 |
| | | | | | *Labor Force Participation Rate* | | | | | |
| 1966 | 75.39 | 96.44 | 94.45 | 90.47 | 104.13 | 113.80 | 106.69 | 99.00 | 110.67 | 108.96 |
| 1971 | 75.25 | 96.17 | 93.73 | 88.56 | 103.50 | 113.56 | 109.21 | 100.79 | 110.84 | 108.39 |
| 1976 | 77.47 | 93.87 | 93.16 | 90.30 | 103.61 | 112.64 | 104.80 | 101.71 | 113.36 | 109.08 |
| 1981 | 80.14 | 93.71 | 91.77 | 89.40 | 102.54 | 113.10 | 104.27 | 99.96 | 116.11 | 109.01 |
| 1986 | 81.61 | 96.31 | 94.24 | 90.72 | 101.91 | 112.26 | 103.36 | 101.28 | 112.06 | 106.26 |
| 1991 | 86.89 | 99.27 | 96.02 | 92.16 | 100.89 | 108.20 | 101.30 | 99.68 | 109.83 | 105.77 |
| 1996 | 83.92 | 104.19 | 95.36 | 94.60 | 100.55 | 105.81 | 101.24 | 98.47 | 111.09 | 104.78 |

[a] GDP at factor cost.

Source: Author's calculations from Statistics Canada, CANSIM series.

In addition, the estimated speed of convergence across the provinces for the different indicators is of the same order of magnitude — between 2 and 3 percent per year — as the one typically estimated for convergence between countries and among regions of the same country in the industrialized world. Lee and Coulombe (1995) and Lefebvre (1994) point out, however, that convergence of labor productivity has typically been faster than that of per capita income and output.

This important finding emphasizes that convergence across the provinces is a fundamental economic phenomenon. It is more than the mere direct consequence of the interregional redistribution that Ottawa has operated on a large scale since the 1950s. This point is consistent with Coulombe and Lee's (1995) finding that convergence occurred faster between 1961 and 1991 for income measures that include the effect of transfers and income tax than for income measures that omit transfers. In other words, the evolution of the transfer and tax system encouraged convergence *ex post* during that period.

Coulombe and Lee (1995) also point out that the development of regional terms of trade had the effect of promoting convergence during their study period. This observation is interesting for an economy as diversified as Canada's, where the composition of producer price indexes, unlike the consumer price index (CPI), changes considerably from one region to another, reflecting a varied production structure. For example, if the price of natural resources increases by more than the price of manufactured goods, the relative situation of a regional economy that produces natural resources should improve. Coulombe and Lee (1995) show that, between 1961 and 1991, the evolution of interregional relative prices encouraged relative growth in the poorest regions and discouraged it in the richest provinces.

Coulombe and Lee's (1998) empirical findings suggest that most of the sigma convergence across the provinces occurred during the 1950–77 period. Evidence of beta and sigma convergence prior to 1950 is not robust, and the process of sigma convergence has slowed since the end of the 1970s. Sala-i-Martin (1996) makes the same observation about the industrialized countries generally. In the next section, I suggest certain elements that may explain this phenomenon.

## The Meaning of the Convergence Studies

The convergence studies have added a healthy dose of optimism to the analysis of regional disparities in Canada. They have established certain statistical facts that, curiously, are sometimes opposed to those thought to have been observed in the 1970s. And they have proposed a new analytical grid with which to diagnose the fundamental problem. In the rest of this section, I show how these studies can contribute to a new perspective on the evolution of regional disparities in this country.

The studies' findings indicate that the neoclassical hypothesis of the adjustment of human and physical capital cannot be dismissed as an explanation of the evolution of certain regional disparities since the 1950s. The existence of substantial disparities at mid-century was partly the result of major upheavals, such as the Great Depression and World War II, which radically altered Canada's economic structure. Hence, the regions temporarily found themselves off their long-run growth paths.

The solid curve in Figure 3 illustrates the evolution from 1926 to 1996 of the standard deviation of the log of the provinces' per capita income (an unweighted measurement of relative dispersion).

The changes in this dispersion index clearly show a downward tendency after 1950. It is far more difficult to identify a clear trend between 1926 and 1950, when dispersion was

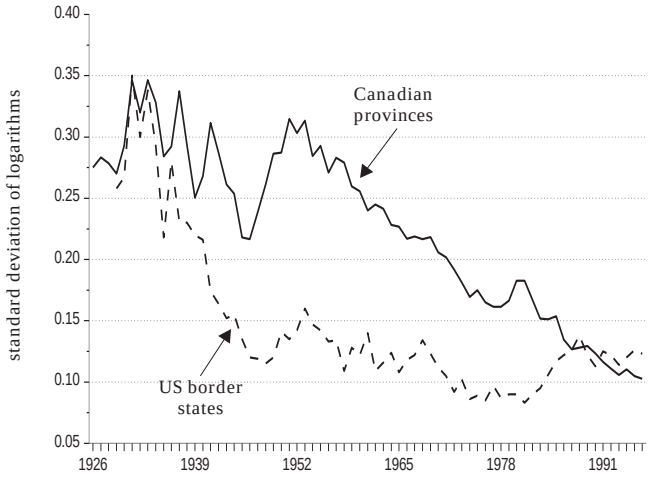
tremendously volatile. The Great Depression and World War II in particular provoked a substantial increase.

This finding is unsurprising since the literature on regional development in Canada recognizes that the Great Depression had particularly harmful consequences on the economies of the peripheral regions (Lithwick 1987, 122). Saskatchewan, for example, saw its per capita income fall from more than 100 percent of the national average to about 44 percent. And the war greatly disrupted Canada's regional economic structure by encouraging extremely rapid, concentrated industrialization and by speeding up urbanization. There was a decisive impact on the location of the automobile industry in Ontario and the aircraft industry in Quebec, which were to experience a real postwar boom. The 1965 auto pact subsequently consolidated Ontario's dominance in an industry that is still the engine of central Canada's economy.

Another interesting element of Figure 3 is the shape of a comparable dispersion index of the US states that share a border with Canada. This figure is taken from Coulombe and Day (1998), who compare regional growth patterns in the two countries. The assumption is that, because the US border states occupy a geographic and economic space relatively similar to that of southern Canada, they constitute an appropriate control group for the Canadian economy.

The difference in patterns is interesting. The two dispersion indexes evolve side by side through the 1930s, but they diverge starting in 1939, when the impact of World War II begins to show up in Canada. In contrast, the war's effect on the dispersion of per capita income among the US border states is almost nil. In 1949, the dispersion index in Canada was still twice that observed in the United States. From 1950 to the present day, the level of per capita income disparities among the Canadian provinces has drawn considerably closer to that of the US border states. What is also fascinating is that the index for the border states is about the same today as it was in 1944.

**Figure 3:** ***Changes in the Dispersion of Personal Income Per Capita, Canadian Provinces and US Border States, 1926–96***




Source: Coulombe and Day 1998.

It is a fact, however, that over the entire period, disparities in per capita income among US border states have been less than those observed among other US states. This point aptly illustrates the phenomenon of north-south convergence that has been observed by Barro and Sala-i-Martin (1995, 389–391) Per capita income in the southern United States, the location of the poorest states in 1880, grew much faster than the national average between 1880 and 1990. Thus, in any comparison of regional disparities in the two countries, one must keep in mind that regional convergence in Canada operates between the center and the periphery, whereas in the United States it is a north-south phenomenon.

## *The Convergence of Human Capital*

A convergence rate of 2 percent of GDP per capita per annum, such as that estimated for Canada in recent empirical studies, is consis-

tent with a capital share in national income on the order of two-thirds, a ratio suggesting that a large component of the payment of labor accrues from the return on investment in human capital (see the appendix). In this context, the facts observed in postwar Canada can be explained by the neoclassical process of broad capital adjustment, as advanced by Mankiw, Romer, and Weil (1992) and by Barro, Mankiw, and Sala-i-Martin (1995).

Following a major structural shock, it is the relative slowness of the adjustment of human capital that results in gradual convergence. In an open economy, capital flows generate great mobility of physical capital and a rapid drop in the return to it, given the relative scarcity of human capital. In the absence of interprovincial migration (which can produce a readjustment of human capital), the accumulation of human capital in the poorest regions can result only from an internal process, external financing of its formation being difficult because individuals face a lack of collateral. I return to this point in discussing the interesting question of migration in the next section.

