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CONVERGENCE ACROSS PROVINCIAL ECONOMIES IN CANADA: TRENDS, DRIVERS, AND IMPLICATIONS

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Convergence across Provincial Economies in Canada: Trends, Drivers, and Implications

Abstract

Canada has long been characterized by significant regional disparities. Such inequalities can create and exacerbate regional tensions and lead to demands for further redistribution of wealth. The objective of this study is to report on the current state of provincial differences in twenty-five economic variables related to income, productivity, the labour market, well-being and fiscal capacity, and to analyze trends toward or away from convergence for these economic variables. This report also examines the factors influencing these trends and discusses the implications for the federation.

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Executive Summary

Over the last half century, there has been a broad tendency toward convergence of economic variables across provincial economies in Canada, with poorer provinces making up some of the ground between themselves and richer ones. However, the trend has periodically been interrupted and reversed by episodes of high economic disparities among the provinces, resulting mostly from high crude oil prices. Two periods stand out in this regard: the early 1980s and from the early 2000s to present. Since the early 2000s, there has been significant divergence across the provinces in nominal variables due to soaring prices for many commodities (but chiefly crude oil), the benefits of which have largely accrued to the oil-producing provinces – namely, Alberta, Saskatchewan, and Newfoundland and Labrador.

The objective of the report is to provide a comprehensive analysis of disparities across provincial economies in Canada for twenty-five economic variables related to income, productivity, the labour market, well-being, and fiscal capacity. Specifically, the report examines trends toward or away from convergence in Canada, sheds light on the drivers of these trends, and discusses the implications for the federation.

The report is organized into ten sections. The first section provides an outline of the report and discusses the economic variables to be examined in the report. The second section defines the measures of convergence and regional disparities used in the report, and discusses issues related to the concepts of convergence and regional disparities in the Canadian context. The third section highlights key contributions to the literature on convergence. The fourth section presents the current state of provincial disparities in Canada. The fifth section presents the trends toward or away from convergence across the provinces. The sixth section decomposes income disparities into their labour productivity, labour market and demographic components. The seventh section discusses the effect of commodity booms on provincial disparities. The eighth section discusses the factors affecting future trends in convergence among the provinces. The ninth section discusses the implications of trends toward or away from convergence for the federation. The tenth section concludes the report.

The Coefficient of Variation

Convergence is about the reduction in regional disparities. Therefore, to understand what is meant by convergence one must first understand what is meant by regional disparities. The coefficient of variation (CV) is the key measure of regional disparities in the report. Thus,

convergence is defined as a decrease in the CV over time, and divergence is defined as an increase in the CV over time.

The CV – defined as the standard deviation of a data set divided by its mean – tells us the level of dispersion in a data set relative to its mean. In the report, CVs are multiplied by 100 to be expressed in percentage terms. The CV is used in the report because it is a "normalized" measure of dispersion, meaning that it can be used to compare the level of variation of data sets with different units and vastly different means. In the report, CVs are calculated using data for the provinces because the ultimate purpose of this report is to inform federal policy relating to federal-provincial relations, and more data are available for the provinces than for other relevant geographic units. It is also important to note that non-weighted (or equally weighted) CVs form the basis of the report rather than weighted CVs.

The Current State of Provincial Disparities

The report examines trends toward or away from convergence across the Canadian provinces for twenty-five economic variables organized under five headings. Figure 1 presents these economic variables along with their CV for the most recent year for which data are available.

Figure 1: *Summary of CVs, the Most Recent Year*

Headings	Economic Variables	Coefficient of Variation
Income	1. Nominal GDP per Capita	26.6
	2. Real GDP per Capita	24.2
	3. Real GDI per Capita	25.7
	4. Nominal Personal Income per Capita	12.1
	5. Nominal Personal Disposable Income per Capita	11.8
	6. Average Real Market Family Income	16.9
	7. Average Real Total Family Income	13.1
	8. Average Real After-tax Family Income	12.2
Productivity	9. Nominal GDP per Worker	24.8
	10. Nominal GDP per Hour Worked	21.9
	11. Real GDP per Worker	20.9
	12. Real GDP per Hour Worked	18.2
Labour Market	13. Participation Rate	5.0
	14. Employment Rate	7.4
	15. Unemployment Rate	32.7
	16. Share of the Total Population Aged 15+	2.0
	17. Share of the Total Population Aged 15-64	1.6
	18. Educational Attainment	6.0
Composite Indices of Well-being	19. Human Development Index	1.5
	20. Index of Economic Well-being	13.1
	21. Index of Total per Capita Consumption Flows	8.8
	22. Index of Total per Capita Stocks of Wealth	34.4
	23. Equality Index	12.9
	24. Security Index	18.4
Fiscal Capacity	25. Fiscal Capacity (Nominal Provincial Own Source Revenue per Capita)	30.2

Figure 1 illustrates a number of key findings. First, provincial disparities are most significant for the following economic variables: total per capita stocks of wealth (#22); the unemployment rate (#15); fiscal capacity (#25); nominal and real GDP per capita (#1-2); real GDI per capita (#3); and nominal and real labour productivity (#9-12). Second, CVs are always higher for any given nominal variable than for its corresponding real variable. Third, there are relatively small disparities across the provinces with respect to the labour market variables (excluding the unemployment rate).

The Evolution of Provincial Disparities

Figure 2 summarizes the report's findings with respect to the absolute change in the CVs for the economic variables analyzed in the report from 1990 to the most recent year (the "shorter period") and from the earliest available year to the most recent year (the "longer period").

Of the twenty-five economic variables studied, eleven saw their CVs fall over the shorter period; this means that there was convergence across the provinces for eleven economic variables. Real GDP per capita, generally considered the most important convergence indicator, experienced a slight fall of 0.9 percentage points in its CV over the shorter period. Notably, the CVs for the equality index and the index of total per capita consumption flows experienced the two greatest declines over the shorter period. Most labour market indicators also experienced declining CVs over the shorter period. All other variables experienced less dramatic changes in their CVs. It is also interesting to note that the index of total per capita stocks of wealth, the unemployment rate and fiscal capacity – the economic variables with the highest CVs in 1990 – retained their status in 2012. Similarly, our two measures of the share of the population that is of working age, the participation rate, and the HDI had the lowest CVs in 1990 and 2012.

By far, the CVs for six economic indicators – namely, nominal GDP per worker, nominal GDP per hour worked, nominal GDP per capita, real GDI per capita, fiscal capacity, and the security index – rose most dramatically over the shorter period, meaning that these variables experienced the most divergence.

The report also examines convergence over the longer period, meaning the change in the CVs for the twenty-five indicators for the longest period for which data are available. In contrast to the convergence trends over the shorter period, nearly two-thirds of the indicators (16 of 25) experienced a fall in their CV over the longer period. Five indicators that exhibited divergence in the shorter period experienced convergence in the longer period: real GDI per capita, nominal GDP per capita, nominal personal disposable income per capita, the share of population that is aged 15 and over, and the IEWB. Of the six indicators that experienced the most divergence over the shorter period, four experienced significant divergence over the longer period: the two nominal labour productivity measures, the security index, and fiscal capacity. In addition, the

economic variable that experienced the greatest convergence over the shorter period – the index of total per capita consumption flows – also experienced the greatest convergence over the longer period.

Figure 2: *Absolute Change in CVs, the Earliest Available Year and 1990 to the Most Recent Year*

	Earliest Year		1990	Most Recent Year		Absolute Change	
	Year	CV	CV	Year	CV	Shorter Period	Longer Period
1. Nominal GDP per Capita	1961	29.8	19.1	2012	26.6	7.5	-3.2
2. Real GDP per Capita	1981	29.5	25.0	2012	24.2	-0.9	-5.3
3. Real GDI per Capita	1981	33.2	20.3	2012	25.7	5.4	-7.5
4. Nom. Personal Income per Capita	1961	24.0	12.7	2010	12.1	-0.6	-11.8
5. Nom. Personal Disposable Income per Capita	1961	22.6	10.9	2010	11.8	1.0	-10.8
6. Average Market Family Income	1976	15.4	14.7	2011	16.9	2.3	1.5
7. Average Total Family Income	1976	11.6	9.9	2011	13.1	3.2	1.5
8. Average After-tax Family Income	1976	9.8	8.5	2011	12.2	3.8	2.4
9. Nominal GDP per Worker	1976	17.9	10.5	2012	24.8	14.3	6.9
10. Nominal GDP per Hour Worked	1976	18.1	10.4	2012	21.9	11.5	3.8
11. Real GDP per Worker	1981	18.1	18.8	2012	20.9	2.1	2.8
12. Real GDP per Hour Worked	1981	17.0	17.1	2012	18.2	1.1	1.2
13. Participation Rate	1976	8.4	6.8	2012	5.0	-1.7	-3.4
14. Employment Rate	1976	11.3	10.0	2012	7.4	-2.6	-3.9
15. Unemployment Rate	1976	38.1	33.9	2012	32.7	-1.2	-5.5
16. Share of the Total Population Aged 15+	1972	3.6	1.9	2012	2.0	0.1	-1.6
17. Share of the Total Population Aged 15-64	1972	3.8	3.1	2012	1.6	-1.5	-2.2
18. Educational Attainment	..	..	9.6	2012	6.0	-3.6	..
19. Human Development Index	..	..	2.1	2011	1.5	-0.6	..
20. Index of Economic Well-being	1981	24.4	11.6	2012	13.1	1.5	-11.2
21. Index of Total per Capita Consumption Flows	1981	43.4	17.6	2012	8.8	-8.8	-34.6
22. Index of Total per Capita Stocks of Wealth	1981	58.0	35.3	2012	34.4	-1.0	-23.7
23. Equality Index	1981	24.9	22.0	2012	12.9	-9.2	-12.1
24. Security Index	1981	15.4	6.4	2012	18.4	12.0	3.0
25. Fiscal Capacity	1972	26.4	25.1	2012	30.2	5.2	3.8

Decomposing Provincial Disparities for Nominal and Real GDP per Capita

Given their link to economic prosperity, nominal and real GDP per capita are among the most important economic indicators examined in the report. Thus, trends in the CVs for nominal and real GDP per capita are decomposed. Specifically, their CVs are decomposed into four components: labour productivity; the employment rate; the average number of hours worked per

person employed; and the share of the population that is of working age (15+). This decomposition is provided for the 1981-2012 period for real GDP per capita, and it is provided for the 1976-2012 period for nominal GDP per capita.

Convergence trends for nominal GDP per capita were driven by nominal labour productivity disparities, while convergence trends for real GDP per capita were driven by disparities in the employment rate and the share of the population that is of working age. In fact, there has been significant convergence in the employment rate and the share of the population that is of working age; this has pushed toward convergence in both nominal and real GDP per capita. Convergence in these variables was strong enough to offset divergence in real GDP labour productivity and actually bring about real GDP per capita convergence. Nevertheless, convergence in these variables was *not* strong enough to offset divergence in *nominal* GDP labour productivity. As a result, Canada experienced divergence in nominal GDP per capita. Commodity booms are a key factor behind trends in the CVs for nominal GDP per capita and nominal labour productivity.

The Role of Commodity Booms

The report also examines the role of commodity booms in determining convergence and divergence trends for nominal GDP per capita and fiscal capacity. Crude oil prices have important implications for convergence trends in Canada. In general, there is an extremely strong relationship between the CV for nominal GDP per capita and real crude oil prices. Above all, this relationship is driven by the positive effect of crude oil prices on nominal GDP in oil-producing provinces, and their ability to push oil-producing provinces into commodity booms. For example, the CV for nominal GDP per capita rose 9.8 percentage points between 1971 and 1980 to 35.5 per cent, while real crude oil prices increased more than eight-fold. Booming oil prices led to rapid nominal GDP growth in Alberta and, to a lesser extent, Saskatchewan. Similarly, real crude oil prices reached 4.2 times their 1999 level in 2008. As a result, the CV for nominal GDP per capita increased 12.0 percentage points between 2002 and 2008 to 29.6 per cent. This divergence was completely due to strong nominal GDP per capita growth in the oil-producing provinces (which now included Newfoundland and Labrador).

Commodity booms are also associated with appreciation of the Canadian dollar. In fact, there is strong correlation between real oil prices and the Canadian dollar effective (or trade-weighted) exchange rate index (CERI). The Canadian dollar, as measured by CERI, appreciated 39.7 per cent between 2002 and 2008, driven by a 186.4 per cent increase in real oil prices. Currency appreciation may harm other export-oriented sectors as Canadian exports become more expensive to foreigners. In addition, capital and labour tend to flow toward the booming provinces from the other provinces in order to receive a higher return. The side effects of regional commodity booms exacerbate income disparities in the Canadian economy by

weakening certain provincial economies while the economies of oil-producing provinces thrive. However, more research is needed to quantify the magnitude of these side effects.

Commodity booms also impact provincial disparities in fiscal capacity. In general, the impact of high crude oil prices on nominal GDP per capita in oil-producing provinces also applies to fiscal capacity. Commodity booms indirectly raise general government revenues by boosting incomes in affected provinces. In addition, commodity booms directly raise revenues from natural resource taxes, licenses and royalties. In Canada's case, the direct effect was very significant. In fact, the provinces with the highest levels of fiscal capacity also had the largest shares of their fiscal capacity attributable to natural resource rents. A consequence of inflated fiscal capacity in the oil-producing provinces is related to equalization payments. Since the growth of the equalization program is linked to nominal GDP growth (which is boosted by commodity booms), other provinces qualify for more equalization payments.

Factors Affecting Future Trends in Provincial Disparities

Nominal GDP per capita is a useful proxy for living standards in the context of provincial comparisons because it is directly related to income levels, purchasing power and a government's ability to provide various amenities. As demonstrated by the decomposition analysis, trends toward or away from convergence in nominal GDP per capita are driven by trends in provincial disparities for nominal labour productivity and, to a lesser degree, the employment rate and the share of the total population that is of working age. To hypothesize what will happen to provincial income disparities, one must understand these drivers and their determinants.

Provincial disparities for the share of the population that is of working age have levelled off and are not likely to impact future trends in income convergence given that there is little room for further demographic convergence. However, there appears to be more room for further convergence in the employment rate, which is likely to continue to contribute toward convergence in nominal GDP per capita.

Historically, the CV for nominal labour productivity has been the most important component of the CV for nominal GDP per capita. Above all other factors, provincial disparities in nominal labour productivity are affected by the interactions between crude oil prices, the terms of trade and commodity booms. Therefore, the report examines the likelihood of real crude oil prices remaining at contemporary levels, as they can sustain above average living standards in oil-producing provinces.

There exists a great deal of uncertainty concerning the future of the Canadian oil sector. Whether Alberta, Saskatchewan and Newfoundland and Labrador are likely to sustain their

respective commodity booms ultimately depends on the future of crude oil prices, which are notoriously hard to predict, as well as their ability to get their product to key markets. Therefore, a great deal of uncertainty exists concerning the future of provincial disparities in Canada. Nonetheless, recent forecasts suggest that after a 3-5 year period of relative weakness, crude oil prices are projected to be on an upward trend. In addition, it appears to be likely that the WCS-WTI-Brent gap will narrow as oil sands production becomes less land-locked and pipelines are further developed. If these two premises are true, we can conclude that the price Canadian oil producers receive for their oil will rise in the long run, putting upward pressure on provincial income disparities.

Conclusion

The report finds that, from a long-term perspective, the ten Canadian provinces have experienced convergence for most of the economic indicators included in the analysis (16 of 25 variables), at least as measured by trends in the coefficient of variation (CV). This is a positive development for Canada as it means that the provinces are increasingly experiencing a comparable level of economic development, reflecting in large part the convergence of the educational attainment, the employment rate and demographic structures across the provinces. Convergence in the employment rate and educational attainment, two key drivers of long-term GDP growth, is a positive trend for Canada.

Generally speaking, there was divergence in economic variables related to income (at least since 1990), productivity and fiscal capacity, while there was convergence in economic variables related to the labour market and demographics. Economic variables expressed in current prices or nominal terms experienced greater divergence, especially since the early 2000s. This was particularly the case for nominal productivity measures and nominal GDP per capita. This development reflects the increased crude oil prices, which have resulted in the nominal GDP increasing at a much faster rate than real GDP in the three oil-producing provinces, increasing the degree of dispersion across the provinces. The increased disparities in income and fiscal capacity represents a challenge for managing relations between the federal government and the provinces, but it is a positive challenge in the sense that it flows from a growing economic pie.

There was convergence across the provinces in real GDP per capita, a key variable and the most widely studied indicator in the convergence literature. However, it is important to emphasize that real GDP per capita convergence was exclusively due to convergence in the employment rate and the share of the population that is of working age, as there was divergence in real labour productivity.

Convergence across Provincial Economies in Canada: Trends, Drivers, and Implications[1]

I. Introduction

Over the last half century, there has been a broad tendency toward convergence of economic variables across provincial economies in Canada, with poorer provinces making up some of the ground between themselves and richer ones. However, the trend has periodically been interrupted and reversed by episodes of high economic disparities among the provinces, resulting mostly from high crude oil prices. Since the early 2000s, Canada has experienced a commodity boom driven primarily by the rapid industrialization of emerging markets. While Canada as a whole has benefited from surging commodity prices, the benefits have largely accrued to the oil-producing provinces – namely, Alberta, Saskatchewan, and Newfoundland and Labrador. This development has important implications for trends in the relative fiscal capacities and living standards of the Canadian provinces.