This analysis suggests that disparities in human capital can largely explain the level and evolution of disparities of per capita income and output in Canada. Although formal testing of this hypothesis seems interesting, it is difficult to obtain a precise and appropriate indicator of human capital at the aggregate level. Any measure of the stock of capital presents theoretical and statistical problems, and human capital is no exception.

Yet because the slow adjustment of human capital is what drives convergence, I provide some statistics that may support the thesis. But I caution readers that the analysis presented in this section is an exploratory exercise, not an exhaustive examination of the problem.

Convergence deals with relative growth profiles. To test the empirical relationship between the convergence of human capital and the convergence of income and output, one needs an indicator other than income and output — an indicator for which data exist and that is proportional to the human capital of the population residing in the province.

I opted for simple indicators calculated from Statistics Canada census data on the educational attainment of both sexes age 15 and over.[11] In fact, I adopted two indexes: the first is the percentage of the population that obtained a university degree; the second is the percentage that completed at least one year of secondary school.

The first index is an attempt to measure highly specialized human capital — physicians, engineers, professors, managers — and the second that of the labor force in general. Although the great majority of Canadians finishing their studies today have completed at least one year of high school, this was far from the case in the middle of the century. These two indexes in fact relate to two different concepts of human capital, and it may be interesting to compare the results. Table 4 presents the two indexes.

Notice in the table that the human capital indicators for the poor provinces are typically below the national average and those for the rich provinces are above it. But notice, too, that the distribution of human capital has tended to converge since 1951. In most cases, the provinces that initially had an index above or below the average have seen it move toward the national average.

Newfoundland offers the most striking case among the poor provinces. From 1951 to 1996, the index based on the the proportion of the population with a university degree increased from 36.2 to 69.6. Interestingly, this index dropped slightly in the period immediately following the province's entry into Confederation — a phenomenon that may be attributable to a "brain drain" to Britain. And, based on elementary studies, its human capital indicator shows continuous convergence.

**Table 4:** ***Schooling Indexes for Provincial Populations Ages 15 and Over***

| | Index 1 | Index 2 | Index 1 | Index 2 |
|---|---|---|---|---|
| | | *(ten-province average = 1)* | | |
| | Newfoundland | | Ontario | |
| 1951 | 0.362 | 0.669 | 1.884 | 1.131 |
| 1961 | 0.340 | 0.808 | 1.447 | 1.054 |
| 1971 | 0.508 | 0.839 | 1.283 | 1.085 |
| 1981 | 0.656 | 0.890 | 1.257 | 1.053 |
| 1991 | 0.666 | 0.934 | 1.312 | 1.039 |
| 1996 | 0.696 | 0.945 | 1.280 | 1.031 |
| | Prince Edward Island | | Manitoba | |
| 1951 | 0.580 | 0.997 | 0.942 | 1.042 |
| 1961 | 0.638 | 0.980 | 1.106 | 1.065 |
| 1971 | 0.775 | 0.952 | 1.114 | 1.025 |
| 1981 | 0.852 | 0.976 | 1.034 | 0.999 |
| 1991 | 0.858 | 0.994 | 1.029 | 1.002 |
| 1996 | 0.912 | 0.993 | 0.995 | 1.001 |
| | Nova Scotia | | Saskatchewan | |
| 1951 | 0.942 | 1.095 | 0.725 | 0.944 |
| 1961 | 0.979 | 1.070 | 0.851 | 0.964 |
| 1971 | 0.993 | 1.032 | 0.847 | 0.970 |
| 1981 | 1.034 | 1.017 | 0.852 | 0.984 |
| 1991 | 1.049 | 1.019 | 0.868 | 0.987 |
| 1996 | 1.049 | 1.019 | 0.844 | 0.994 |
| | New Brunswick | | Alberta | |
| 1951 | 0.652 | 0.846 | 0.942 | 1.150 |
| 1961 | 0.766 | 0.838 | 1.277 | 1.131 |
| 1971 | 0.823 | 0.887 | 1.332 | 1.150 |
| 1981 | 0.838 | 0.918 | 1.341 | 1.116 |
| 1991 | 0.848 | 0.944 | 1.201 | 1.072 |
| 1996 | 0.874 | 0.955 | 1.138 | 1.060 |
| | Quebec | | British Columbia | |
| 1951 | 1.377 | 0.827 | 1.594 | 1.330 |
| 1961 | 1.234 | 0.862 | 1.362 | 1.228 |
| 1971 | 1.114 | 0.893 | 1.211 | 1.165 |
| 1981 | 0.992 | 0.937 | 1.145 | 1.110 |
| 1991 | 1.039 | 0.935 | 1.130 | 1.072 |
| 1996 | 1.046 | 0.938 | 1.165 | 1.062 |

Note: Index 1: university degree completed; Index 2: at least one year of high school completed (see text).

Sources: Statistics Canada, *Educational Attainment and School Attendance*, Cat. 93-328 (Ottawa, 1993); data for 1996 census computed by Statistics Canada for Coulombe and Tremblay (1998).

The rich provinces all have indicators well above the national average, except Alberta, which had little highly specialized human capital in 1951.

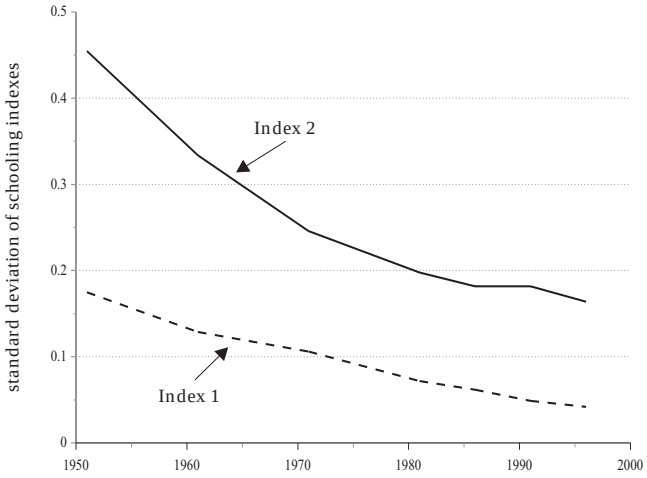
The case of Nova Scotia contrasts with that of the other Atlantic provinces. This relatively poor province nonetheless has human capital indicators that are close to, and sometimes higher than, the national average — a fact that is surely related to its long record of teaching excellence in specialized colleges offering advanced and technical education.

The only major surprise is the asymmetry in the evolution of the two indexes for Quebec. Its general education indicator is typical of a poor province, beginning the period below the national average and then drawing closer to it continuously over the analysis period. However, Quebec's indicator of postsecondary education does not develop in typical fashion; for 1951 and 1961 it is well above the national average. Quebec's labor force was poorly endowed in human capital, but its elite was well educated.

This curious finding has two possible explanations. First, the asymmetry may stem from the fact that, before the Quiet Revolution that led to the creation in 1964 of the Ministère de l'Éducation, Quebec's education system, with its classical colleges, encouraged a concentration of top-level schooling within the elite while leaving the majority of the population in relative ignorance.[12] The other possibility is that the 1951 and 1961 figures illustrate that the highly educated anglophone minority at that time was better represented in Quebec than it is today. The many departures that followed the province's economic and financial downturn and the coming to power of the Parti Québécois in 1976 may have contributed to the drop in the index during the 1960s and 1970s.

Despite these few special cases, Table 4 indicates a convergence of human capital in Canada. Figure 4 illustrates the evolution of that phenomenon over time by plotting as the measure of dispersion the standard deviation of the indicators of the ten provinces for each period. Both curves clearly show a downward tendency.

**Figure 4:** ***The Convergence of Human Capital Indicators, Canada, 1951–96***




Note: Index 1 is for provincial populations that have completed a university degree. Index 2 is for those who have completed at least one year of high school. (See text and Table 4.)

Source: Coulombe and Tremblay 1998.

The standard deviation of each of the two indexes diminishes from one decade to another over the entire study period. Disparities in levels of highly specialized human capital (Index 1) drop from 45.5 to 16.4 percent during this period. The curve is even convex in terms of the starting point, which suggests an asymptotic adjustment typical of the neoclassical convergence phenomenon following from the law of diminishing returns.

For general education (Index 2), the coefficient of dispersion falls from 17.5 to 4.2 percent. The shape of the curve suggests that human capital disparity, as measured by this index, may be completely eliminated in one or two decades. This finding is not surprising since by that time virtually all Canadians over the age of 15 likely will have completed at least one year of high school.

The analysis presented here clearly shows that, to understand the evolution of regional disparities in Canada since the 1950s, it is useful to apply the neoclassical growth model incorporating an expanded concept of capital. The primary conclusion that emerges from this approach is that many of the regional disparities observed at the close of World War II were transitional in nature. They stemmed from the fact that the distribution of human capital was far from having adjusted to the profound upheavals of the Great Depression and, above all, the war, which had radically altered Canada's economic structure by concentrating industrial development and accelerating urbanization and economic growth. Human capital took longer to adjust because investment in it is not easily financed externally.

Could labor mobility have accelerated the convergence of human capital? As we will see in the next section, migration flows do not guarantee faster convergence of human capital, since individuals well endowed in such capital tend to leave poor regions to settle in rich ones. Rather, convergence depends on the slow process of accumulating human capital that is based on domestic investment in education. It was in the interest of the residents of the poor provinces to increase their investment in human capital, which was relatively scarce there. And that is what they have done.

In a recent study, Coulombe and Tremblay (1998) thoroughly address the issue of the role of human capital in the regional convergence process in Canada. They estimate the speed of convergence for a variety of human capital indicators based on schooling achievements. As predicted by the theory of Barro, Mankiw, and Sala-i-Martin (1995), the speed of convergence of human capital indexes for the overall population is roughly equal to the speed of convergence of post-transfer measures of per capita income. For human capital indicators based on the percentage of the population with at least a university degree, Coulombe and Tremblay (1998) estimate that the share of the implicit earnings of human capital in national income ranges from 0.42 to 0.57. This share is higher than the share of profits in national income, which is the usual measure of physical capital earnings.

This finding suggests that human capital accumulation has been a major factor in the relative evolution of regional economies in Canada. By itself, the human capital catch-up process, based on the advanced education indicator, explains roughly 70 percent of the relative evolution of per capita income since 1951 across the provinces.

Finally, consider that the point raised in this section is consistent with the study by Cousineau and Vaillancourt (1987) on the interregional differential in returns to human capital investment in Canada. Using 1981 census data, these authors estimate that investment in secondary and university education is more profitable in the poor provinces than in the wealthy ones. In Newfoundland, they estimate that investment in secondary education increased wages by 76 percent, whereas in Alberta the increase was only 21 percent.

## *Interprovincial Migration and Human Capital*

Interprovincial migration can play an important role in the convergence of regional disparities. People tend to migrate from poor regions with high unemployment to rich regions with low unemployment. The decision to migrate or not is also tied to the costs of migration, to the political, institutional, and cultural context, and to the geographic and climatic environment.

One must, therefore, expect migration flows within a country to be more sensitive than flows between countries to differences in income and unemployment rates. The former are not hampered by immigration laws, and the homogeneity of cultural, institutional, and

political context is a cost-reduction factor. Empirical studies (see, for example, Barro and Sala-i-Martin [1995, 294]) also show that the elasticity of income differentials for — that is, their responsiveness to — migration between regions of a country is about 50 percent higher than that observed for migration between countries.

The impact of migration on convergence is thus potentially greater for regions of a single country than between countries. However, empirical studies (Braun 1993; Barro and Sala-i-Martin 1995, ch. 11) indicate that the effect of interregional migration on convergence is minimal. For all practical purposes, migration can be considered to have a neutral impact on the evolution of per capita income and output disparities.

This finding derives from the interaction of two factors. In a neoclassical growth model, the migration of residents of poor regions to rich regions leads to a redistribution of labor, which translates via the adjustment of capital-to-labor ratios, other things being equal, into a reduction of the productivity gaps among regions. But migrants bring physical and human capital with them. Although the costs of transporting physical capital are generally high, migrants can take with them their stock of financial savings, which in the long term translates into an increase of physical capital in the region to which they move.

The theoretical impact of migration on convergence thus depends on the characteristics of migrants compared with those of people who do not move. More specifically, it is related to the ratios of human capital to labor and of physical capital to labor. Empirical studies — such as Boadway and Green (1981) for Canada; and Borjas, Bronars, and Trejo (1992) for the United States — on the characteristics of migrants between regions of a country show that such people are typically better endowed in human capital than the stay-at-home population of their province or state, although they carry little physical capital and savings with them. Given this context, Barro and Sala-i-Martin (1995) demonstrate that, in various neoclassical growth models, the theoretical impact of migration on convergence is extremely limited.

Few empirical studies have looked at isolating the effect of migration on regional convergence in Canada.[13] In a recent exploratory study, Lajoie (1998) analyzes the relationship between interprovincial migration and convergence among the provinces. Her findings are relatively similar to those obtained by Barro and Sala-i-Martin (1992b) in their examination of regional convergence in Japan and the United States. Lajoie's results suggest that interprovincial migration has not had any significative impact on the regional convergence of GDP per capita across provinces. Lee (1997) shows, however, that interprovincial migration may have speeded the convergence rate of labor productivity across provinces between 1966 and 1992.

Finally, interprovincial migration means a geographic redistribution of the human capital represented by university graduates. In Canada, empirical studies tend to demonstrate that the better-educated young people tend to leave poor regions to settle in rich ones (see Cousineau and Vaillancourt 1997). Thus, the federal government's direct financing of university education in poor regions could improve the Canadian social optimum. Without that funding, the poor provinces would tend to underinvest in university education knowing that some graduates would leave to settle in Ontario, British Columbia, or Alberta.

Since 1977, however, Ottawa's contribution to postsecondary education has no longer been tied to actual investment in the provinces. Rather, under Established Programs Financing (EPF), the funding of postsecondary studies became part of a block grant, a strategy that has continued under the Canada Health and Social Transfer (CHST). It is possible that the nature of the CHST (and of EPF before it) leads

to underinvestment in postsecondary education, especially in the poor provinces.

## Where Is Canada Headed?

The discussion on the nature and evolution of regional disparities in Canada contributes some important elements to our vision of their future development. At midcentury, regional imbalances were generally very large, but because many of them were transitional in nature, they have gradually diminished since the 1950s. The slowness of the adjustment follows from the slowness intrinsic to the accumulation of human capital.

The obvious forecasting question is: Can we expect the convergence of regional disparities to continue over the next 10 or 15 years? Can the process of human capital accumulation still contribute to the elimination of regional disparities? In this section, I show that the answer is probably no.[14]

### *Scope of the Analysis and Methodology*

Before identifying an analytical framework that allows me to forecast the evolution of regional economies in Canada, I must clarify a few points in order to stress the limited scope of the analysis.

First, it is particularly difficult to anticipate the relative evolution of the growth pattern of a peripheral economy that is largely based on the exploitation of natural resources. The fortunes of such an economy often depend on changing world prices of its main resources, such as oil, wheat, or wood pulp. These prices fluctuate much more than those of manufactured products and are often subject to significant sudden movements that are difficult to predict. An example is the relative evolution of GDP per worker in Alberta and Saskatchewan, Figure 5 illustrates the magnitude of regional shocks on these economies with particularly low diversification.

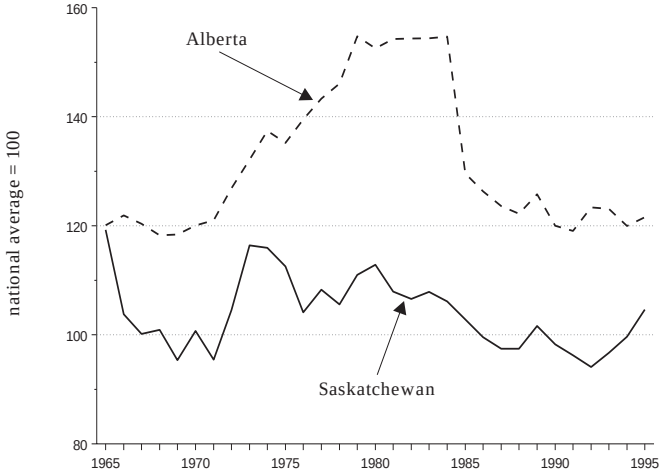
Second, the recent crisis in cod and certain other marine resources has shown the potential volatility of a stock of a renewable resource that is subjected to the hazards of uncoordinated exploitation. Development of such a stock can display chaotic characteristics typical of the most complex predator-prey models, which are virtually impossible to predict.