The objective of the report is to provide a comprehensive analysis of provincial disparities in economic variables in Canada. The report examines trends toward or away from convergence in economic variables, sheds light on the drivers of these trends, and discusses the implications for the federation. Convergence is a key objective of economic policy. Studying the degree to which convergence has occurred in Canada and deciphering its drivers is the first step towards crafting economic policies that effectively offset and reduce provincial disparities.

A. Structure of the Report

The report is organized into ten sections. The first (and current) section will provide an outline of the report and discuss the economic variables to be examined in the report. The second section will define the measures of convergence and regional disparities used in the report and discuss issues related to the concepts of convergence and regional disparities in the Canadian context. These issues relate to the technical definition of convergence and regional disparities as well as the choice of jurisdictions. The third section will highlight key contributions to the theoretical and empirical literature on convergence and regional disparities in Canada and abroad. The fourth section will present the current state of provincial disparities in Canada across a range of economic variables relating to the labour market, income, well-being, productivity, and fiscal capacity. The fifth section will discuss the trends toward or away from convergence in the variables discussed in the preceding section. The sixth section will determine the drivers of

[1] This report was prepared by Evan Capeluck, under the supervision of Andrew Sharpe. We would like to thank Mario Lapointe, John Lester and Bert Waslander for their comments and Roland Tusz for his assistance in preparing this report. For comments, please email andrew.sharpe@csls.ca or evan.capeluck@csls.ca.

trends in provincial disparities for income by decomposing these disparities into their labour productivity, labour market, and demographic components. The seventh section will provide a detailed discussion of the role of commodity booms in the evolution of provincial disparities in Canada. The eighth section will discuss the factors affecting future trends in convergence among the provincial economies; this section will focus on the probability that high crude oil prices will sustain provincial disparities in income and fiscal capacity in the short- and medium-run, as well as the likely impact of changes in labour productivity, the employment rate and demographic structures on these disparities. The ninth section will discuss the economic, political and policy implications of trends toward or away from convergence in economic variables for the federation. The tenth (and final) section will conclude the report.

B. Economic Variables of Interest

The report examines trends toward or away from convergence across the Canadian provinces for twenty-five economic variables that are classified under the following headings: income; productivity; labour market; composite indices of well-being; and fiscal capacity. Figure 1 provides a detailed listing of the economic variables focused on in this report.

Figure 1: *Economic Variables*

Economic Variable	Description
Income	
Nominal GDP per Capita	The ratio of nominal (current dollar) GDP to the total population. Nominal GDP per capita estimates are available for the 1961-2012 period.
Real GDP per Capita	The ratio of real GDP to the total population. These estimates are available in 2007 chained dollar terms from 1981 to 2012.
Real Gross Domestic Income (GDI) per Capita	The ratio of real GDI to the total population. Estimates are available from 1981 to 2012.
Nominal Personal Income per Capita	The ratio of nominal (current dollar) personal income to the total population. Nominal personal income per capita estimates are available for the 1926-2010 period.
Nominal Personal Disposable Income per Capita	The ratio of nominal (current dollar) personal disposable income to the total population. Nominal personal disposable income per capita estimates are available for the 1926-2010 period.
Average Real Market, Total and After-tax Family Income	Average real (2011 constant dollar) market, total and after-tax family income are the average level of incomes across all family units for these three types of income. The differences between market income, total income and after-tax income, which relate to the inclusion of taxes and transfers, will be discussed in further detail later on. Estimates for these economic variables are taken from the Survey of Labour and Income Dynamics (SLID) and are available from 1976 to 2011.
Productivity	
Nominal GDP per Worker	The ratio of nominal (current dollar) GDP to employment. Nominal GDP per worker estimates are available from 1976 to 2012.
Nominal GDP per Hour Worked	The ratio of nominal (current dollar) GDP to the total number of actual hours worked. Nominal GDP per hour worked estimates are available from 1976 to 2012.

Figure 1: *Economic Variables (continued)*

Economic Variable	Description
Productivity (continued)	
Real GDP per Worker	The ratio of real GDP to employment. These estimates are available in 2007 chained dollar terms from 1981 to 2012.
Real GDP per Hour Worked	The ratio of real GDP to the total number of actual hours worked. These estimates are available in 2007 chained dollar terms from 1981 to 2012.
Labour Market	
Participation Rate	The ratio of the labour force (*i.e.*, the total number of people willing and able to work) to the working age population (*i.e.*, the total population aged 15+). Participation rate estimates are taken from the Labour Force Survey (LFS) and are available for the 1976-2012 period.
Employment Rate	The ratio of employment to the working age population. Employment rate estimates are taken from the LFS and are available from 1976 to 2012.
Unemployment Rate	The ratio of unemployment to the labour force. Unemployment rate estimates are taken from the LFS and are available from 1976 to 2012.
Proportion of Working-Age Population to Total Population (15+)	The percentage share of the total population over the age of 15.
Proportion of Working Age Population to Total Population (15-64)	The percentage share of the total population between the ages of 15 and 64.
Educational Attainment	The share of the working age population that has indicated that their highest level of education is a degree, diploma or certificate earned at an accredited post-secondary institution. Estimates for this economic variable are taken from the LFS and are available from 1990 to 2012.
Composite Indices of Well-being	
Human Development Index (HDI)	A composite measure of health, education and income. The HDI estimates used in this report, which were calculated by the CSLS, are available for 1990, 2000 and the 2005-2011 period. For more information on the HDI, see the Human Development Reports website or Hazell et al. (2012).
Index of Economic Well-being (IEWB)	A composite measure of consumption, wealth, equality and economic security (see below). The IEWB estimates used in this report, which were calculated by the CSLS, are available from 1981 to 2012. For more information on the IEWB, see Osberg and Sharpe (2011).
Index of Total per Capita Consumption Flows	A composite measure of market consumption, life expectancy, unpaid work, leisure, government spending, and regrettable expenditures. Estimates are calculated by the CSLS, and are available from 1981 to 2012.
Index of Total per Capita Stocks of Wealth	A composite measure of capital stocks, R&D, natural resources, human capital, international investment and environmental degradation. Estimates are calculated by the CSLS, and are available from 1981 to 2012.
Equality Index	A composite measure of income inequality and poverty intensity. Estimates are calculated by the CSLS, and are available from 1981 to 2012.
Security Index	A composite measure of risks from unemployment, illness, and poverty. Estimates are calculated by the CSLS, and are available from 1981 to 2012.
Fiscal Capacity	
Fiscal Capacity per Capita	Per capita nominal (current dollar) total fiscal capacity, which includes all provincial own source revenues and 100% of resource revenues. These estimates, which are calculated by the Department of Finance for the purpose of determining equalization entitlements, are available from FY1972 to FY2012.

II. Measures and Definitions of Convergence

Before examining trends toward or away from convergence across the Canadian provinces, it is important to properly define what is meant by "convergence". In this section, the statistical measures of regional disparities and convergence used throughout this report are defined. In addition, we discuss the reason for using the provinces rather than other geographic units when measuring disparities and convergence trends in Canada.

A. Regional Disparities

Ultimately, convergence is about the reduction in regional disparities. Therefore, to understand what is meant by convergence one must first understand what is meant by regional disparities. First, the statistical measure for regional disparities used throughout this report – the coefficient of variation – is discussed. Second, there is a discussion of whether to weight the coefficient of variation to account for differences in the size of the provinces.

i. Statistical Measures[2]

There are a number of statistical measures of variation that could be used to measure provincial disparities, including the range, the variance, the standard deviation, and the coefficient of variation. Statistical measures of spread tell us the extent to which numbers in a data set are spread out. For the purpose of this report, the range and the variance are not very useful, because the former only tells us about the distance between two extremes and the latter cannot be used to compare across multiple economic variables.

The standard deviation – which is the square root of the variance – tells us the standard amount of dispersion from the mean that exists in a given data set, where a lower standard deviation indicates that the data points of a given data set tend to be closer to its mean. The standard deviation is expressed in the same units as the data set; this can pose a problem if one is interested in comparing the level of variation of data sets with different units or vastly different means. Therefore, the standard deviation should not be used to compare the level of variation across multiple data sets.

The coefficient of variation (CV) – which is the standard deviation divided by the mean – tells us the level of dispersion of a given data set *relative to its mean*, where a lower CV indicates that the data points of a given data set tend to be closer to its mean. In this report, the CV is multiplied by 100 to be expressed as a percentage. Since the CV is expressed as a ratio of the standard deviation to the mean, it is a "normalized" measure of dispersion, meaning that it can be used to compare the level of variation of multiple data sets.

[2] See Appendix I for the equations of the statistical measures used in this report.

Only the CV will be used to measure the level of provincial disparities in this report for three reasons: (i) the CV is easy to understand and discuss because it can be expressed in percentage terms; (ii) the CV can be used to compare the level of variation of data sets with different units and vastly different means; and (iii) the use of additional measures of dispersion will increase the size of the report while adding little additional value.

ii. Weighted Versus Non-weighted Statistical Measures

The provinces differ greatly in terms of their size, ranging from Ontario's population of 12,851,821 people to Prince Edward Island's population of 140,204 people.[3] Given that the provinces differ so much in terms of their size, it may not make sense to assign each province equal weight when calculating statistical measures like the arithmetic mean or the CV. Non-weighted statistical measures merely assign each data point the same weight, whereas weighted statistical measures assign each data point a different weight. Generally speaking, weights reflect the relative size of each data point. For example, Ontario would receive a higher weight when calculating the weighted mean unemployment rate of the provinces than Prince Edward Island because Ontario accounts for a larger share of the Canadian labour force than Prince Edward Island. National figures are almost always calculated by weighting the provinces, resulting in larger provinces driving trends in national figures. The weight of every data point must sum to one. In the case of provincial disparities in the unemployment rate, weighting *reduces* the CV because weighted measures put a lower weight on the small provinces (which have unemployment rates that are above the national average) than non-weighted measures.

The decision to weight statistical measures in the context of determining the level of provincial disparities is not clear-cut. In fact, this decision involves significant value judgements. For example, the use of labour force shares as weights to calculate the mean unemployment rate of the provinces involves the following value judgement: provinces with smaller labour forces are less important than provinces with larger labour forces. This value judgement is implicit in the choice to use weights, because the less weight a province is given in the calculation of a statistical measure, the smaller its effect on the value of that statistical measure. Consequently, weighted arithmetic means tend toward the values of high-weighted provinces, and weighted measures of spread tend to provide much lower levels of variation than non-weighted measures of spread. Therefore, weighted CVs will generally indicate lower levels of provincial disparities than non-weighted CVs.

On the surface, the case for weighting is clear: it makes little sense to implicitly assume that a province as small as Prince Edward Island is of equal importance to a province as large as Ontario by using non-weighted arithmetic mean to calculate the average national unemployment rate, because understanding the average experience of Canadian individuals is more important

[3] These population estimates are from the 2011 Census of the Population.

than understanding the average experience of the Canadian provinces. However, within the Canadian political context using non-weighted statistical measures is appropriate, as policies related to regional disparities deal with political units and hence provincial disparities. In addition, the main rationale for using weighted statistical measures – to understand the experience of individuals rather than the experience of the provinces – is imperfect: if we are interested in the knowing about individuals, it is more direct to calculate statistical measures using individuals as the relevant units rather than using provinces and assigning them weights. Furthermore, calculating weighted measures of spread for the provinces would provide little insight concerning disparities between individuals, because it would completely ignore intra-provincial inequalities.

For the purposes of this report, the *non-weighted* CV will be the key statistical measure of provincial disparities. Nevertheless, the *weighted* CV will also be provided to verify that the decision to not weight CVs does not greatly affect this report's findings.

B. Convergence

The simplest way to determine whether there has been convergence in Canada for any economic variable is to measure changes in the CV over time. A time series of the CV will be the main measure of convergence used throughout this report because: (i) it effectively quantifies the degree to which convergence has occurred for any economic variable; (ii) it is communicable in percentage terms; (iii) it allows for a comparison of convergence trends across multiple economic variables; and (iv) it can be used to precisely quantify how sensitive our findings are to the inclusion of exceptional regions, such as the oil-producing provinces.

C. Choice of Geographic Units

In this report, the provinces will be used to evaluate whether convergence has occurred in Canada for two reasons: (i) the ultimate purpose of this report is to inform federal policy relating to federal-provincial relations; and (ii) more data are available for the provinces than for other relevant geographic units, such as the economic regions used to calculate employment insurance benefits. Ideally, we would like to be able to measure the degree to which convergence or divergence has occurred within the provinces; however, measuring intra-provincial convergence or divergence is difficult due to data unavailability.

Unfortunately, the territories will be excluded from our analysis for three reasons: (i) there are limited data for the territories; (ii) the territories represent a small portion of the Canadian population (0.3 per cent in 2013); and (iii) in most instances federal-territorial relations are defined by a different set of parameters than federal-provincial relations.

III. Review of Literature on Convergence

This section will highlight key contributions to the theoretical and empirical literature on convergence and regional disparities in Canada and abroad. It is important to mention that the literature on convergence focuses on real income, output, and productivity variables, while this report also pays attention to nominal income, output and productivity variables as well as demographic and labour market variables.

a. Theories of Convergence

Literature on convergence seeks to answer the following questions: Will poorer regions catch-up with richer regions and, if so, why? Convergence, defined broadly as the reduction of income disparities between regions, is the consequence of poorer regions growing faster than richer ones. Therefore, it is unsurprising that literature on convergence is inextricably linked to theoretical and empirical research concerning economic growth, as one must recognize the drivers of economic growth to understand trends toward or away from convergence. The most influential literature on convergence is based on neoclassical growth theory.

According to neoclassical growth models, of which the most influential was Solow (1956), the growth of a region's economic output per capita is inversely related to its initial level of output per capita. Solow (1956) defined output by an aggregate production function where output is a function of a region's capital stock and its labour pool. A year later, Solow (1957) incorporated technological progress into this aggregate production function such that output is a function of capital, labour and technical efficiency. Ultimately, Solow (1957) argued that the growth of output per capita is determined by capital deepening and technical change. Capital deepening is determined by a region's savings rate, depreciation rate and population growth rate. Technical change, on the other hand, is assumed to be exogenous. Solow (1957) pointed out that capital deepening (and therefore growth of per capita output) would slow as a region grows due to diminishing returns to capital accumulation. Eventually, the savings rate would only be high enough to replace the capital stock at a given ratio to effective labour, and consequently output per unit of effective labour would reach a "steady state". Once a region reaches its steady state, which is determined by its savings rate, depreciation rate and population growth rate, per capita output growth is solely determined by the rate of technical change (known as its "balanced growth path"). It is important to note that not all economies have the same steady state, because they do not have identical savings rates, depreciation rates, population growth rates and aggregate production functions. Put simply, the further a region is from its balanced growth path, the faster it will grow. As a region grows toward its steady state, its output per capita growth rate will tend toward the balanced growth path.

The model developed in Solow (1957) implies that regions with similar economic fundamentals will have similar steady states and balanced growth paths, and therefore will converge in the long-run. For example, if there are two regions with the same steady state – a richer region at the steady state and a poorer region below the steady state –, then the poorer region will grow faster than the richer one until the poorer region reaches the steady state. At such a point, both regions will grow at the rate of technical change. Thus, the poorer region will converge with the richer one in absolute terms until it reaches its balanced growth path, after which the poorer region will only converge with the richer one in relative terms. Generally speaking, the tendency for poorer regions to catch-up with richer ones is a key prediction of neoclassical growth models.

Since the early 1990s, a great deal of theoretical and empirical research examining neoclassical growth theory's convergence hypothesis has emerged. Essentially, this literature distinguishes four related concepts of convergence: σ (sigma) convergence; β (beta) convergence; conditional β (beta) convergence; and stochastic convergence (Ralhan and Dayanandan, 2005). The first three concepts of convergence – σ convergence, β convergence, conditional β convergence – are tested using cross-sectional regression models. There exists σ convergence if the dispersion of per capita output falls over time, implying that there is a broad tendency for the equalization of per capita output across regions. Typically, the standard deviation of the log of per capita output is used to test for σ convergence. There exists β convergence if regions that were initially poorer tend to grow faster than those that were initially richer, so that poorer regions catch up (or converge) with richer ones. There exists conditional β convergence if regions that were initially poorer tend to grow faster than those that were initially richer *after accounting for the existence of different steady states or balanced growth paths* by augmenting cross-sectional regression models with additional explanatory variables. It should be noted that β convergence (or conditional β convergence) often works toward σ convergence. The most common tests for β convergence are cross-section regressions relating the initial per capita income level for a group of regions to their subsequent per capita income growth rates. Tests for conditional β convergence include additional explanatory variables. Stochastic convergence is quite different from the three other concepts of convergence, as it uses panel data rather than cross-sectional data (Ralhan and Dayanandan, 2005).

Even though convergence analysis blossomed within the neoclassical (or exogenous) growth framework, it is important to emphasize that economists have explained and tested for convergence across regions using alternative growth models, such as endogenous growth models. However, there is no "natural" trend toward convergence for some endogenous growth models because their production functions include increasing returns to scale, and therefore are not characterized by diminishing returns to capital accumulation (DeJuan and Tomljanovich, 2005).

b. Empirical Studies

Although there is an abundance of empirical literature on convergence across countries, the studies most pertinent to this report are those related to convergence across regions *within* a country. The vast majority of the empirical work on convergence tests for σ convergence, β convergence and conditional β convergence using neoclassical growth models and cross-sectional analysis. It is also important to note that the empirical literature on convergence focuses on real variables.