Finally, the distribution of physical and human capital and of mobile labor between competing growth centers, such as Montreal, Toronto, and Vancouver, is based on the existence of multiple equilibriums. The relative growth of one center can substantially increase or decrease after a seemingly innocuous shock. Such developments are typical of the nonconvexities characteristic of production functions with economies of scale and externalities.[15] Thus, it is not surprising that, following a discussion of similar problems, Krugman comments, "Changes in regional fortunes will be difficult to predict" (1991, 8).

### *The Evolution of Transitional Disparities*

The evolution of regional imbalances of a transitional nature can, however, be predicted, if we have an appropriate model. Analysis of capital accumulation in a neoclassical model gives us a model of the evolution of transitional imbalances. In the context of neoclassical growth models, Barro and Sala-i-Martin (1995) show that, starting from an initial situation of disequilibrium arising from transitional regional shocks, the phenomenon of beta convergence causes the average level of regional disparities to gradually approach a steady-state level. The asymptotic reduction of regional disparities, starting from a situation in which they are larger than in steady state, accrues from the gradual, slow adjustment of the distribution of physical and human capital for the reasons given previously.

**Figure 5:** ***Nominal GDP Per Worker, Saskatchewan and Alberta, 1966–96***




Source: Author's calculations from Statistics Canada, CANSIM database series.

The expected level of regional disparities in stationary state is not nil, however. The relative growth of regional economies is constantly being disturbed by the repercussions of regional shocks. It is even possible that, following a long period of relative calm, the average level of disparities may fall below its steady-state level. In that case, the dynamic of growth-pattern evolution implies a return to the steady state — in other words, an increase in the observed level of regional disparities.

To my knowledge, Coulombe and Day (1997) are the first to use Barro and Sala-i-Martin's theoretical framework to try to establish the path of the evolution of regional disparities based on the estimated convergence equation. Their analysis addresses the evolution of the dispersion of labor productivity among the provinces. First, the authors estimate beta convergence, using several methods. They then use the estimated speed of beta convergence and the estimate residual related to the regional shocks that cause the regions to stray temporarily from their growth path to estimate the theoretical path of per capita GDP dispersion.

The results feature a finding that is revealing for situating the evolution of regional growth patterns in Canada within a global perspective: different estimation methods suggest that the regional disparities in productivity observed since the mid-1980s are close to their steady-state level.

The neoclassical convergence process, under which the poor regions catch up by accumulating physical and human capital, may finally be over. Figure 6 is an example of a simulation exercise obtained from an estimate of beta convergence based on panel data. The speed of convergence across provinces is estimated while each province is allowed to converge to a different long-run steady state. The estimated coefficients of beta convergence, the long-run levels of provincial personal income, and the autoregressive structure are then used to produce a model for the long-run evolution of the provinces.

The dynamic simulation uses historical data for 1949 through 1952 and thereafter only the values forecast by the model. The theoretical path of evolution of per capita income shows an asymptotic convergence of the dispersion index toward its stationary level.[16]

For this estimation method, the long-run level of the dispersion index is about 12 percent. The remaining regional disparities in per capita income are attributable to structural and institutional disparities that are not likely to fade away in the medium or long term via redistribution of physical and human capital.

Overall, Figure 6 shows that the observed path of regional disparities has closely followed the predicted path of the dynamic simulation exercise. Note that, unlike World War II, the Korean War does not seem to have had any significant effect on the evolution of regional disparity in Canada. In recent years, interestingly, the observed dispersion index has undershot its long-run equilibrium level.

## *An X-Ray of Per Capita GDP Disparities*

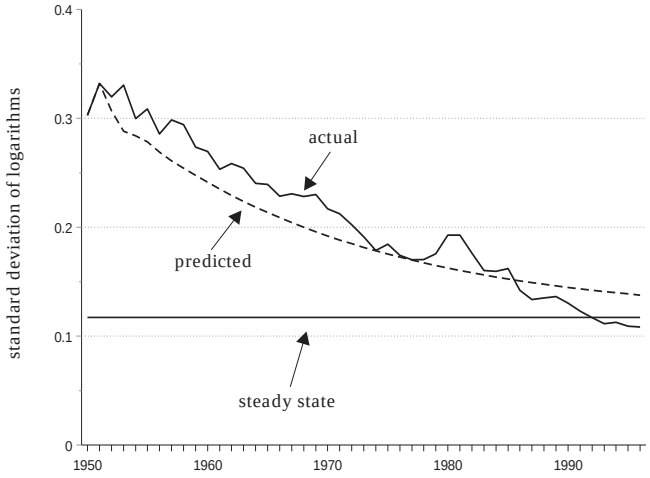
As noted earlier, the dispersion index of per capita income among the provinces has drawn considerably closer to the level observed in the United States. But the dispersion of per capita GDP has not.

As Coulombe and Lee (1995) demonstrate, the income concept chosen is important in analyzing convergence in Canada in view of the magnitude of the interregional redistribution effected through the transfer and taxation systems. This is not true of the United States, where the extent of interregional redistribution is far less than it is in Canada.

Pursuing the same line of thought, Coulombe and Day (1998) show that, despite the postwar convergence observed among the provinces, their per capita GDP dispersion index at the beginning of the current decade was still about 50 percent higher than that observed between US border states and other states. This finding suggests that the need for interregional redistribution via fiscal federalism and the transfer and tax systems is potentially one and a half times what it would be if output disparities among the regions of Canada were comparable to those in the United States.

This analysis indicates that the magnitude of regional disparities in Canada is such that they must still be considered a problem, regardless of the convergence observed over the past 50 years. To examine this problem and its causes in more detail, I turn to an adaption of Coulombe and Day (1998), which offers a comparative analysis of US border states and Canadian provinces excluding Alberta. Alberta is excluded here because it is the only important oil-producing economy among Canadian provinces and US border states, and shocks to the oil-producing sector have a disproportionate effect on measures of regional disparities

**Figure 6:** ***Dispersion of Personal Income Per Capita, Canada, 1951–96***



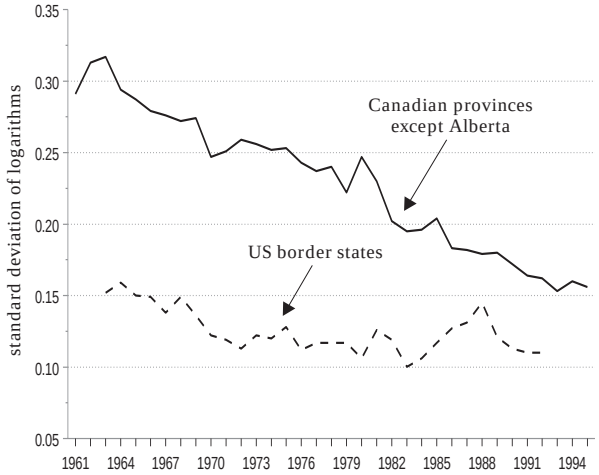

Sources: Author's dynamic simulation of a conditional convergence model for the ten provinces using EViews 3. Actual values are author's calculations from Statistics Canada, CANSIM database series.

based on per capita GDP and productivity. With Alberta excluded from the analysis, convergences of per capita GDP and of labor productivity are much more gradual.

We begin by nothing that per capita GDP dispersion among the US border states (see Figure 7) has been relatively stable since 1963 and that its level is very close to that observed during the same period for the dispersion index of labor productivity (Figure 8). And since 1944, the per capita income dispersion index for those states has also been relatively stable (look back at Figure 3) at a level comparable to the dispersion measured by the other indicators. In other words, there are no major differences in US border states in the convergence of income, of output, and of productivity. These observations lead us to conclude that regional disparities in per capita income, output, and productivity among US border states have been around a stationary state since the end of World War II.

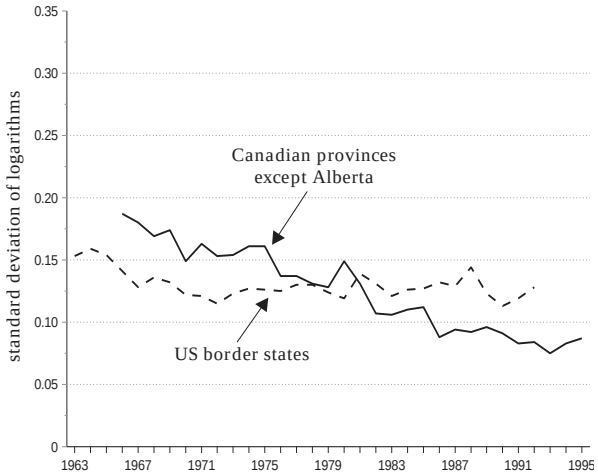
How then does one explain the fact that, although the per capita GDP dispersion index in Canada now seems to be at about its steady-level, it is still about 50 percent higher than the

**Figure 7:** ***Dispersion of GDP Per Capita, Canadian Provinces and US Border States, 1961–95***



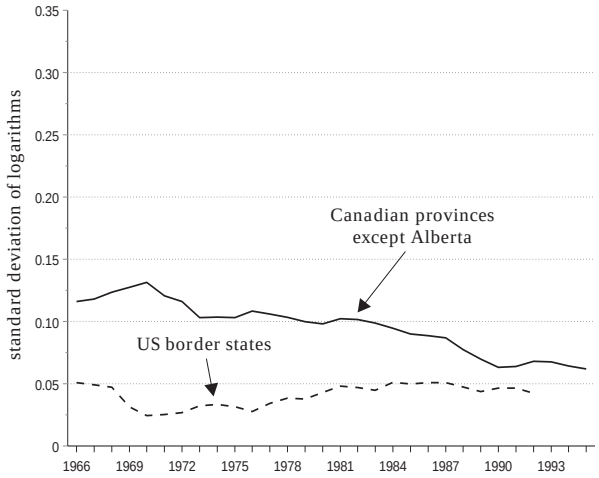

Source: Data bank used for Coulombe and Day (1998).

**Figure 8:** ***Dispersion of Labor Productivity, Canadian Provinces and US Border States, 1963–95***



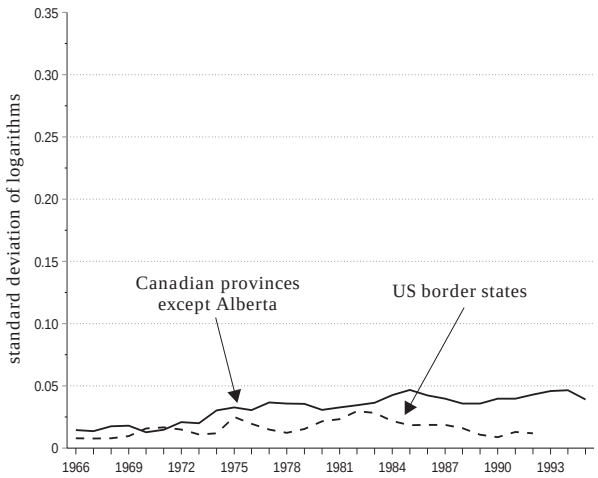

Source: Data bank used for Coulombe and Day (1998).

**Figure 9:** ***Dispersion of Labor Force Participation Rates, Canadian Provinces and US Border States, 1966–95***




Source: Data bank used for Coulombe and Day (1998).

**Figure 10:** ***Dispersion of Employment Rates, Canadian Provinces and US Border States, 1966–95***

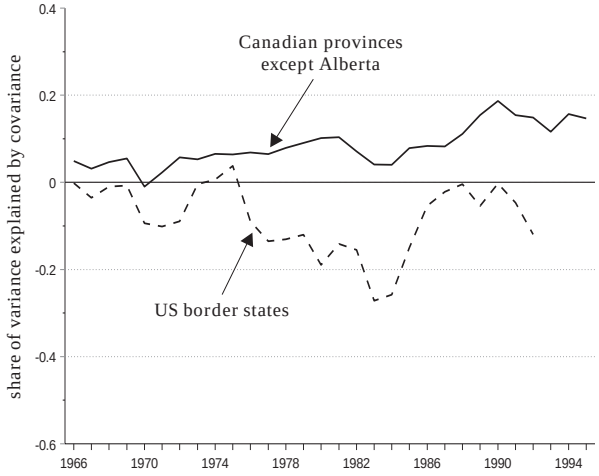



Source: Data bank used for Coulombe and Day (1998).

average observed among US border states since 1944? In an attempt to isolate explanatory factors, Coulombe and Day (1998) propose a variance decomposition of the spread between per capita GDP dispersion indexes for Canadian provinces and US border states.

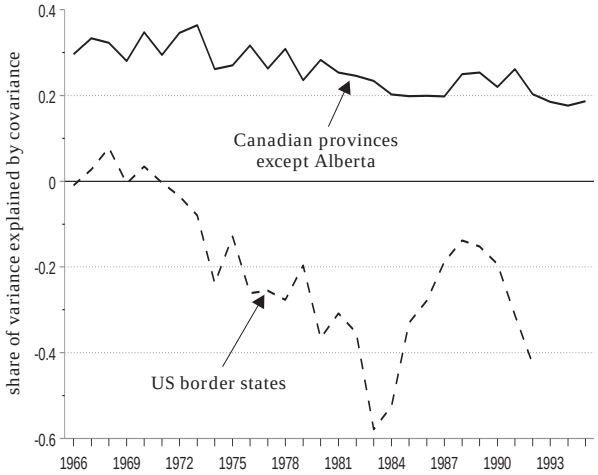
The results of the decomposition analysis are presented here graphically. The variances in productivity and in labor force participation rates (Figures 8 and 9) were responsible for a substantial part of the dispersion index differential until the late 1970s. The magnitude of these two effects has, however, gradually lessened. Indeed, the direct effect of the productivity variance is gradually fading and, since the early 1980s, has contributed to a decrease in

**Figure 11:** ***Contribution of Productivity and Employment Covariances to the Dispersion of GDP Per Capita, 1966–95***



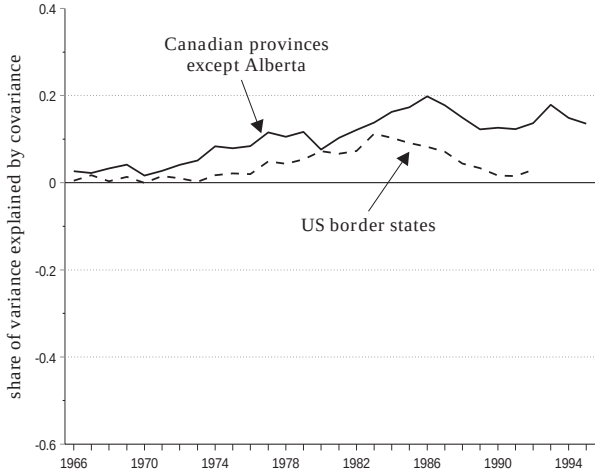

Source: Data bank used for Coulombe and Day (1998).

**Figure 12:** ***Contribution of Productivity and Participation Rate Covariances to the Dispersion of GDP Per Capita, 1966–95***




Source: Data bank used for Coulombe and Day (1998).

**Figure 13:** ***Contribution of Employment and Participation Rate Covariances to the Dispersion of GDP Per Capita, 1966–95***




Source: Data bank used for Coulombe and Day (1998).

the GDP dispersion index differential among the two sets of regional economies. The other direct effect, the variance in the unemployment rate (Figure 10) was never a noteworthy explanatory factor throughout the period.

Since the late 1980s, the total effect of the three variances of productivity, employment, and labor force participation rates on the differential in per capita GDP disparities between US border states and Canadian provinces has been negative. Rather, it is the magnitude of the covariances (Figures 11 to 13) that is the telling finding of this analysis for explaining the differential. The three figures show the contribution of each covariance to the variance between the two sets of regional economies, (the ratio between two times the covariance to the variance).

The single most important effect, depicted in Figure 12, is the covariance between productivity and labor force participation rates. In Canada participation rates are low in low-productivity provinces and high in high-productivity provinces, but the reverse is observed across the border. For example, in Maine and Montana, two states with lower-than-average productivity, participation rates are higher than in high-productivity New York.

The second most important contribution comes from the covariance between employment and productivity (Figure 11). Although the negative correlation between these two variables is not as pronounced among US border states, the correlation across provinces is always positive — a covariance that explains a significative proportion of the GDP disparity

gap. Again, Canadians may be surprised to note that, on average, unemployment rates are lower in the low-productivity states of Maine and Montana than in the high-productivity state of New York.