Using a neoclassical growth framework, Barro and Sala-i-Martin (1990) found evidence of β convergence across the U.S. states at a rate of about 2-2.5 per cent per year between 1940 and 1988 for per capita personal income and between 1963 and 1988 for per capita gross state product (GSP).[4] Barro and Sala-i-Martin (1990: 34) concluded that "poor states tend to grow faster than rich states even if we do not hold constant any variables other than initial per capita income or product." In fact, the speed of convergence was about the same regardless of whether other variables were held constant. A year later, these authors extended their analysis to 73 regions across Western Europe and again found a convergence rate of about 2 per cent per year (Barro and Sala-i-Martin, 1991). Similarly, Sala-i-Martin (1996) discusses convergence across the U.S. states, Japanese prefectures, Western European regions and the Canadian provinces; he estimated convergence rates of 2.4 per cent for Canada (from 1961 to 1991), 1.5-1.8 per cent for Western Europe (from 1950 to 1990), 1.9-3.1 per cent for Japan (from 1955 to 1990), and 1.7-2.2 per cent for the United States (from 1880 to 1990).

For Canada, there is ample empirical research demonstrating the existence of convergence across the provinces. McInnis (1968), who was probably the first to estimate the level of regional disparities in Canada, shows that the dispersion of provincial per capita income levels to the Canadian average were relatively constant between 1926 and 1962 in both weighted and non-weighted terms.

In the 1990s, a great deal of literature emerged showing that the Canadian provinces had experienced σ and β convergence since the 1950s with respect to an array of economic variables, including per capita income, per capita output, and labour productivity (Coulombe, 2001). Coulombe and Lee (1995, 1998), Coulombe (1996, 2000), Helliwell (1996), Coulombe and Day (1999), Ralhan and Dayanandan (2005), Sala-i-Martin (1996), Shiller (2009), Sulaiman and Bryant (2010), DeJuan and Tomljanovich (2005), Hamit-Haggar (2013) and Darku (2011) support the existence of convergence across the Canadian provinces for various real income, output and productivity variables. The contribution of this report is to examine convergence

[4] A simple way to put convergence rates into context is the rule of 72, a method for estimating the doubling time of a variable growing at a constant rate. More specifically, the rule of 72 states that it will take $(72/g)$ years for a variable growing at g per cent per annum to double; this rule also applies to halving time. Thus, a convergence rate of 2 per cent implies that income disparities will halve in about 36 years.

among provincial economies in *nominal* economic variables, which are more directly related to living standards.

As previously mentioned, Sala-i-Martin (1996) found a rate of β convergence of 2.4 per cent for the Canadian provinces between 1961 and 1991. Likewise, Shiller (2009) determined that the provinces experienced both σ and β convergence over the 1950-1990 period at a rate of 2.15-2.37 per cent per year (compared to 1.30-2.04 per cent per year in the U.S. states); however, the rate of convergence slowed considerably between 1976 and 1990. Coulombe (1996) estimated that personal income per capita converged across the provinces at a rate of 2.77 per cent per annum between 1950 and 1977. Sulaiman and Bryant (2010) found evidence of relatively weak σ convergence across the Canadian provinces over the 1981-2007 period, which was consistent with the previously mentioned studies. To put the power of such convergence rates into context, Coulombe (1999) stated that provincial disparities in per capita income reached approximately half of their 1950s level in the 1990s.

Dissimilarly, Serletis and Afxentiou (1998), which studied the evolution of real per capita income from 1961 to 1991, noted that while poorer provinces did grow faster than richer ones over this period (albeit slightly), they found no evidence that income levels of the provinces converged toward that of Ontario (the "rich" province).

Using different econometric techniques than previous studies, Ralhan and Dayanandan (2005) estimated rates of β convergence and conditional β convergence for personal disposable income per capita across the provinces of 6-6.5 per cent per year from 1981 to 2001. The convergence rates estimated by Ralhan and Dayanandan (2005) were much higher than previous studies, which used ordinary least squares (OLS) regression techniques. Similarly, Darku (2011) found a convergence rate for per capita personal income of 4.41 per cent per year using generalized method of moments (GMM) estimators (which he argued was able to address the endogeneity problems posed by OLS regression and to incorporate fixed effects). DeJuan and Tomljanovich (2005), who also relied on GMM estimators, demonstrated that β convergence, stochastic convergence and σ convergence in per capita personal income occurred for most provinces since World War II.

More importantly, DeJuan and Tomljanovich (2005: 591) noted that "convergence clubs, notably the Atlantic provinces and Plains provinces, are found to display stronger convergence properties than Canada as a whole." Hamit-Haggar (2013) argued that club convergence testing better suits the Canadian provinces, because the provinces vary greatly with respect to economic make-up, resource endowments, and income levels. Hamit-Haggar (2013) concluded that the

provinces do not form a homogeneous convergence club and identifies three clubs of provinces that converge to separate steady states.[5]

Following Mankiw, Romer, and Weil (1992) and Barro, Mankiw, and Sala-i-Martin (1995), Coulombe has consistently put human capital at the heart of the convergence story. Coulombe and Tremblay (2006: 21) argued that "the Canadian empirical evidence is quite consistent with one of the key predictions of the open-economy neo-classical growth model, namely that the growth of income per capita is largely driven by the accumulation of human capital." In fact, Coulombe (1999: 1) estimated that "about half the regional imbalances in per capita income among the provinces have been eliminated, mainly due to the convergence of human capital". Coulombe (1999) partly attributed human capital convergence to fiscal federalism, as it allows poorer provinces to provide education of a quality comparable to that found in their richer counterparts.

Many other factors have contributed toward convergence among the Canadian provinces. For example, Coulombe and Lee (1995, 1998) and Coulombe (1996, 2000) provide evidence that redistributive policies and terms of trade have contributed to trends toward convergence. Similarly, DeJuan and Tomljanovich (2005: 591) noted that "federal transfer programs play a part in redistributing wealth from richer to poorer provinces and hence foster faster personal income convergence." Rodriguez (2006), on the other hand, argued that interprovincial transfers "were not determinant or decisive to the attainment of deterministic convergence in the Canadian provinces. More than that, the interprovincial transfers have had the role to accelerate the convergence process in poorer Canadian provinces." Of the same spirit, Serletis and Afxentiou (1998) concluded that the various regional developmental policies and transfers introduced post-1960 had no material effect on provincial disparities. Most recently, Darku (2011) argued federal government transfers have accelerated the rate of convergence in income in Canada.

[5] According to Hamit-Haggar (2013), the constituents of the three clubs are: (i) Newfoundland and Labrador, Ontario, Saskatchewan, Alberta and British Columbia; (ii) New Brunswick, Quebec and Manitoba; and (iii) Prince Edward Island and Nova Scotia. While these clubs exist for real GDP and labour productivity, it is noted that provinces exhibit divergent behaviour in terms of capital intensity and total factor productivity.

IV. The Current State of Provincial Disparities[6]

This section presents an overview of the current state of provincial disparities in Canada for twenty-five economic variables organized under five categories: income, productivity, labour market, composite indices of well-being, and fiscal capacity. Table 1 compares the provinces for these economic variables for the latest available year. In addition, Table 1 provides weighted and non-weighted standard deviations and CVs for each economic variable.

Compared to the other economic variables examined in this section, the income variables had some of the highest levels of provincial disparities. For example, the CV for nominal gross domestic product (GDP) per capita was 26.6 per cent in 2012.[7] The level of disparities was so large for nominal GDP per capita because the three oil-producing provinces – namely, Newfoundland and Labrador, Saskatchewan and Alberta – had levels of nominal GDP per capita well above those of the other provinces.

Relative to the CV for nominal GDP per capita, the CVs for nominal personal (disposable) income per capita were low in 2010. If the shares of personal (disposable) income in GDP were the same in every province, we would expect the CVs for personal (disposable) income and the CV for GDP per capita to be the same; however, personal (disposable) income's shares of GDP differs by province. Alberta was the only oil-producing province for which well above average nominal GDP per capita translated into well above average nominal personal (disposable) income per capita, which is explained by the fact that personal (disposable) income's shares of GDP were much higher in Alberta than in Newfoundland and Labrador and Saskatchewan. Since only one oil-producing province (Alberta) had relatively high nominal personal (disposable) income per capita, the CVs for nominal personal (disposable) income per capita were much lower than the CV for nominal GDP per capita.

At 24.2 per cent, the CV for real GDP per capita was slightly lower than the CV for nominal GDP per capita in 2012. Similar to the case of nominal (disposable) income per capita, the fact that Alberta was the only oil-producing province with relatively high real GDP per capita explained why the CV for real GDP per capita was lower than the CV for nominal GDP per capita. It is not surprising that the CV was lower for GDP per capita in real terms than in nominal terms, because the rapid growth in nominal GDP per capita in the oil-producing provinces has largely been due to favourable changes in relative prices and only partly due to the growth of real output. Real gross domestic income (GDI) CVs are relatively similar to those of real GDP, at 25.7 in 2012.

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[6] The estimates used throughout the report are based on data from Statistics Canada as well as a variety of other sources, and can be found in the database on convergence created for this project and maintained by the Centre for the Study of Living Standards (CSLS). The database on convergence will be posted concurrently with this report.

[7] It is important to note that, unless otherwise stated, all CVs referred to in the report are non-weighted.

In 2011, the CVs for average market family income, average total family income and average after-tax family income were 16.9 per cent, 13.1 per cent and 12.2 per cent, respectively. The CV is smallest for average after-tax family income due to the redistributive effects of taxes and transfers.[8] Since taxes and transfers redistribute income between individuals, poorer provinces, which are made up of individuals with relatively low incomes, will gain from these policies (see the Atlantic Provinces in Table 1) while wealthier provinces, which are made up of individuals with relatively high incomes, will see a reduction in average incomes due to these policies. Effectively, taxes and transfers redistribute income between the provinces; this explains why the CVs were lower for after-tax income than for market income. It is interesting to note, however, that Newfoundland and Labrador benefited from these redistributive policies in 2011 despite the fact that they had above average market income.

In contrast, the level of provincial disparities for the productivity variables was substantial. In 2012, the CV for nominal labour productivity levels – that is, GDP per hour worked expressed in current dollars – was 21.9 per cent, 4.7 percentage points lower than the CV for nominal GDP per capita. The fact that the level of provincial disparities was lower for nominal labour productivity indicates that differences in provincial disparities in the number of hours worked per capita contributed to the high CV for nominal GDP per capita; this issue will be discussed in further detail in the subsequent section. Unsurprisingly, the CV for labour productivity was lower in real terms (at 18.2 per cent in 2012). As was the case for GDP per capita, the oil-producing provinces had the highest levels of labour productivity, while the Maritime Provinces had the lowest levels.

Compared to the other economic variables examined thus far, the level of provincial disparities was relatively low for the labour market variables (excluding the unemployment rate). In 2012, participation rates merely ranged from 61.6 per cent in Newfoundland and Labrador to 73.4 per cent in Alberta. Overall, the CV was 5.0 per cent in 2012.

Similar to the participation rate, the level of provincial disparities was relatively small for the employment rate and the share of the working age population with a post-secondary degree, certificate or diploma, with respective CVs of 7.4 per cent and 6.0 per cent. Among the provinces, Newfoundland and Labrador had the lowest employment rate (53.9 per cent) in 2012 while Alberta had the highest employment rate (70.0 per cent). Dissimilarly, Quebec had the highest share of the working age population with a post-secondary degree, certificate or diploma

[8] Market income is the sum of earnings (from employment and self-employment), net investment income, private retirement income, and the items under "other income". Most importantly, it is income *before* taxes and transfers. Total income refers to income from all sources including government transfers and before the deduction of federal and provincial income taxes. After-tax income is total income less income tax. Therefore, subtracting the average market total income by the average market family income provides the impact of transfers on average family income; subtracting the average after-tax family income by the average total family income show how taxes affect average family income; and subtracting the average after-tax family income by the average market family income provides the effect of both taxes and transfers on average family income.

in 2012 (56.6 per cent). Manitoba, on the other hand, fared worst in this regard, as only 46.8 per cent of its working age population had a post-secondary degree, certificate or diploma in 2012.

Among the labour market variables, the unemployment rate was the clear exception. In 2012, there were substantial provincial disparities for the unemployment rate, which had a CV of 32.7 per cent. Notably, the Prairie Provinces had extremely low unemployment rates, and the Atlantic Provinces had unemployment rates well above the national average.

Provincial disparities were quite low for the Human Development Index (HDI). Its CV was merely 1.5 per cent in 2011. Alberta had the highest HDI value at 0.917, only 4.6 per cent higher than the HDI value for the province with the lowers ranking – namely, Prince Edward Island. Conversely, the level of provincial disparities was much higher for the Index of Economic Well-being (IEWB). The CV for the IEWB was 13.1 per cent in 2012. In fact, the level of disparities for this composite index was higher than the level for personal (disposable) income per capita. Other composite indices analyzed include the four sub-categories of the IEWB: the index of total per capita consumption flows, the index of total per capita stocks of wealth, the equality index, and the security index. In this regard, the equality index's CV has fallen 9.2 percentage points since 1990 to 12.9 per cent, virtually the same level as the IEWB. Similarly, the CV for the index of total per capita consumption flows has fallen significantly since 1990, to 8.8 per cent in 2012. On the other hand, both the security index and the index of total per capita stocks of wealth both had CVs higher than the IEWB in 2012, with the index of total per capita stocks of wealth having the highest CV of all indicators considered.

Fiscal capacity – defined as provincial own source revenue per capita – had the third highest CV among all of the economic variables analyzed in this report (at 30.2 per cent in 2012-13). Provincial disparities were so high for fiscal capacity for two reasons: (i) fiscal capacity is measured in nominal terms and nominal variables exhibit greater variation than real variables across provinces; and (ii) the fiscal capacity of the three oil-producing provinces was extremely high compared to the other provinces, due to the massive contribution of resource rents reflecting high crude oil prices.

Chart 1 demonstrates that non-weighted and weighted CVs provide consistent results, as the rankings for the CVs of the twenty-five economic variables are similar in non-weighted and weighted terms. However, it affects the estimated *level* of provincial disparities for all economic variables. More specifically, weighted CVs are consistently lower than non-weighted CVs. While it is important to keep in mind that CVs are consistently lower in weighted terms, this report will only focus on non-weighted CVs for the reasons outlined in the second section of this report.

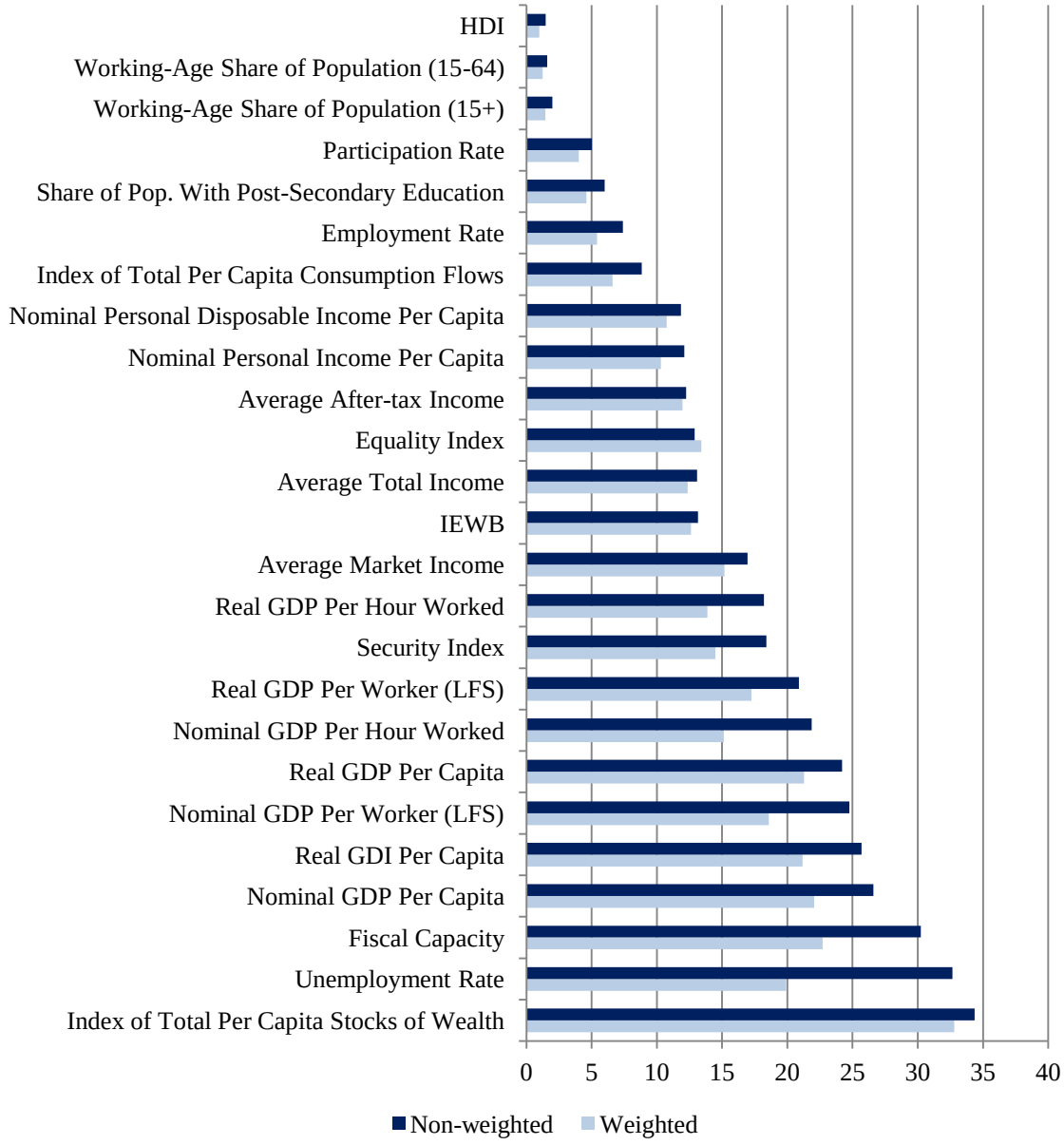
Table 1: *Provincial Disparities for Select Economic Variables, Canada and the Provinces, the Most Recent Year*

Economic Variable	Year	Province												Non-Weighted		Weighted	
		Canada	Prov. Avg.	NL	PE	NS	NB	QC	ON	MB	SK	AB	BC	SD	CV	SD	CV
Income																	
Nominal GDP Per Capita (Current Dollars)	2012	52,177	52,673	65,964	37,966	40,473	41,726	44,428	49,940	45,971	72,159	80,516	47,591	14,010	26.6	11,458	22.1
Real GDI Per Capita (2007 Chained Dollars)	2012	47,975	47,886	59,449	34,411	36,918	37,581	40,743	46,255	42,107	63,187	73,204	45,000	12,298	25.7	10,146	21.2
Real Average Market Income (2011 Constant Dollars)	2011	65,700	62,340	58,100	52,800	53,800	52,100	55,500	69,400	61,600	69,600	88,400	62,100	10,563	16.9	9,979	15.2
Real GDP Per Capita (2007 Chained Dollars)	2012	47,636	46,605	53,808	33,544	37,936	37,233	40,617	45,856	43,120	54,244	74,488	45,204	11,277	24.2	10,108	21.3
Real Average Total Income (2011 Constant Dollars)	2011	75,000	72,030	70,600	64,600	63,900	62,900	65,300	79,100	69,900	77,800	95,400	70,800	9,421	13.1	9,273	12.4
Average After-tax Income (2011 Constant Dollars)	2011	63,000	60,710	59,700	55,000	53,900	54,200	54,200	66,500	58,400	65,200	78,800	61,200	7,425	12.2	7,533	12.0
Nominal Personal Income Per Capita (Current Dollars)	2010	37,505	35,982	33,938	30,480	33,922	33,431	34,439	37,814	34,392	37,682	47,529	36,197	4,356	12.1	3,859	10.3
Nominal Personal Disposable Income Per Capita (Current Dollars)	2010	29,706	28,824	27,370	24,700	27,298	27,089	26,644	29,902	27,619	30,583	37,856	29,176	3,415	11.8	3,187	10.8
Productivity																	
Nominal GDP Per Worker (Current Dollars)	2012	103,952	106,397	146,711	76,195	84,296	89,764	89,815	99,427	92,438	145,092	145,096	95,133	26,349	24.8	19,216	18.6
Nominal GDP Per Hour Worked (Current Dollars)	2012	59.4	59.5	79.8	42.8	48.6	49.7	53.6	56.6	52.2	78.4	77.4	55.8	13.0	21.9	8.9	15.1
Real GDP Per Worker (2007 Chained Dollars)	2012	94,904	93,988	119,675	67,321	79,012	80,097	82,110	91,297	86,705	109,069	134,233	90,362	19621	20.9	16,295	17.2
Real GDP Per Hour Worked (2007 Chained Dollars)	2012	54.2	52.6	65.1	37.8	45.5	44.4	49.0	52.0	49.0	59.0	71.6	53.0	9.6	18.2	7.5	13.9
Labour Market																	
Unemployment Rate (%)	2012	7.2	8.0	12.5	11.3	9	10.2	7.8	7.8	5.3	4.7	4.6	6.7	2.6	32.7	1.4	19.9
Employment Rate (%)	2012	61.8	61.3	53.9	60.4	58.4	56.6	60	61.3	65.4	66.2	70.0	60.6	4.5	7.4	3.3	5.4
Educational Attainment (%)	2012	53.6	51.5	52.0	50.8	54.4	47.9	56.6	53.9	46.8	47.4	52.0	52.7	3.1	6.0	2.5	4.6
Participation Rate (%)	2012	66.7	66.5	61.6	68.0	64.1	63.1	65.1	66.5	69.1	69.5	73.4	65.0	3.3	5.0	2.7	4.0
Working-Age Pop. (15+) (%)	2013	83.7	83.9	85.5	84.2	85.8	85.3	84.6	83.8	81.3	81.2	81.8	85.2	1.7	2.0	1.5	1.8
Working-Age Pop. (15-64) (%)	2013	68.6	68.4	66.9	68.0	67.7	68.0	68.6	66.9	66.7	70.6	68.8	68.6	1.1	1.6	1.2	1.7
Composite Indices of Well-being																	
Index of Total Per Capita Stocks of Wealth	2012	0.423	0.424	0.54	0.265	0.291	0.342	0.334	0.355	0.381	0.560	0.764	0.407	0.146	34.4	0.153	37.2
Security Index	2012	0.492	0.484	0.481	0.389	0.372	0.419	0.46	0.455	0.498	0.634	0.656	0.479	0.089	18.4	0.090	18.5
Index of Economic Well-being	2012	0.569	0.573	0.62	0.497	0.525	0.526	0.527	0.547	0.55	0.644	0.758	0.533	0.075	13.1	0.082	14.4
Equality Index	2012	0.534	0.577	0.588	0.621	0.567	0.606	0.545	0.534	0.555	0.668	0.68	0.404	0.074	12.9	0.072	13.2
Index of Total Per Capita Consumption Flows	2012	0.829	0.805	0.869	0.715	0.868	0.738	0.768	0.842	0.765	0.714	0.931	0.843	0.071	8.8	0.081	9.8
Human Development Index	2011	0.908	0.897	0.894	0.877	0.886	0.882	0.903	0.913	0.885	0.898	0.917	0.91	0.013	1.5	0.009	1.0
Fiscal Capacity																	
Fiscal Capacity (Current Dollars)	2012 -13	8,258	8,427	12,657	5,794	6,304	6,137	6,922	7,909	6,875	11,007	12,729	7,939	31	30.2	1,873	22.8

Note: The non-weighted CV is calculated by dividing the standard deviation (SD) by the non-weighted average of the provincial values then multiplying by 100. The weighted CV is calculated by dividing the weighted SD by a weighted average of the provinces and then multiplying by 100. This weighted average does not include the territories (*i.e.*, not the same as the 'Canada' column of Table 1).

In addition, Chart 1 illustrates a number of key findings. First, provincial disparities are clearly the most significant for total per capita stocks of wealth, the unemployment rate, fiscal capacity, nominal and real GDP per capita, real GDI per capita and nominal and real labour productivity. Second, CVs are always higher for any given nominal variable than for its corresponding real variable. Third, the provinces are quite similar with respect to the labour market variables (excluding the unemployment rate).

Chart 1: *CVs for Select Economic Variables, the Most Recent Year*



V. The Evolution of Provincial Disparities: Convergence or Divergence?

This section examines the evolution of provincial disparities in Canada; it is organized into five parts corresponding with the five categories of economic variables discussed in this report – namely, income, productivity, labour market, composite indices of well-being, and fiscal capacity. Most importantly, this section attempts to identify trends toward or away from convergence across the Canadian provinces.

This section consists of time series charts for non-weighted CVs and provincial values relative to the national average for the twenty-five relevant economic variables. Appendix III provides time series charts for weighted CVs of all relevant economic variables. Likewise, time series charts for the absolute values by province (*i.e.*, not relative to the national average) for all relevant economic variables are available in Appendix IV. Generally speaking, non-weighted CVs and weighted CVs are subject to the same trends over time and only differ in terms of levels (*i.e.*, CVs are typically lower when weighted). As a result, weighted CVs will not be discussed unless trends differ significantly in weighted and non-weighted terms, and non-weighted CVs will simply be referred to as CVs for the remainder of the report.

A. Income

First and most significantly, the evolution of disparities across the provinces will be examined for income variables – namely, nominal GDP per capita, real GDP per capita, real GDI per capita, nominal personal income per capita, nominal personal disposable income per capita, and average real market, total and after-tax family income.

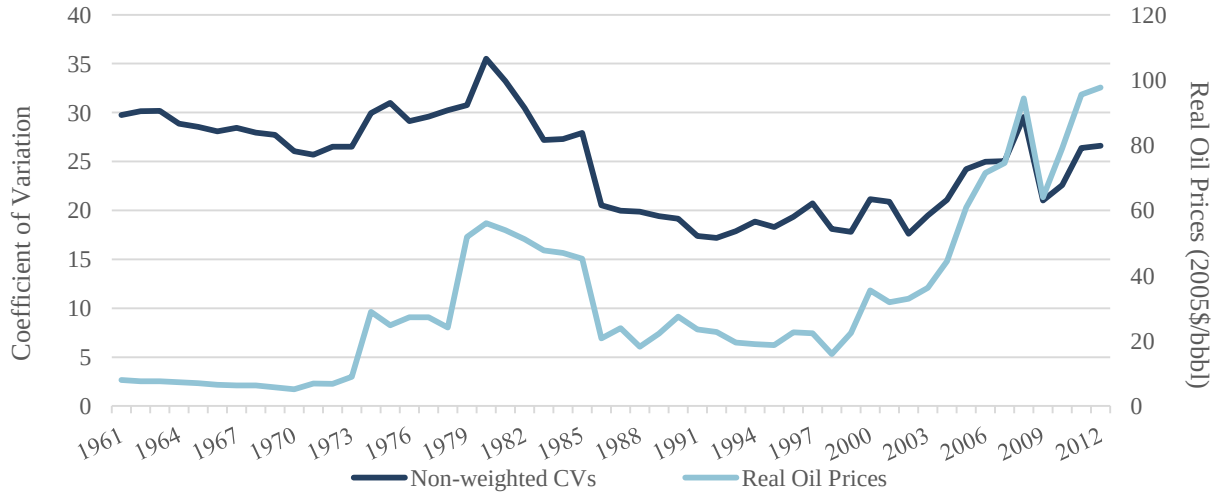
Nominal GDP per capita is one of the most basic measures of the standard of living. As such, examining the evolution of provincial disparities in nominal GDP per capita is an appropriate place to start when assessing whether the provinces have converged in terms of living standards. Levels of nominal GDP per capita converged somewhat across the provinces over the 1961-2012 period, as the CV for nominal GDP per capita fell from 29.8 per cent in 1961 to 26.6 per cent in 2012 (Chart 2). Rather than illustrating a steady trend toward convergence, the CV was choppy over the entire period. The CV for nominal GDP per capita fell slightly from 29.8 per cent in 1961 to 25.7 per cent in 1971; this drop was driven by the fact that the five poorest provinces in 1961 – namely, Saskatchewan and the Atlantic Provinces – grew swiftly in the ten years prior to 1971. Nevertheless, convergence did not last: the CV rose by 10.3 percentage points between 1971 and 1980 to 35.5 per cent, as real oil prices increased more than eight-fold. Booming oil prices led to rapid nominal GDP growth in Alberta and, to a lesser extent, Saskatchewan. Thus, the level of nominal GDP per capita rose in these provinces relative to the Canadian average (Chart 3).

Real oil prices fell gradually over the 1980-1985 period and crashed in 1986. Falling oil prices led to a dramatic decline in the CV for nominal GDP per capita. By 1992, real oil prices were only 40.4 per cent of their 1980 peak and the CV for nominal GDP per capita was only 17.2 per cent. Real oil prices remained low over the 1986-1999 period; however, they began a rapid ascent in 2000. Real oil prices reached 4.2 times their 1999 level in 2008. As a result, the CV for nominal GDP per capita increased 12.0 percentage points from 17.6 per cent in 2002 to 29.6 per cent in 2008. This divergence was completely due to strong nominal GDP per capita growth in the oil-producing provinces (which now included Newfoundland and Labrador). Consequently, nominal GDP per capita in these provinces rose relative to the Canadian average. In fact, Saskatchewan and Newfoundland and Labrador actually rose above the Canadian average in 2005.

The rapid decline in real crude oil prices during the recession led to convergence in 2009, because the oil-producing provinces experienced the most dramatic declines in nominal GDP per capita. Nonetheless, real crude oil prices rebounded between 2009 and 2012, leading to greater divergence across the provinces. It is important to note, however, that the price of many commodities – not just petroleum – saw record highs in the 2000s due to rapidly growing demand from industrializing countries like China. Despite this, only crude oil prices are discussed throughout this report because they have had the most substantial impact on the Canadian economy. In general, there is an extremely strong relationship between the CV for nominal GDP per capita and crude oil prices, as illustrated by Chart 2. This relationship is driven by the positive effect of crude oil prices on nominal GDP in oil-producing provinces. Therefore, trends in these prices are likely to have important implications for divergence across provincial economies in living standards.

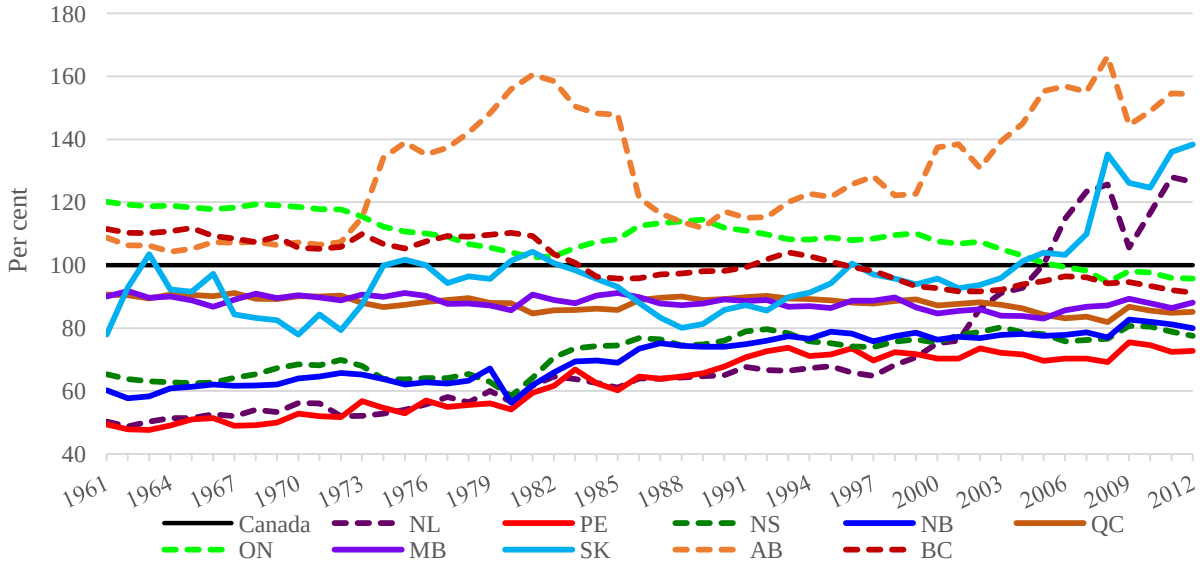
Generally speaking, trends in the CV for nominal GDP per capita can shed light on the evolution of purchasing power differences between the Canadian provinces; however, purchasing power parity (PPP) nominal GDP series for the provinces are required to fully appreciate the evolution of these differences. PPP nominal GDP series would make GDP per capita comparisons more accurate by accounting for differences in the cost of living. Unfortunately, Statistics Canada does not produce PPPs by province.

Chart 2: *Non-weighted CVs for Nominal GDP per Capita (per cent) and Real Oil Prices (2005 U.S. Dollars per Barrel), 1961-2012*



Note: "Real oil prices" are the average spot prices (2005$/bbl) for crude oil based on WTI, Dubai, and Brent.
Source: World Bank, DataBank, Global Economic Monitor (GEM) Commodities.

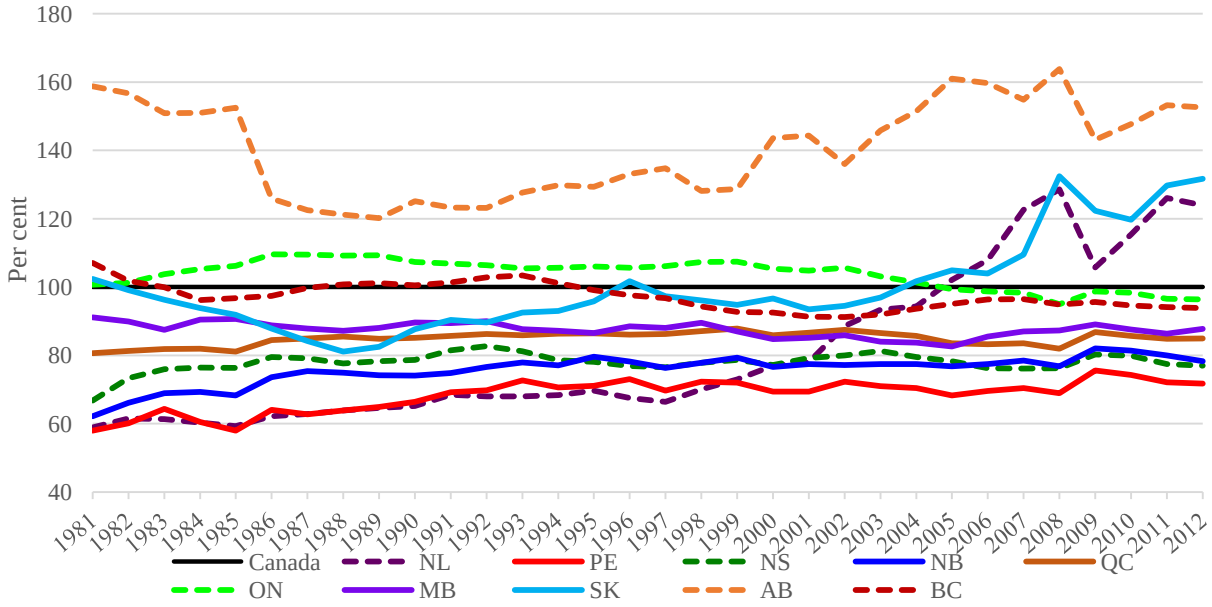
Chart 3: *Nominal GDP per Capita for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1961-2012*



Unlike what was found for nominal GDP per capita, there has been significant convergence across the provinces in real (2007 chained dollars) GDP per capita. Between 1981 and 2010, the CV for real GDP per capita decreased from 29.5 per cent to 24.2 per cent, a drop of 5.3 percentage points (Chart 5).[9] The CV for real GDP per capita fell because of convergence across all provinces except for Alberta (Chart 4), which remained well above the Canadian average over the entire 1981-2012 period. Saskatchewan and Newfoundland and Labrador contributed toward divergence after about 2005.