Quantitatively, the contribution of the covariance between employment rates and participation rates (Figure 13) is the least important of the three sets of covariances examined. However, correlations between these two variables still contribute to increasing the GDP disparity gap between Canadian provinces and US border states.

Thus, the "covariance phenomenon" can be summarized as follows: unlike in US border states, in Canada the labor force participation rate is lower and the unemployment rate relatively higher in the low-productivity regions than in the high-productivity regions.

What is more, the three covariances have had a significant and relatively constant impact on the dispersion spread between Canadian provinces and US border states through the entire study period. Researchers noted the Canadian aspect of this phenomenon as early as the 1970s. What is surprising is that it has not been observed in US border states. In states with less-than-average productivity, unemployment and participation rates are not systematically higher or lower than in states with higher productivity.

Canada's case is distinct from that of the US border area because Canadians are inclined to remain in regions of low productivity even if they are not working and not participating in the labor market. In fact, they are even inclined to remain in regions of high unemployment. These phenomena have not shown any downward tendency since the mid-1960s; the sum of the contribution of the three covariances was just as large in 1990 as it was in 1966. Hence it would be rash to expect a future reduction of these factors without a change in the institutional context that induces Canadians to make different decisions about geographic location and labor force participation.

## Some Preliminary Observations

To arrive at an economic policy prescription in the face of the analysis just completed, one must try to explain why Canadians make decisions that differ from those of Americans with regard to choice of location and labor market participation. Given the cultural closeness between the two countries, I do not believe that preferences vary sufficiently to explain the difference in behavior. Rather, I think that the answer lies in the Canadian institutional context in policies on labor, employment insurance, social security, and fiscal federalism.

### Summary

The new view of provincial disparity I have developed throughout this paper is based on establishing a distinction between dynamic processes that are transitional in nature and those that are permanent. This distinction is similar to the division between cyclical and structural phenomena in traditional macroeconomics. In modern economic growth theory, however, that which is transitional takes a number of decades to be absorbed and that which is permanent is constantly evolving.

Within this new view of regional disparity, recent empirical findings of regional growth in Canada can be summarized in three points. First, much of the "problem" of regional disparities was gradually removed between 1950 and the mid-1980s through the convergence phenomenon, which follows from the tendency of human and physical capital to accumulate more quickly in regions where they are relatively scarce. The limited stock of human capital in a less-developed region is the variable that impedes the mobility of financial and physical capital.

Second, the catch-up dynamic process generated by the convergence of capital in the broad sense seems to have exhausted its effects since the mid-1980s. Those equilibrium disparities that persist are not likely to fade away more or less automatically, as was the case between 1950 and the mid-1980s. Rather, the level of regional disparities in Canada today reflects the industrial structure of the regions and the institutional and political context. Differences in economic structure mean that output activities are not equally intensive in human capital from one region to the next.

Third, a substantial portion of the long-run component of per capita GDP disparity in Canada is attributable to the covariance phenomenon: proportionally more Canadians live in low-productivity regions — mainly the Atlantic provinces — without working there.

## Policy Lessons

One can draw a few broad lessons for economic policy from this unified framework.

The systematically unfavorable relationship among levels of productivity, employment rates, and participation rates contributes largely to the size of the remaining regional disparities in Atlantic Canada. As a result of this phenomenon, proportionally more Canadians live in this low-productivity region without working there. Nothing similar is observed in US border states. In those with low productivity, the unemployment rate is not systematically higher and the participation rate is not systematically lower than elsewhere.

In my view, the covariance phenomenon follows from people's adapting their behavior to the incentives provided by the Canadian economic policy framework. The decision to remain in a region without working follows from the interaction among an individual's preferences, the environmental context, and the institutional and policy context.

In the absence of interregional redistribution effected by the federal government, one must expect the quality of public infrastructures and the generosity of income security and support programs to be inferior in low-productivity regions. An individual will, therefore, be less inclined to remain in a low-productivity region without working there. This is probably the case in the United States, where most public infrastructure and income support programs (except the old age security program established at the end of the 1930s) are financed by the private sector or by state and local governments. People who do not work tend to move to high-productivity regions to benefit from public infrastructure such as health care, education, roads, and income security and support programs.

Any massive state intervention to resolve an economic problem generates side-effects as economic agents adjust to the change in incentives. The convergence process in Canada has

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coincided with Ottawa's commitment to interregional redistribution in the 1950s — namely, the establishment of the equalization program and the cofinancing of national programs in health care, postsecondary education, and social assistance. In my view, the single most important contribution that interregional redistribution has made toward reducing regional disparities in Canada is its support for the financing of human capital investment and education infrastructure in lagging regions.

One way to explain the per capita income gap between Canadian provinces and US border states in 1950 is to look at the human capital gap. Canadian provinces were then about 35 years behind US border states in investment in education. This fact is analyzed in a recent US study (Goldin and Katz 1997) that associates the United States' rapid economic growth in the first part of the century with the phenomenal public investment in secondary education between 1910 and 1940 in the states that shared socially homogeneous populations — the far West, the Great Plains, and parts of New England. Most US border states belong to this group, and in 1950 had secondary school enrollment rates that were much higher than those in Canada. Indeed, at the time, enrollment rates in many Canadian provinces were comparable to those of the poor states in the US South.

Finally, with regard to economic policy, I have emphasized the role of accumulation of human capital in the process of regional growth. In particular, in a situation in which educated Canadians tend to leave relatively poor regions to settle in high-productivity regions, governments of the former will be led to underinvest in postsecondary education because a portion of public investment in education will profit other provinces' economies.

Interregional redistribution may be a partial answer to the problem of underinvestment. However, the incentives generated by the current Canada Health and Social Transfer system are no more adequate to fully eradicate the problem of the underfunding of postsecondary education than were those under Established Programs Financing.

## Appendix:
## More on the Theoretical Framework

As noted in the main text, the issue of regional disparities is now examined using growth-model analysis rather than the neoclassical general equilibrium model. The key concepts are economies of scale, the law of diminishing returns, and the dynamics of accumulation of physical and human capital. This appendix offers summaries of the theories.

### Neoclassical versus Endogenous Growth Models

One of the inherent characteristics of neoclassical growth models (as in the Solow-Swan framework or a model with intertemporal optimization) is that basic economic variables such as output, income, and consumption per effective unit of labor are independent of initial conditions in the steady state. If everyone has access to the same technology and if preferences are identical, the per capita GDP of a relatively poor part of a country will converge toward that of an advantaged region, since the law of diminishing returns holds that capital return is higher in the region where the capital-to-labor ratio is lowest. The dynamic of accumulation of the variable factor (capital) ultimately equalizes returns and capital-to-labor ratios.

In these models, history leaves no trace. Analysis of long-run phenomena can be separated from analysis of transitional phenomena. In such a context, the existence of regional disparity can be explained in only one of the following three ways:

- It is simply a transitional phenomenon that will, in the end, be eradicated by the capital accumulation process.
- It derives from regional differences in endowments of nonmobile natural resources.
- It derives from imperfections that hinder the operation of market forces.

The explanation based on market imperfections has profoundly marked the analysis of regional disparities in Canada. For example, Mansell and Copithorne (1986), in an exhaustive overview of regional disparities prepared for the Royal Commission on the Economic Union and Development Prospects for Canada (the Macdonald Commission), distinguish between studies that have tried to explain regional disparities via a structural approach and those using an approach based on poor market adjustment.

In endogenous growth models, it is the operation of the market itself that creates, maintains, and perpetuates regional disparities. In the 1980s, new growth models made a sensational entry onto the economic research scene with studies by Romer (1986) and Lucas (1988). These new models revolutionized the way in which the phenomenon of growth is regarded, even if, as Solow (1994) judiciously notes, the new approach can be viewed as a return to Domar (1946) and Harrod (1948).

One of the basic ideas of a large class of endogenous growth models is the constancy of returns to the accumulation of a capital (physical and human). That hypothesis directly contradicts the law of diminishing returns — the keystone of the neoclassical approach. Endogenous growth models radically transform the way one perceives the growth dynamic of a country's regions for two closely related reasons. First, elimination of the law of diminishing returns means that accidents of history have a determining impact on the future. Second, a region that starts out poorer than another may remain poorer indefinitely.

Of course, the law of diminishing returns seems entirely logical. If the amount of one factor of production is fixed, capital accumulation must in the long run translate into a lower return on that factor. (Accordingly, this phenomenon is referred to as a *law* and not a *hypothesis*.)

For classicists, such as Malthus, land seemed to be the factor that limited growth potential in the long term. First-year economics courses still use the example of the small clay pot to demonstrate that the law of diminishing returns is a natural law that prevents all the earth's wheat from being cultivated in that small pot, even if adequate capital and labor are provided. The pessimistic Malthusian scenarios have not, however, come to pass. With the Industrial Revolution and technical advances in farming, scarcity of land has not yet translated into a lower return on variable factors. In the neoclassical model, labor replaces land as the fixed factor, thus becoming the ultimate obstacle to the perpetual growth that capital accumulation might generate.

A prototype endogenous growth model, one that is extremely simple and yet representative, illustrates how the law of diminishing returns can be avoided by a sequence of hypotheses that are not contrary to common sense or natural law. Suppose that a set of goods can be produced by technology that is modeled as

$$Y = CK^{\alpha} (LH)^{1-\alpha},$$

where $Y$ is the output, $C$ a constant, $K$ the stock of capital, $L$ the quantity of labor, $H$ the human capital, and $\alpha$ and $(1 - \alpha)$ are, respectively, the shares of the returns to capital and labor in the national income. The technology is of the Cobb-Douglas type, and the modeling in theory appears purely neoclassical. Yet this equation contradicts the neoclassical law of diminishing returns.

Notice that the accumulation of capital in the broad sense (fixed capital and human capital) does not result in lower returns on capital. To highlight this point, assume that the human capital required to maintain output efficiency per unit of labor is proportional to physical capital: $H = QK$. More human capital is required to dig a hole with a steam shovel than with a worker's hands. Production technology can thus be represented as

$$Y = CL^{1-\alpha} QK^{1-\alpha} K^{\alpha} = AK.$$

When as much is invested proportionally in physical and human capital, the law of diminishing returns no longer applies. The marginal product of capital equals the average product $A$ and is constant. Investment in human and physical capital is, therefore, a sustainable engine of per capita GDP growth, even if $L$ is a factor whose growth rate is fixed.

In an $AK$ model, history determines the relative levels of per capita GDP in regions that have access to the same technology and agents with identical preferences. In fact, the region that initially has the highest ratio of capital to labor will always retain its advance over the lagging region, since the return to capital, the mobile factor, does not decrease with capital accumulation.

Anyone who is concerned about the existence and magnitude of regional disparities in Canada should find this pattern worrying since it predicts that market forces will not bring the gradual elimination of disparities in per capita GDP.

## Agglomeration Effects

In analyzing the location of economic activity, Krugman (1991) follows an approach that is methodologically similar to the endogenous growth models. His starting point is that, to have anything useful to say about the location of economic activity, one must discard hypotheses of constant returns to scale and perfect competition.

In a world characterized by pure, perfect competition, the location of economic activity

is of no importance. Land use depends solely on endowment in natural resources. A traveler crossing Canada can actually see pure, perfect competition on the fertile prairies of Saskatchewan. There is no agglomeration. Economic activity appears to extend over the entire territory at the same level of intensity.

The geographic concentration of industrial activity generates externalities that are a source of scale economies for three reasons. First, firms tend to locate in a region where they have access to a labor pool that has the requisite characteristics for efficient production. Second, by concentrating in a particular region, producers can benefit from the presence of a great many firms that produce intermediate inputs. Finally, the geographic proximity of producers facilitates the phenomenon of technological spillovers, which brings about diffusion of the technology by an external effect.

This concept is very similar to that of Porter's regional industry clusters (1990). In fact, Porter recommends that regional development policy encourage the geographic concentration of industries that can support each other. In this way, regional development becomes dependent on the development of focal points for growth that permit companies to profit from externalities and vertical integration. Concentration also allows firms that have the same needs to access, at relatively low cost, quality goods and services of a collective, public nature — such as transportation networks; technical schools and universities for the training of specialized labor, technicians, engineers, and researchers; and distribution and communications networks.

The structure of regional development can be represented by a core-periphery model. Not only do the producers in one industry tend to concentrate in an economic center, but so do all industries that use a mobile work force and want access to a large market for their consumer's products.

The interaction between transport costs and economies of scale is crucial here. The larger the economies of scale, the more advantage there is in concentrating production activities in a single region that serves both the core and the periphery. Transportation costs limit this concentration, however, since it is profitable to produce in the periphery goods and services that are destined for the local market and that have high transport costs relative to the economies of scale achievable in the core. Some goods and services are more efficiently produced near consumers' abodes.

In this context, economic activity on the periphery is characterized by the exploitation of natural resources, by the production of goods and services whose transportation costs are high, and by the production of public goods and services to serve the regional population. This last point, which is not explicitly treated in Krugman's model, is very important in understanding the comparative evolution of regional growth patterns in Canada and the United States.

More and more, the benefits of geographic concentration are not limited to the production of manufactured goods. The increase in the relative importance of the services sector in recent decades and the speed of technical progress in telecommunications and office automation have brought about increased geographic concentration on the production of certain services, such as financial services, consulting services, warehousing, research, education, and health care. To profit from concentration, services production has to generate economies of scale and externalities, and the product has to be able to travel. Increasingly, it is certain services' ability to travel that is leading to concentration. In fact, according to Krugman (1991, 65–67), today's most spectacular examples of concentration of economic activity, such as Tokyo and London, are no longer linked to the manufacturing sector.

Further, since the cost of transporting services that are subject to concentration, such as financial services, is not proportional to the geographic distance between producer and consumer, and the strategic advantage of locating the production core at the center of the economy is disappearing. For instance, Vancouver can benefit from a concentration of services even if the city is far away from the geographic center of the country. The same cannot be said for automobile production. Krugman notes, however, that the choice of locations for concentration of economic activity depends as much on historical accidents for the services industry (he cites the examples of Hartford for insurance and Chicago for futures trading) as for the manufacturing sector.

Krugman (ibid., 90–92) points to Canada's nationalist economic policy as the dominant element that contributed to creating a country. By imposing a tariff and promoting construction of a national railway, the National Policy of the nineteenth century diverted trade between Canada and the manufacturing heartland of the northeastern United States to an east-west axis. One result was the development of a manufacturing core at the center of the country. The Canadian market should now be large enough to be self-sustaining and to prosper in the context of North American free trade.

Finally, the role played by transportation costs in the core-periphery model illustrates the importance of the reference framework chosen. In the economies-of-scale approach, a reduction in transport costs, provided they are not nil, leads to a concentration of economic activity in the manufacturing center at the expense of regional development. Thus, when technology allows people to rent movies or buy merchandise in a virtual market such as the Internet or to easily take a distant-learning university course, production of these services tends to concentrate. Houses will no longer be built in the regions if transportation costs fall far enough.

For Mansell and Copithorne (1986, 35), however, a lowering of transportation costs tends to encourage development of the manufacturing sector in peripheral regions, such as Saskatchewan and the Atlantic provinces, since they can then be more competitive in selling their products in the industrial center. This view, traditional at the time and wholly neoclassical, simply follows from the assumption of constant returns to scale in the production sector. Transportation costs are impediments to regional production; for example, they prevent assembly-line production of cars in Saskatoon.

The decline in transportation and communication costs related to rapid progress in communications and computer technology can be perceived in this neoclassical context as favoring decentralization to the periphery of the production of certain services. The often-cited example is the location in New Brunswick of many 1-800 telephone services. In the Krugman core-periphery model, this decentralization can take place only if transportation costs become nil, in which case location no longer has any importance.

The 1-800 service may be an instance in which transport costs are nil. In this case, economies of scale generate a concentration that could just as easily be located at the center as at the periphery. Natural and human resources, such as the population's bilingualism, then play a decisive role in the location of production of the service. Once an embryonic industry is created, newcomers to the industry tend to locate in the same region to take advantage of the economies of scale and externalities.

## New Growth Analysis

Unlike the *AK* models, the neoclassical growth model incorporates a transitional dynamic that can explain a great many statistical facts. Specifically, the model predicts that, after an upheaval such as World War II, countries such as

Germany and Japan, their capital stock largely destroyed, will go through a catch-up period during which per capita GDP growth will be faster than in other countries. Similarly, this model predicts that areas that suffer a natural disaster that destroys part of their capital stock, such the flood-devastated Saguenay and the region south of Winnipeg, will return to their steady-state growth paths.