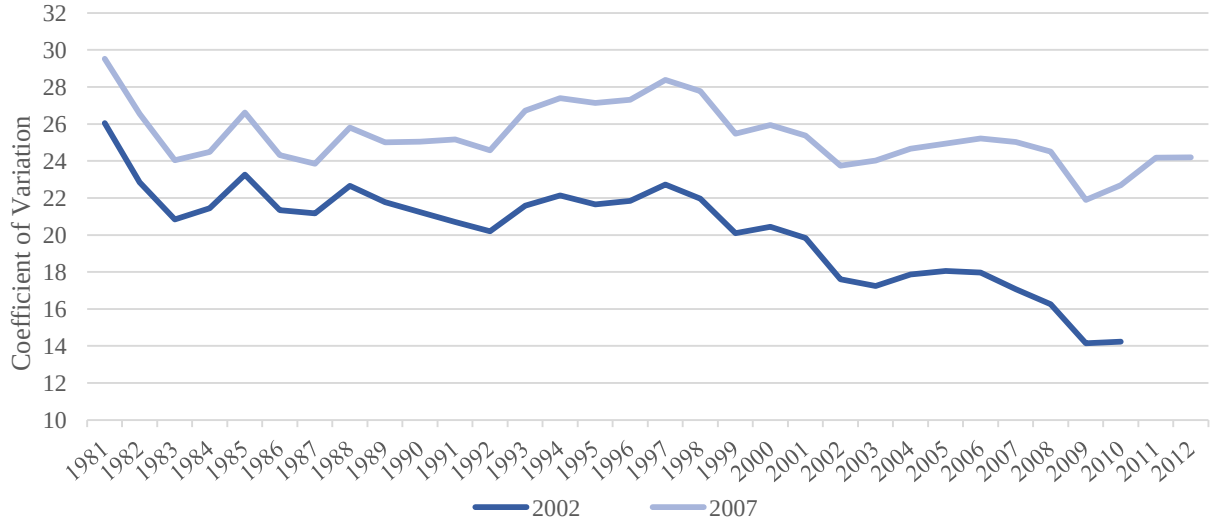
[9] Following 2010, the CV rose again to 24.2 per cent in 2012 (see Chart).

Chart 4: *Real (2007 Chained Dollars) GDP per Capita for the Provinces Relative to the Weighted Canadian Average, Per cent, Canada=100, 1981-2012*



It is important to note the significance of the base year in real GDP estimates. By using 2007 as a base year instead of 2002, we find that real GDP productivity measures diverge slightly between provinces, as opposed to converging, while real GDP per capita converges less dramatically, with a change in CV of -5.3 percentage points rather than -12.5 percentage points for the 1981-2012 period (Chart 5).[10]

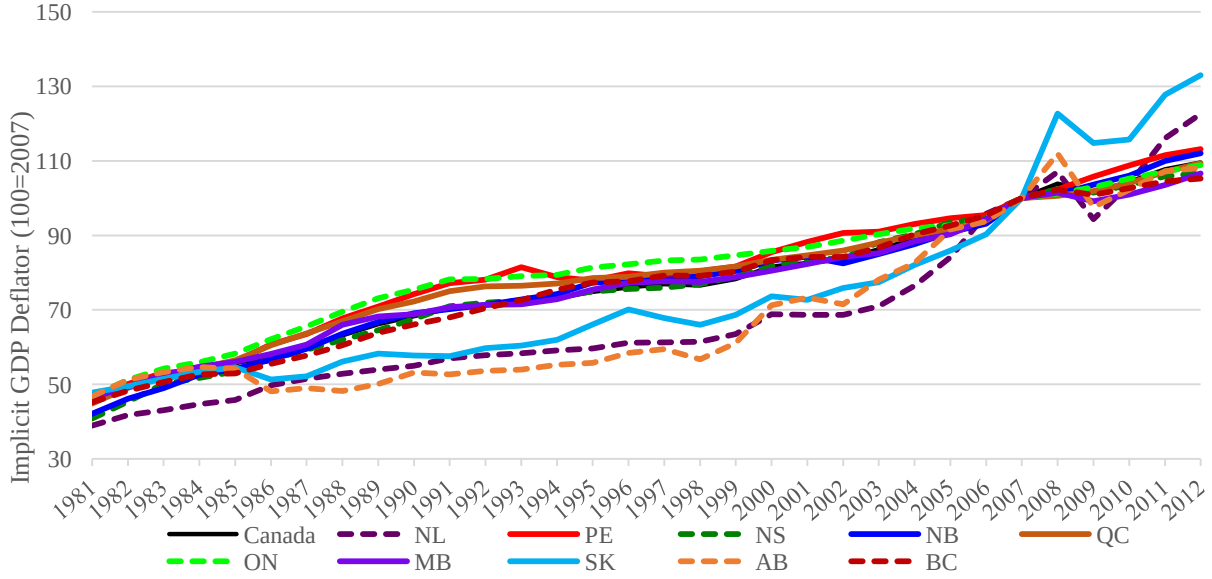
Chart 5: *Non-weighted CVs for Real GDP per Capita in 2002 Chained Dollars (1981-2010) and in 2007 Chained Dollars (1981-2012)*



[10] A prior version of this report had used 2002 chained dollars, as the 2007 series was not available for dates before 2007. These differences are summarized in Table.

To account for the simultaneous convergence in real GDP per capita and divergence in nominal GDP per capita, it is important to examine trends in the implicit GDP deflator (Chart 6). The implicit GDP deflator rose dramatically for Alberta, Saskatchewan and Newfoundland and Labrador between 2002 and 2008, as rising oil prices resulted in an upswing in nominal GDP per capita relative to real GDP per capita in those provinces. It is important to remember that nominal GDP is affected by changes in both the quantity of output and the price of output, while real GDP per capita factors out changes in the price of output. Thus, there was simultaneous convergence in real GDP per capita and divergence in nominal GDP per capita because the price of output increased greatly in the oil-producing provinces (as demonstrated by Chart 6) and these price increases inflated nominal GDP per capita growth in those provinces. While following trends in real GDP per capita disparities is important, more attention should be paid to trends in nominal GDP per capita disparities because they are more closely related to provincial inequalities in purchasing power and therefore living standards, and to the ability of citizens to pay taxes.

Chart 6: *Implicit GDP Deflator (100=2007), Canada and the Provinces, 1981-2012*



Real GDI is a useful measure of well-being, for it captures income and purchasing power in a province in a way that measures of real GDP do not. In particular, GDI is sensitive to commodity prices, meaning that an improvement in the terms of trade can translate into improved living standards without changing real GDP.[11] For example, a province exporting the same quantity of oil, but at a higher price, will experience an increase in income (and therefore purchasing power) without any change in real GDP. Chart 7 shows the evolution of real GDI CVs from 1981 to 2012 compared to those of real GDP, while Chart 8 tracks provincial real GDI

[11] Official real GDI figures by province are not available from Statistics Canada; our series was constructed by deflating nominal provincial GDP by an implicit final domestic demand deflator, which captures Canadian consumption habits.

relative to the weighted national average. We see that, between 2002 and 2008, real GDI disparities surged relative to those of real GDP; this is the result of rising commodity prices boosting real incomes for some provinces, particularly Alberta, Saskatchewan, and Newfoundland and Labrador.

Chart 7: *Non-weighted CVs for Real GDI and Real GDP per Capita, 1981-2012*

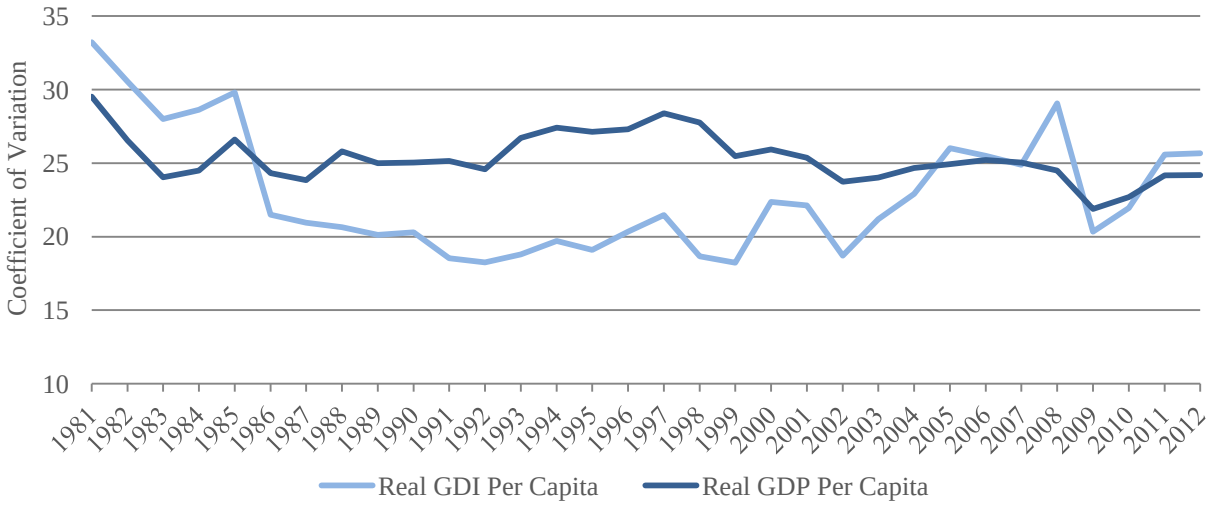


Chart 8: *Real (2007 Chained Dollars) GDI per Capita for the Provinces Relative to the Weighted Canadian Average, Per cent, Canada=100, 1981-2012*

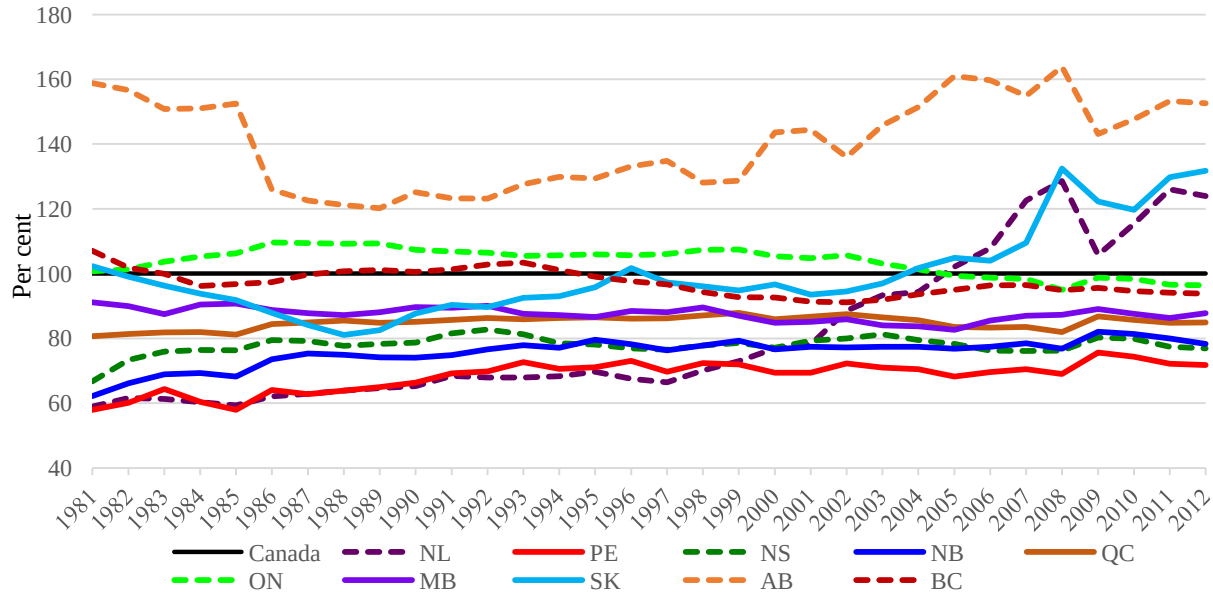


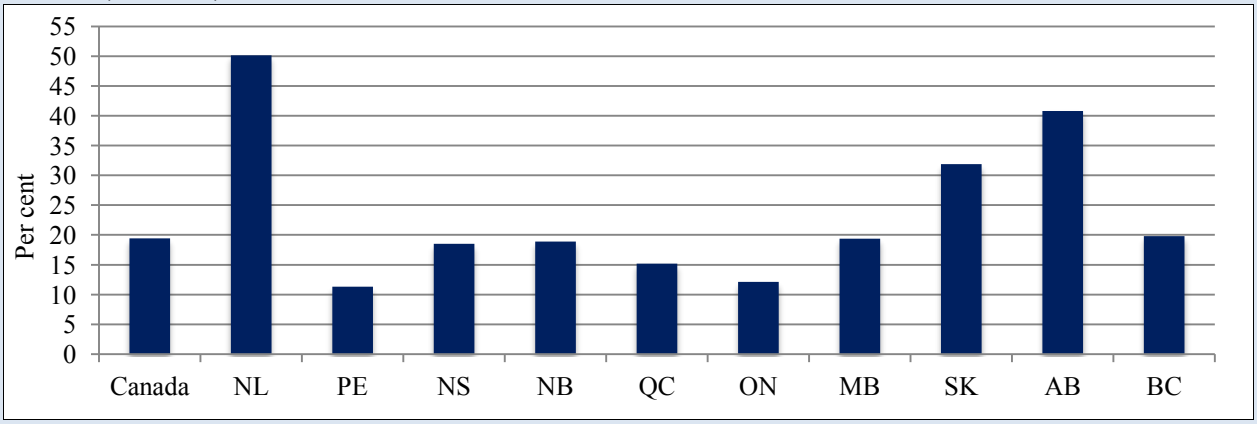
Table 2: *Comparison of 2002 and 2007 CVs for Real GDP Indicators for Canada and the Provinces, 1981-2012*

	Non-Weighted						Weighted					
	Real GDP per Capita		Real GDP per Worker		Real GDP per Hour		Real GDP per Capita		Real GDP per Worker		Real GDP per Hour	
Year	**2002**	**2007**	**2002**	**2007**	**2002**	**2007**	**2002**	**2007**	**2002**	**2007**	**2002**	**2007**
1981	27.5	29.5	14.1	18.1	14.4	17.0	17.1	21.4	9.0	14.8	8.7	13.2
1982	24.1	26.5	12.1	16.7	12.6	15.7	15.5	19.8	7.8	13.9	7.8	12.6
1983	22.0	24.0	11.5	16.1	12.6	16.1	14.7	18.2	7.8	13.5	7.9	12.7
1984	22.6	24.5	12.0	16.7	12.7	16.6	15.3	18.3	8.2	13.5	7.8	12.6
1985	24.5	26.6	13.7	18.2	14.0	17.7	16.2	19.8	9.3	15.0	8.8	13.8
1986	22.5	24.3	12.1	16.9	12.3	16.3	15.2	18.0	8.3	13.8	7.5	12.5
1987	22.3	23.8	12.7	17.3	12.5	16.5	15.0	17.5	8.6	13.9	7.8	12.8
1988	23.9	25.8	14.7	19.2	14.5	18.5	16.0	19.1	9.8	15.4	9.1	14.4
1989	23.0	25.0	13.9	18.5	13.0	17.4	15.8	18.8	9.5	15.0	8.3	13.4
1990	22.4	25.0	13.6	18.8	12.6	17.1	14.9	19.0	9.2	15.3	7.4	12.9
1991	21.8	25.2	13.0	18.6	11.6	16.7	14.8	19.7	9.3	15.7	7.5	13.3
1992	21.3	24.6	12.5	18.2	11.6	16.9	14.6	19.5	9.1	15.3	7.8	13.3
1993	22.8	26.7	14.3	20.4	12.9	19.0	15.6	21.4	10.4	17.3	8.9	15.5
1994	23.3	27.4	14.8	20.9	13.4	19.5	16.1	21.9	11.0	17.7	9.4	15.6
1995	22.8	27.1	14.5	20.8	13.3	19.4	16.2	22.1	11.2	17.7	9.5	15.5
1996	23.0	27.3	13.9	20.1	12.7	18.6	16.2	22.2	10.5	17.1	8.4	14.6
1997	24.0	28.4	14.7	20.8	13.4	19.1	16.8	23.0	11.1	17.7	9.0	15.3
1998	23.2	27.8	14.6	20.8	13.8	19.9	16.8	23.0	11.3	17.9	9.6	16.3
1999	21.2	25.5	13.5	19.4	12.8	18.3	15.5	20.8	10.4	16.2	9.0	14.8
2000	21.5	25.9	14.6	20.8	13.8	19.6	15.7	21.0	10.8	16.8	9.2	14.8
2001	20.9	25.4	14.2	20.3	13.3	18.6	15.3	20.6	10.2	16.1	7.9	13.4
2002	18.5	23.7	13.9	20.9	13.3	19.8	14.2	19.5	10.2	15.9	8.3	13.8
2003	18.2	24.0	13.9	21.7	13.2	20.5	14.0	19.9	9.9	16.2	7.8	13.8
2004	18.8	24.7	14.3	21.9	12.4	20.0	14.4	20.6	10.3	16.9	7.9	14.5
2005	19.0	24.9	14.8	22.5	13.1	20.6	14.4	20.7	10.5	17.1	8.0	14.4
2006	18.9	25.2	14.3	22.5	12.9	20.4	14.7	21.6	10.5	17.4	8.0	14.4
2007	18.0	25.0	14.9	23.8	13.0	21.4	13.9	21.0	10.2	17.2	7.3	13.7
2008	17.1	24.5	14.0	23.0	12.2	20.7	13.2	20.7	9.3	16.8	6.9	13.8
2009	14.9	21.9	11.8	20.3	11.3	19.1	11.5	19.0	8.2	15.4	6.5	13.3
2010	15.0	22.7	12.6	21.5	11.3	19.8	11.6	19.6	8.9	16.8	6.9	14.4
2011	..	24.2	..	21.8	..	19.3	..	20.8	..	17.1	..	14.1
2012	..	24.2	..	20.9	..	18.2	..	21.3	..	17.2	..	13.9
Change	**-12.5**	**-5.3**	**-1.5**	**2.8**	**-3.1**	**1.2**	**-5.5**	**-0.1**	**-0.1**	**2.5**	**-1.8**	**0.7**

Box 1: Comparing Estimates for Real GDP

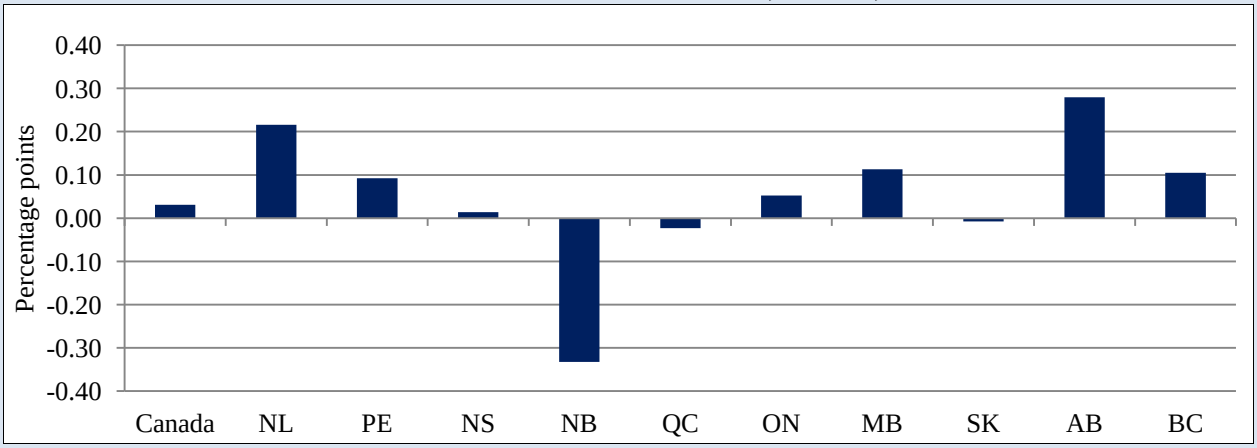
In this report, we focus on real GDP estimates in 2007 chained dollars from 1981 to 2012. However, the choice of the base year for real GDP estimates can have a significant impact on the data. Chart 9 shows the difference between 2002 and 2007 real GDP levels for the year 2007. Remarkably, the chart shows that price inflation in Newfoundland and Labrador is 31 percentage points greater than the national figure (19 per cent). For Alberta, the difference is 21 percentage points. In dollar terms, this means that Newfoundland and Labrador's real GDP in 2007 was 29.7 billion chained 2007 dollars, compared to 19.8 billion chained 2002 dollars. There were similarly large changes for Alberta and Saskatchewan.

Chart 9: Real GDP (2007 Chained Dollars) Relative to Real GDP (2002 Chained Dollars), Canada and the Provinces, Per Cent, 2007



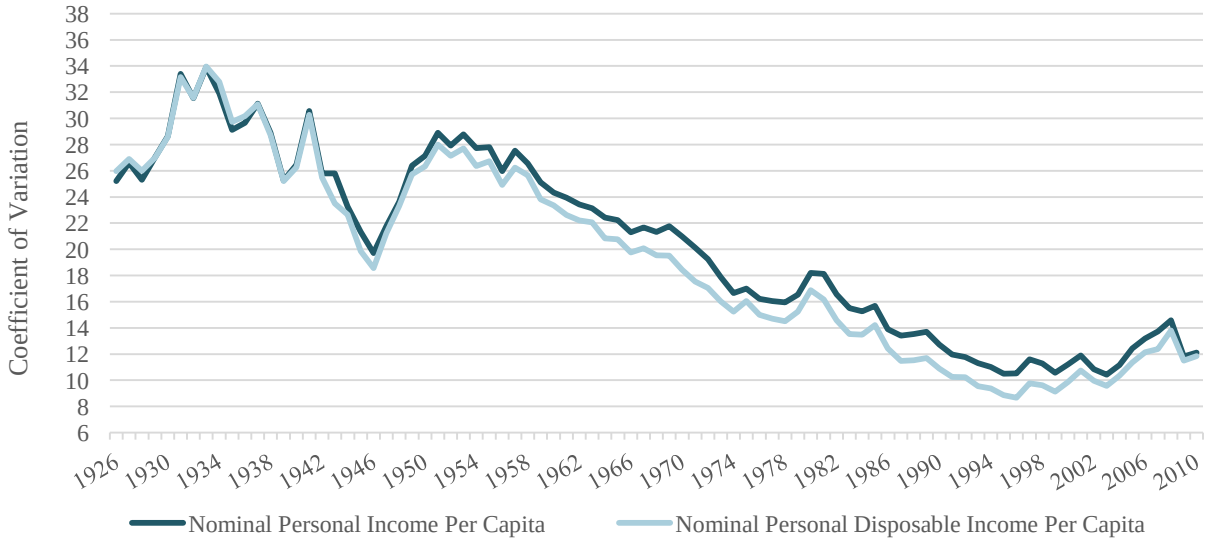
These divergent price levels have a significant effect on growth rates as well. Chart 10 depicts the difference between compound annual growth rates in real GDP when measured in 2002 versus 2007 dollars. We see that, for the 2000-2010 period, real GDP growth in Newfoundland and Labrador is 0.22 percentage points greater when measured in 2007 dollars; this number jumps to 0.28 points for Alberta (*i.e.*, real GDP in Alberta grew at 2.66 per cent annually as opposed to 2.38 per cent). This is the result of higher 2007 commodity prices pushing up the output for Newfoundland and Labrador and Alberta, thereby increasing GDP figures.

Chart 10: Difference Between 2007 and 2002 Real GDP Growth Rates, Per Cent, 2000-2010



Estimates for nominal personal income and nominal personal disposable income are available for the 1926-2010 period, allowing us to examine trends toward or away from convergence across the provinces for a significant time period (Charts 11, 12 and 13). There are many interesting trends in the CVs for nominal personal income per capita and nominal personal disposable income per capita. First, the trends for these measures were practically identical. Second, government spending during the Second World War appears to have had a significant effect on provincial disparities. Third and most importantly, there has been significant convergence over the 1952-2010 period, as the CVs for these measures have fallen by more than half. Nevertheless, these measures' CVs rose during the early 1980s as well as during the 2004-2008 period, following the trends in the CV for nominal GDP per capita.

Chart 11: *Non-weighted CVs for Nominal Personal Income per Capita and Nominal Personal Disposable Income per Capita, 1926-2012*



Note: Newfoundland and Labrador is not included in the coefficient of variation prior to 1949.

Chart 12: *Nominal Personal Income per Capita for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1926-2010*

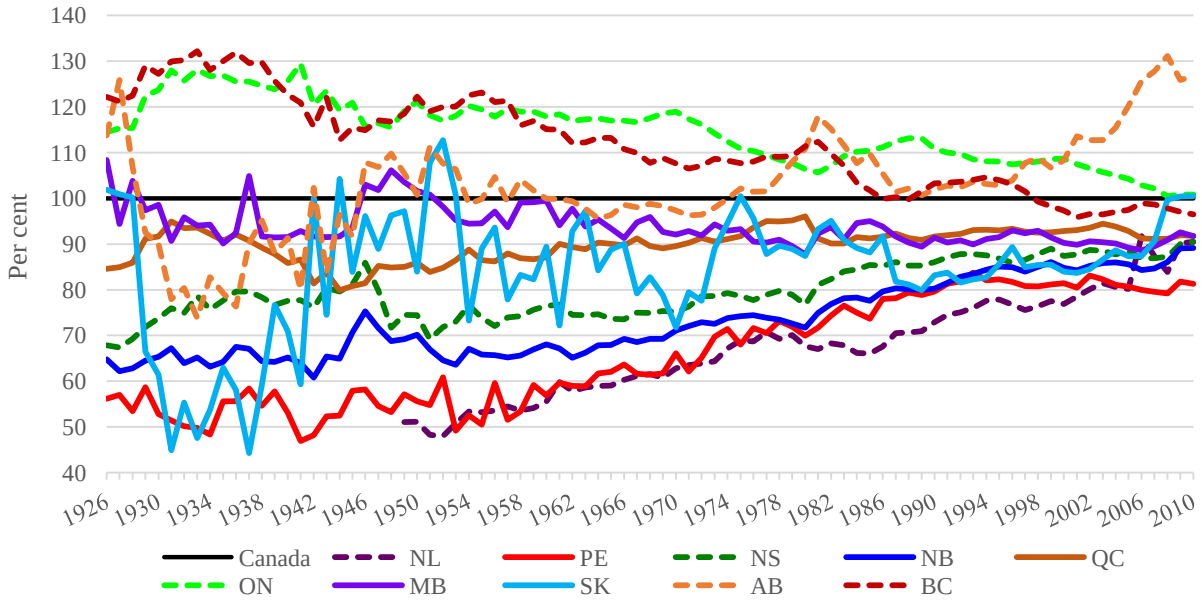
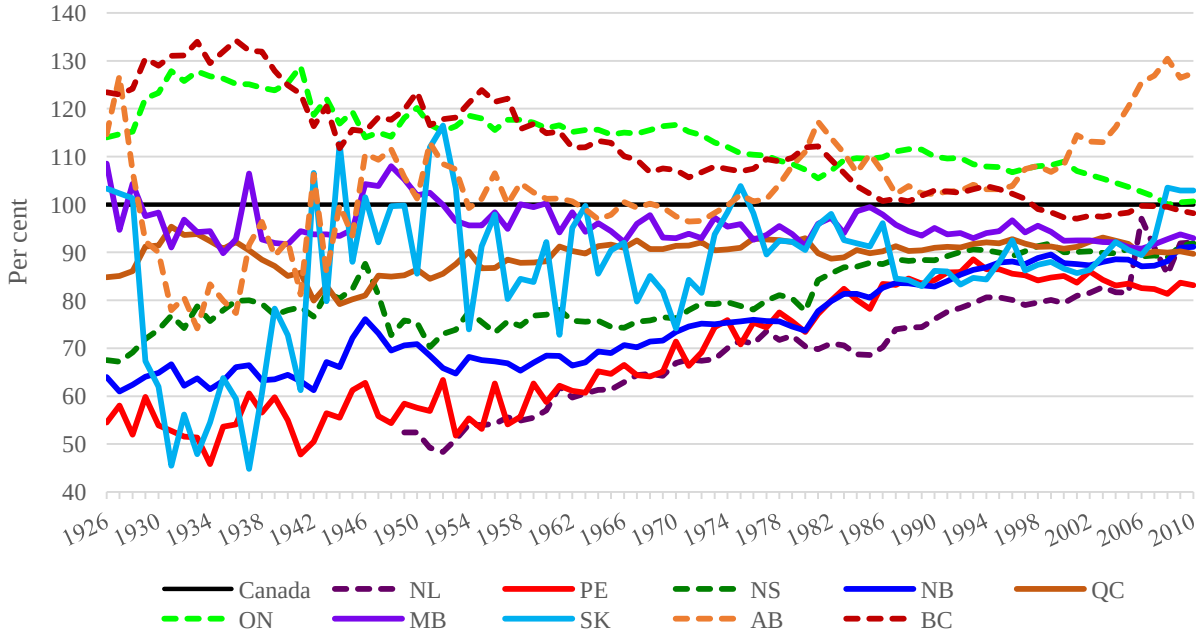


Chart 13: *Nominal Personal Disposable Income per Capita for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1926-2010*

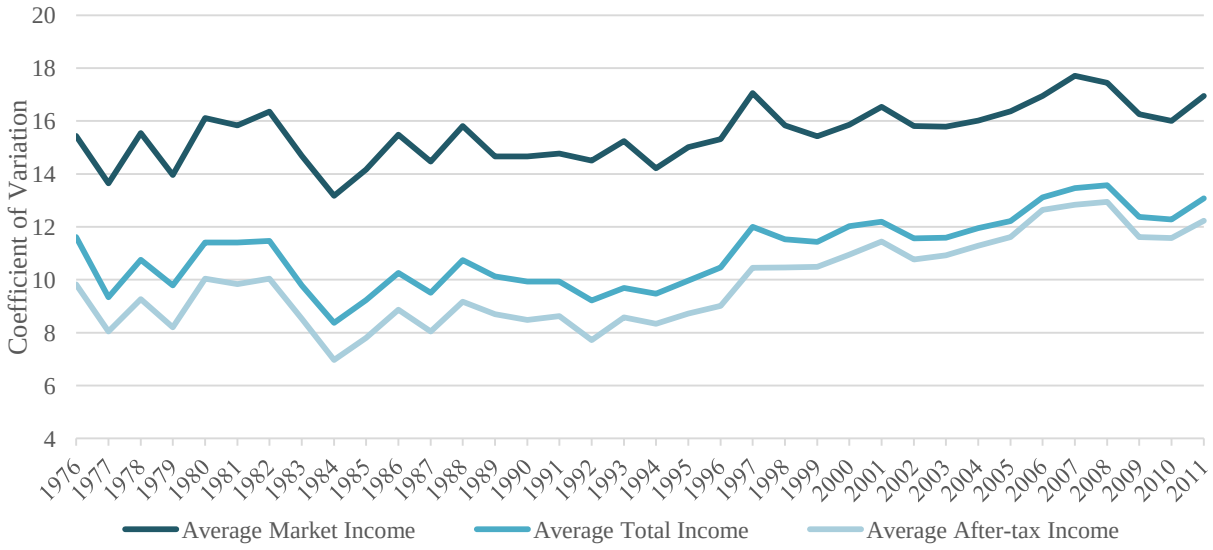


Unlike nominal personal (disposable) income per capita, there appears to have been divergence across the provinces in terms of average real market, total and after-tax family incomes over the 1976-2011 period (Chart 14). For each of these measures, divergence was limited to the 1994-2008 period and to around a 2.0 percentage point increase in the CVs between 1976 and 2011. The magnitude of divergence was even higher for weighted CVs.

Further research is required to understand why the convergence trends for average market, total and after-tax family incomes differ from those observed for the income variables we have already examined. Nevertheless, such inconsistencies are likely due to the fact that these variables are based on a different type of income – family income – which is affected by changes in the average family size (which has grown at a faster rate than total population), as well as the fact that these variables are from a different source (the Survey of Labour and Income Dynamics, SLID, versus national accounts estimates based on Canada Revenue Agency personal income tax data).

As discussed earlier, the CVs are lowest for average after-tax family income due to the redistributive effects of taxes and transfers. Federal taxes and transfers redistribute income between individuals across Canada. Ergo, poorer provinces (which are composed of individuals with lower incomes) will gain from these policies, while wealthier provinces (which are made up of individuals with higher incomes) will see a reduction in average incomes due to these policies. As a result, federal taxes and transfers have the effect of redistributing income between the provinces; this explains why the CVs are lower for after-tax income than for market income. In addition, the difference between the CVs for market income and total income is greater than the difference between the CVs for total income and after-tax incomes, which indicates that transfers play a more important role than taxes in reducing provincial income disparities. Chart 14 illustrates the important role played by redistributive policies in offsetting income inequalities between individuals across provinces.

Chart 14: *Non-weighted CVs for Average Market, Total and After-tax Family Income, 2011 Constant Dollars, 1976-2011*



B. Productivity

Convergence trends for both nominal and real labour productivity levels will now be explored. It is important to note that labour productivity can refer to both GDP per worker and GDP per hour worked. An effort will be made to specify which of these two economic variables is being examined throughout the remainder of this section.

Chart 15 shows the CVs for nominal GDP per capita, nominal GDP per worker and nominal GDP per hour worked between 1976 and 2012. The CVs for all three economic variables followed the same movements between 1976 and 2012; this is consistent with the story we developed related to crude oil prices. Chart 16 demonstrates that high crude oil prices benefiting Alberta, Saskatchewan and Newfoundland and Labrador drove trends toward or away from convergence in nominal labour productivity, as they did for nominal GDP per capita.