This is the phenomenon of convergence, which has recently attracted the attention of many researchers. It plays a large role in explaining the evolution of regional disparities in Canada since World War II.

Since the late 1980s, a wave of empirical studies has focused on the issue of convergence between countries and among regions of one country.[17] Among the key points to emerge from these studies is that, although per capita income disparities among the industrialized countries have tended to diminish since the war, convergence has slowed since the end of the 1970s. Convergence has also been observed within developed countries, with regions that had been relatively poor posting relatively faster growth than others.

Convergence is not evident if one considers all developed and developing countries; indeed, the gap between certain less-developed countries (notably those in Africa) and the developed countries has widened. But if one takes account of the variables that determine steady-state levels of per capita income in the neoclassical model (such as the savings rate, human capital, infrastructure, population growth, and public institutions), we can see a conditional convergence between poor and rich countries. Empirical studies also reveal that the speed at which poor countries or regions catch up to richer ones is relatively constant at about 2 percent per annum.

Empirical studies on convergence have thus shown that endogenous growth models of the *AK* type with no transitional dynamic cannot fully explain the evolution of growth patterns across regions and countries. One could then conclude that the law of diminishing returns apparently still has a role to play in explaining the relative growth of economies in development phases that are not in steady state.

## The Schumpetarian Approach

The Schumpeterian approach to endogenous growth proposes another explanation for the convergence process.[18] In this approach, the return-to-capital accumulation is not the key element of these endogenous growth models. They focus instead on the relationship among research and development, innovation, and the diffusion of technology through the creative destruction process.

Aghion and Howitt (1998, sect. 2.6.1) show that the Schumpeterian paradigm is consistent with the empirical findings on convergence, which might be the result of the diffusion of technology across countries. Then, it is important to see if convergence is related to the capital accumulation process. This is basically what I tried to do in the main text's discussion of human capital convergence in Canada.

Interestingly, some analysts try to integrate the neoclassical and endogenous growth approaches by incorporating a transitional dynamic into an *AK* model. In the Jones and Manuelli (1990) model, which is an example of these hybrid models, the economy converges asymptotically toward an *AK* equilibrium.

## Convergence and Human Capital

The empirical results of the convergence studies are also leading researchers to modify substantially the concept of capital so as to take better account of the slowness of the observed convergence process. In the neoclassical model, the 2 percent speed at which poor economies are observed catching up to richer ones has been interpreted as an indication that the share of capital ought to be considerably larger than

the one-third indicated in national accounts. Because capital is the factor that accumulates during the convergence process, the speed of convergence is related to the relative importance of capital in the production function. The larger the capital share, the more capital has to be accumulated and the slower the convergence speed. A speed of 2 percent suggests that the capital share should, instead, be in the neighborhood of two-thirds.

This finding leads Mankiw, Romer, and Weil (1992) to modify the neoclassical model by assigning a predominant role to human capital. Part of the payment of labor, as measured in national accounting, thus accrues from accumulation of human capital, a variable factor. This process explains the slowness of the phenomenon of convergence, for in addition to having to catch up to the rich economies by accumulating physical capital, poor economies also have to accumulate human capital.

In a neoclassical model of an open economy with perfect mobility of physical capital, Barro, Mankiw, and Sala-i-Martin (1995) illustrate the importance of human capital in explaining why poor and rich countries are slow to converge. If human capital is not taken into account, the speed of convergence is infinite, since capital mobility results in instantaneous accumulation. Human capital has its own rules of accumulation, however, since it cannot be used as collateral for external financing. In this kind of context, the complementarity of physical and human capital means that capital mobility leads to a rapid drop in return to physical capital in economies that are relatively poor in human capital. It is the speed of adjustment of human capital that determines the overall speed of convergence, and the relative scarcity of human capital acts as a brake on international capital flows.

## Notes

Credit should be given to Kathleen Day, Frank C. Lee, and Jean-François Tremblay, with whom I have collaborated on numerous papers on regional growth since 1993. Key parts of the analysis presented in this study were developed jointly with them. The views expressed in this study do not necessarily reflect those of these co-authors. I remain solely responsible for any remaining errors or omissions. I would like to thank Ken Boessenkool, Finn Poschmann, and Bill Robson for their useful comments, and Lydia Yakonowsky for technical support.

*1* Data on rural and urban populations were computed from the 1996 census by Ray Bollman, Statistics Canada. *Rural* refers to the population outside census metropolitan areas and agglomerations (more than 10,000 inhabitants); *urban* dwellers are within them. Nova Scotia is the most urbanized Atlantic province and Alberta the most urbanized prairie province, with 61.3 and 74.2 percent of their populations, respectively, living in urban areas.

*2* The first such studies were Howland (1957) and Chernick (1966). Then came *Living Together* (Economic Council of Canada 1977), which remains one of the best examples of the considerable research effort expended by Canadian economists to understand the problem of regional disparities. Ten years later, Coffey and Polèse (1987) collected 14 studies by various researchers on regional development in Canada in a volume entitled *Still Living Together*.

The homogeneous approach used in this paper may strike some readers as somewhat limited and a break with the traditions of the 1970s and 1980s, when a different economic model was used for each province. The danger of homogeneity is that one may start off on the wrong foot and model the interpretation of facts so as to support a predetermined theory. I believe that I have avoided this danger by opting for an eclectic approach. In each case, my analysis begins with the facts, and then I show how different modern theories of growth can explain certain facets of the problem.

*3* The complementary data used in the text are taken from Global Econometrics (1996), a detailed descriptive study on regional disparities and the structure of regional economies prepared for Industry Canada.

*4* In Saskatchewan and Manitoba, however, the birth rate had an impact opposite to that of population shifts, since these provinces have the two highest birth rates in the country.

*5* The weight of the Atlantic provinces in the Canadian population has been declining since the 1901 census. Termote (1987) offers a regional demographic analysis in the context of an examination of Canadian regional disparities.

*6* The data sources are Statistics Canada's CANSIM series D984736 and D984670.

*7* Melvin (1987) is an excellent example of this approach.

*8* Growth models are today the new paradigm supporting study of the aggregate evolution of economies, and there is already an extensive literature on epistemological matters. The reader interested in exploring these questions further should consult Romer (1994), Solow (1994), and Mankiw (1995).

*9* See, for example, Coulombe and Day (1997; 1998); Coulombe and Lee (1993; 1995; 1998); Helliwell and Chung (1991); Helliwell (1994); Lee and Coulombe (1995); Lee (1997); and Lefebvre (1994).

*10* See Helliwell and Chung (1991); Coulombe and Lee (1993; 1995; 1998); Lee and Coulombe (1995); Lefebvre (1994).

*11* We have data at ten-year intervals for the census years since 1951; data for the 1996 census were constructed by Statistics Canada at the request of Jean-François Tremblay and I.

*12* A excellent history of the education system in Quebec is available in English on the official Quebec government website: www.gouv.qc.ca/educ/indexa.htm. This source describes the education system in Quebec prior to the reform of the 1960s as being underfunded, poorly organized, undemocratic, elitist, and sexist.

*13* Although Helliwell (1994) introduces the role of migration in his discussion of regional convergence in Canada.

*14* The approach presented in this section is based on two recent studies by Coulombe and Day (1997; 1998) and on my ongoing research project on conditional convergence. Some preliminary findings of these papers have been presented in an Industry Canada working paper (Coulombe 1997). The purpose of the research program is to use convergence analysis to highlight certain elements for forecasting the evolution of regional growth patterns in Canada.

*15* Thus, the traditional neoclassical approach has long preferred to adhere to the convex technologies, with unique and stable equilibriums, where a shock always produces a proportional adjustment of the endogenous variables.

*16* The dynamic simulation produces similar results if the starting point is 1953 or 1954 instead of 1952. Given the lag structure of the model and Newfoundland's 1949 entrance into Confederation, 1952 is the first year for which a dynamic simulation for the ten provinces could start.

*17* See Baumol (1986); Barro and Sala-i-Martin (1991; 1992a; 1995); Mankiw, Romer, and Weil (1992); Quah (1993); Sala-i-Martin (1996); and Barro (1997).

*18* For an extensive analysis of the Schumpeterian approach, see Aghion and Howitt (1998).

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