Between 1976 and 2012, the CVs for nominal GDP per worker and nominal GDP per hour worked rose by 6.9 and 3.8 percentage points, respectively. The CVs for nominal GDP per hour worked and nominal GDP per worker were extremely close over the entire 1976-2012 period. Dissimilarly, the CV for nominal GDP per capita was significantly higher than the CV for nominal GDP per hour worked and nominal GDP per worker over most of the 1976-2012 period. However, the CVs for nominal GDP per worker and nominal GDP per hour worked have converged over time toward that of nominal GDP per capita.

Chart 15: *Non-weighted CVs for Nominal Labour Productivity Measures, 1976-2012*

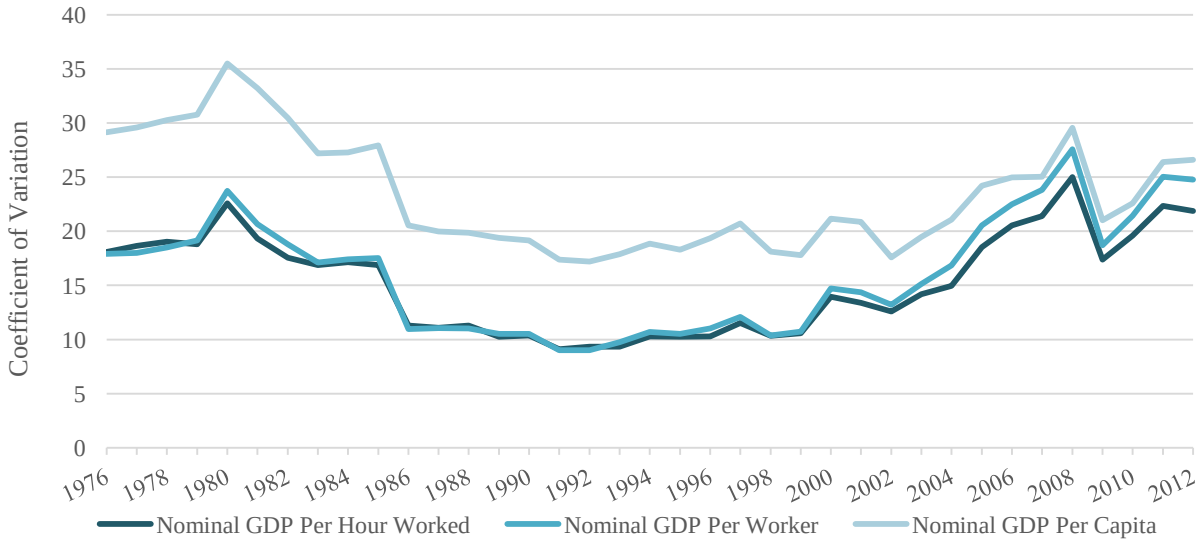
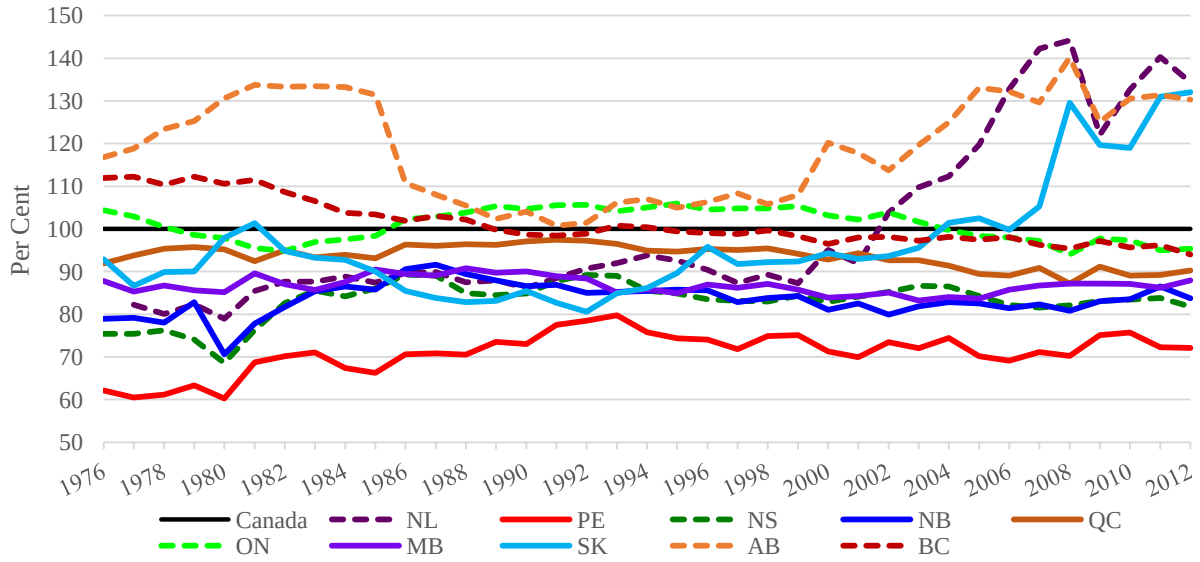


Chart 16: *Nominal GDP per Hour Worked for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1976-2012*



In contrast to the rise in the CVs for nominal productivity measures and the fall in the CV for real GDP per capita, the CVs for real (2007 chained dollar) labour productivity measures (*i.e.*, both real GDP per worker and real GDP per hour worked) were relatively constant over the entire 1981-2012 period, increasing by 2.8 and 1.2 percentage points from 1981 to 2012, respectively (Chart 17). However, the rise in the CVs for real labour productivity would have been larger but for the 2008-2009 global financial crisis.

Chart 17: *Non-weighted CVs for Real (2007 Chained Dollars) Labour Productivity Measures, 1981-2012*

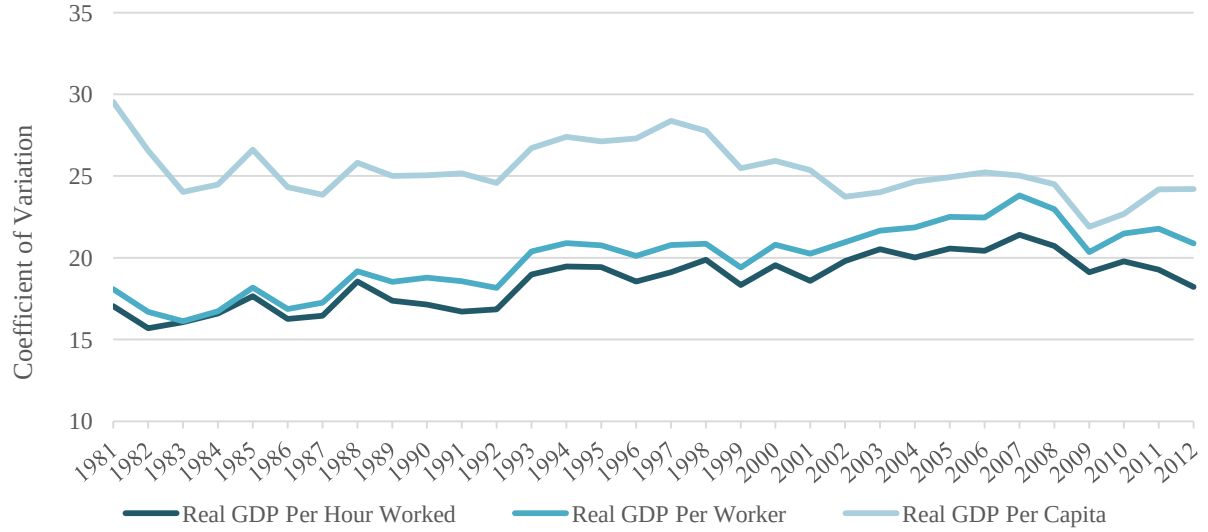
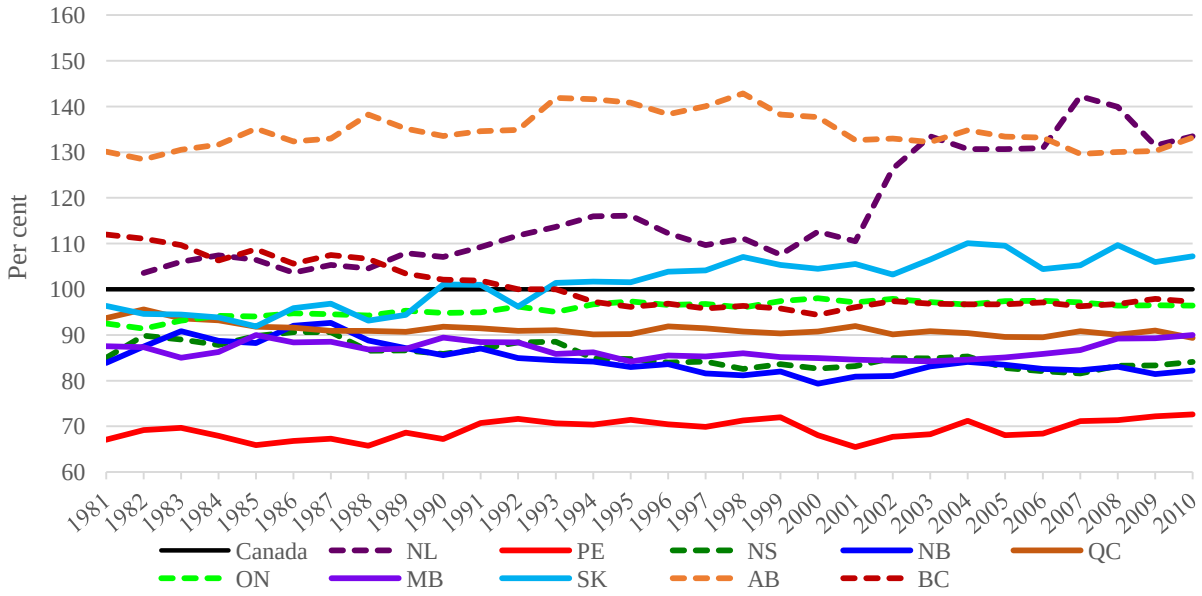


***Chart 18**: Real (2007 Chained Dollars) GDP per Hour Worked for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1981-2012*



C. Labour Market

Provincial estimates for the participation rate, the employment rate and the unemployment rate are available from 1976 to 2012, and for the share of the total population that is of working age from 1971 to 2013. During these periods, the non-weighted CV decreased for all of these labour market variables, implying that there has been convergence across the provinces with respect to these variables (Chart 19 through Chart 24).

Our working-age population indicators (*i.e.*, the proportion of those over the age of 15 and those between the ages of 15 and 64 to the total population) have remained remarkably uniform, with their respective CVs converging slightly by 1.5 and 2.2 percentage points to roughly 1.5–2.0 per cent (Chart 19). Chart 20 shows each province's share of the working population relative to the national average; Newfoundland and Labrador is the most notable province, having leapt from 89.2 per cent of the national average share of working-age population to 102.0 per cent (*i.e.*, the share of Newfoundland and Labrador's population aged 15 and older jumped from 65 per cent to 85 per cent).

***Chart 19**: Non-weighted CVs for the Ratio of Working-Age to Total Population 1971-2013*

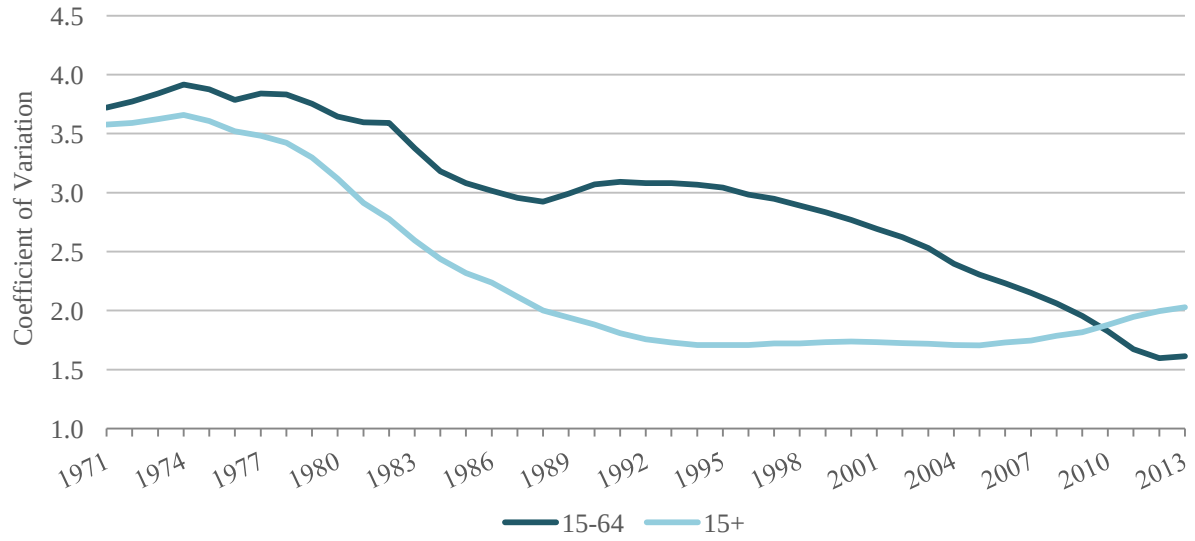
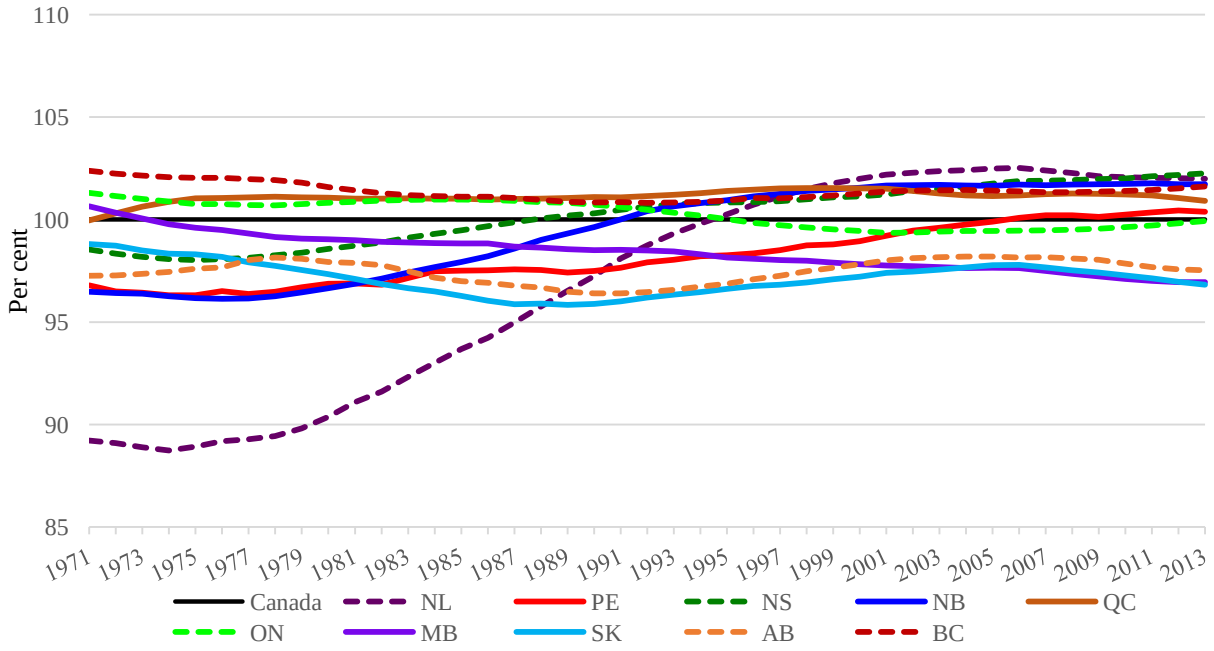
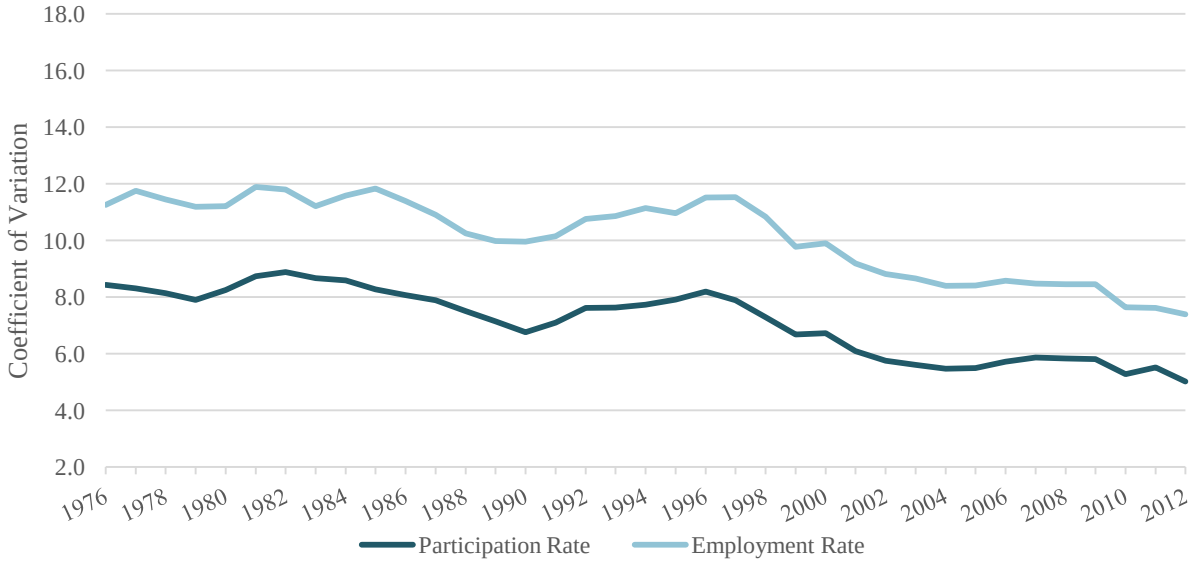


***Chart 20**: Share of Working-Age Population (15+) for the Provinces Relative to the Weighted Canadian Average, Per cent, Canada=100, 1971-2013*



The CVs for the participation rate and the employment rate also experienced relatively continuous declines over the entire 1976-2012 period (Chart 21). The CV for the participation rate fell from 8.4 per cent in 1976 to 5.0 per cent in 2012. Similarly, the CV for the employment rate decreased from 11.3 per cent in 1976 to 7.4 per cent in 2012. These trends indicate that there has been persistent convergence in labour market participation across the Canadian provinces. Such convergence is also demonstrated by the compression of the provinces' participation and employment rates around the national average (Charts 22 and 23).

***Chart 21**: Non-weighted CVs for the Participation Rate and the Employment Rate, 1976-2012*



Over the 1976-2012 period, the employment rate and the participation rate followed comparable trends in all of the provinces. More specifically, the employment rate and the participation rate increased in every province between 1976 and 2012, and followed similar cyclical patterns. Across Canada, the participation rate rose from an average of 61.5 per cent in 1976 to an average of 66.7 per cent in 2012. Similarly, the employment rate increased by 4.7 percentage points between 1976 and 2012. Alberta's participation and employment rates were well above average for the entire period (Charts 22 and 23). The other Prairie Provinces also had participation and employment rates at or above average during this period. The Atlantic Provinces, on other hand, had well below average participation and employment rates.

It is important to note that the only reason participation and employment rates rose in Canada over this period was the growing involvement of females in the labour market. For example, the Canadian average participation rate for females rose from 45.7 per cent in 1976 to 62.2 per cent in 2012, while it fell from 77.7 per cent to 71.3 per cent for males. The trend of rising female participation and falling male participation held true in every province. It is also important to note that much of the increase in the employment and participation rates occurred between 1976 and 1990 and between 1995 and 2004. Since 2004, the employment and participation rates have remained relatively constant in most provinces, as the growth in female labour market membership seems to have leveled off. Participation and employment rates did increase significantly in Newfoundland and Labrador and Saskatchewan between 2004 and 2012 for both sexes, which is doubtless attributable to the booming natural resource sector of these two provinces.

The sustained fall in the CVs for the participation rate and the employment rate between 1976 and 2012 was primarily due to two factors. First, the employment and participation rates of

Atlantic Provinces and Quebec (which had the lowest initial employment and participation rates) increased more than in other provinces. For example, Newfoundland and Labrador's participation rate rose by 12.1 percentage points between 1976 and 2012. Second, Ontario (which started with the second highest employment and participation rates) experienced nearly no change in its employment and participation rates. Therefore, the CV for the employment and participation rates fell due to convergence toward the national average across all provinces but the Prairie Provinces.

Chart 22: *Participation Rate for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1976-2012*

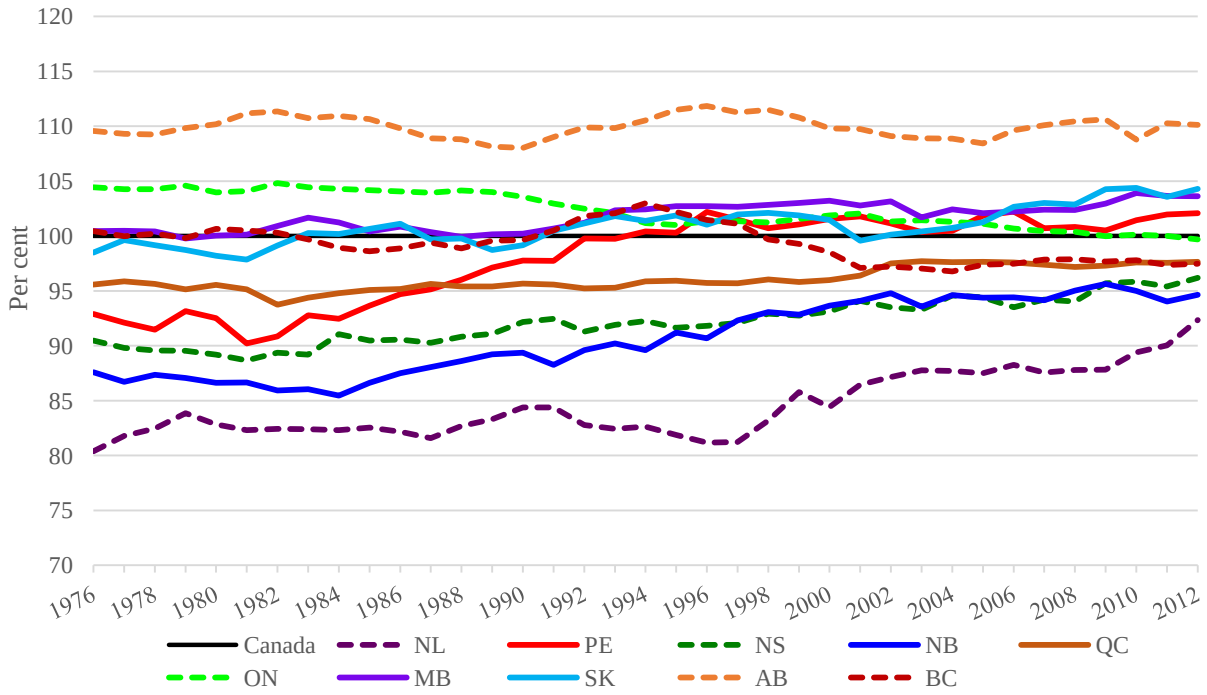
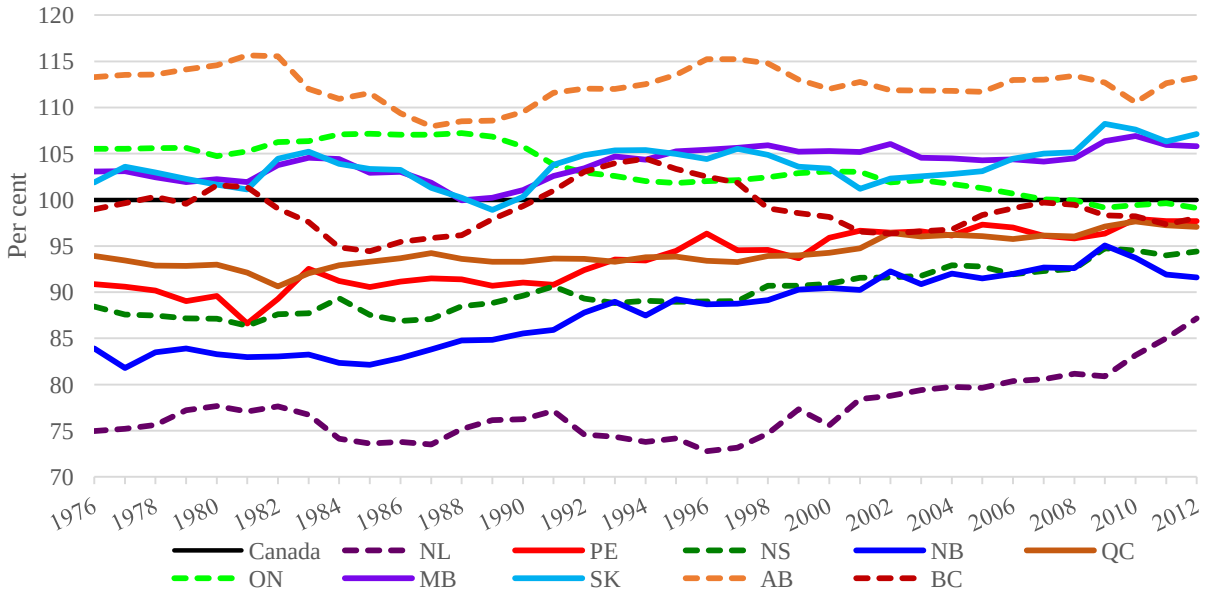


***Chart 23**: Employment Rate for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1976-2012*



Unlike the participation and employment rates, there has been no clear trend toward or away from convergence for the unemployment rate. The unemployment rate's CV was extremely volatile between 1976 and 2012 (Chart 24). The CVs were stable between 1976 and 1981 at approximately 40.0 per cent before dropping to 26.5 per cent in 1982 and 22.8 per cent in 1983. Between 1983 and 2006, there was significant divergence across the provinces in terms of the unemployment rate, as the CV doubled from 22.8 per cent in 1983 to 44.9 per cent in 2006. There was another bout of convergence from 2006 to 2011, as the CV fell by 15.1 percentage points to 29.8 per cent in 2011. In 2012, the CV for the unemployment rate rose again to 32.7 per cent.

Interestingly, the CV for the unemployment rate was lowest during times of recession in Canada. For example, the CV fell when the unemployment rate rose dramatically in every province in the early 1980s, in the early 1990s and during the recent financial crisis. Such behaviour is primarily due to the fact that unemployment rates tend to rise most, especially in relative terms, in low unemployment rate provinces like Ontario, Manitoba, Alberta and British Columbia during turbulent times. The magnitude of the increase in these provinces' unemployment rates drives the upswing in the national average during recessions (because they constitute the vast majority of weight), which has two effects: (i) low unemployment rate provinces converge toward the national average because this average is rising more slowly than their rates; and (ii) high unemployment rate provinces converge toward the national average because this average is growing more quickly than their rates. Consequently, rapidly rising unemployment rates in Ontario, Manitoba, Alberta and British Columbia have resulted in all

provincial unemployment rates concentrating around the Canadian average during economic downturns (Chart 25).

***Chart 24**: Non-weighted CVs for the Unemployment Rate, Per Cent, 1976-2012*

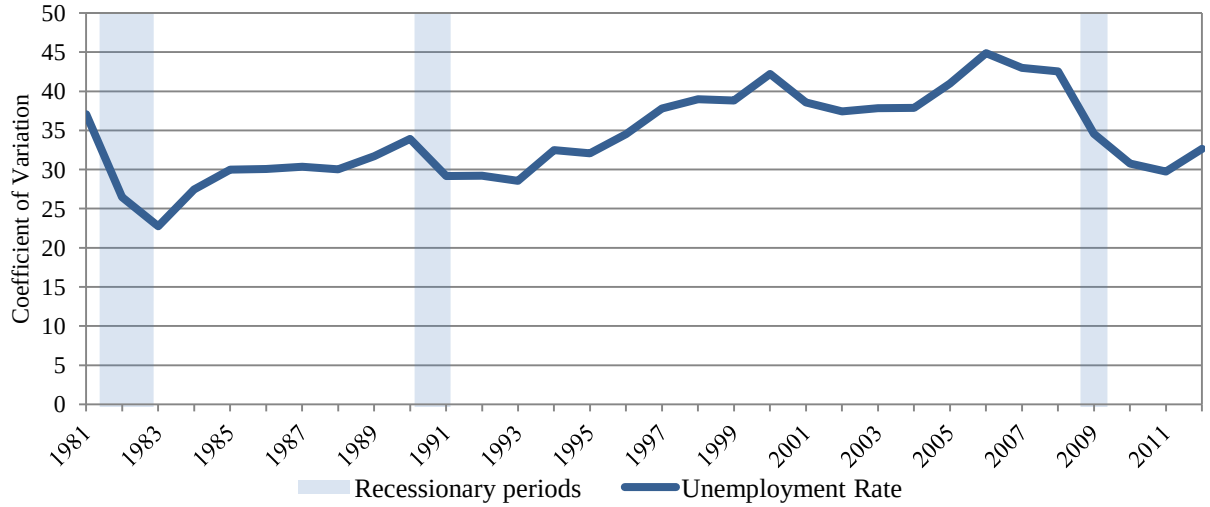
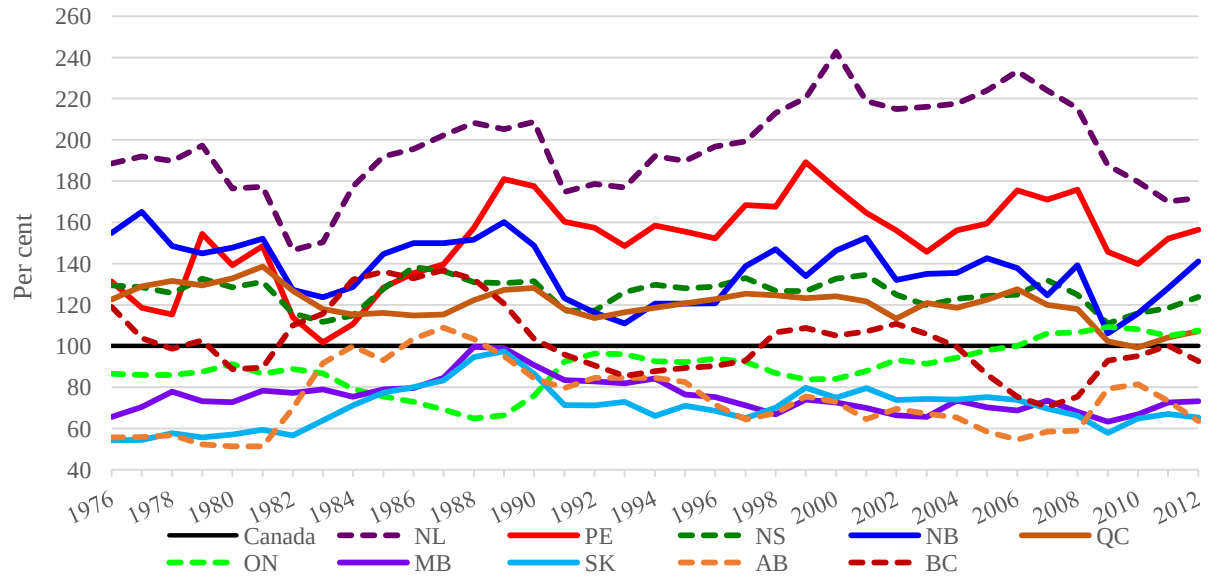


***Chart 25**: Unemployment Rate for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1976-2012*



There has been significant convergence across the provinces in terms of educational attainment. The CV for the share of the working age population with a post-secondary degree, certificate or diploma (hereinafter referred to as educational attainment) fell from 9.6 per cent in 1990 to 6.0 per cent in 2012 (Chart 26). The CV for educational attainment declined between 1990 and 2003. Since 2003, however, the CV has remained relatively stable. This indicates that convergence in educational attainment primarily took place during the 1990s and levelled off in the new millennium.

Educational attainment increased in every province during the 1990-2012 period on a sustained basis. On average, educational attainment, as measured by the proportion of the working age population with post-secondary qualifications, rose from 32.7 per cent in 1990 to 53.6 per cent in 2012, an increase of 20.9 percentage points. Convergence is explained by the fact the educational attainment increased the most in provinces with the worst initial performance. For example, Prince Edward Island, which initially had the lowest rate of educational attainment at 27.8 per cent, saw its rate of educational attainment grow by 23.0 percentage points between 1990 and 2012. It is important to note that while most provinces converged in terms of educational attainment, Manitoba and Saskatchewan were well below the other provinces over the entire 1990-2012 period (Chart 27).

***Chart 26**: Non-weighted CVs for the Share of the Working Age Population with a Post-secondary Degree, Certificate or Diploma, 1990-2012*

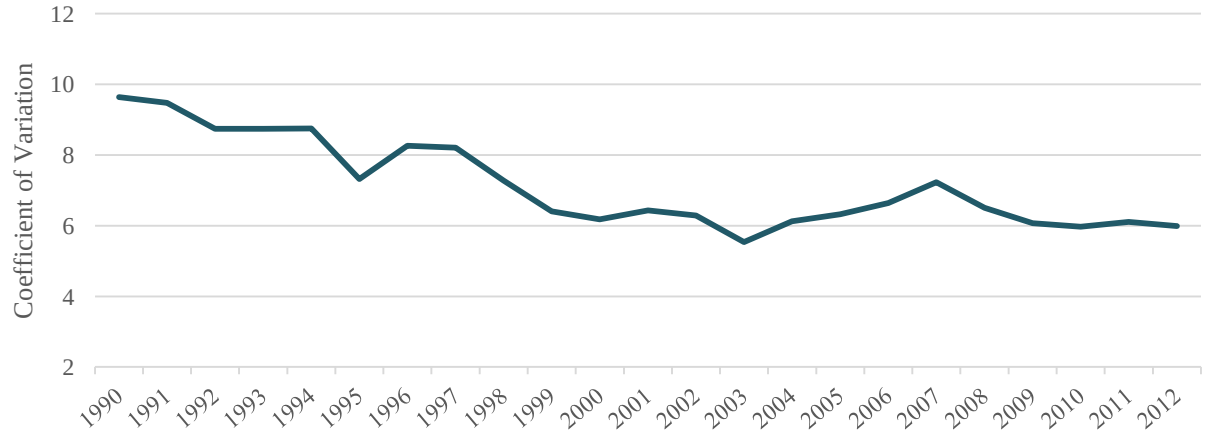
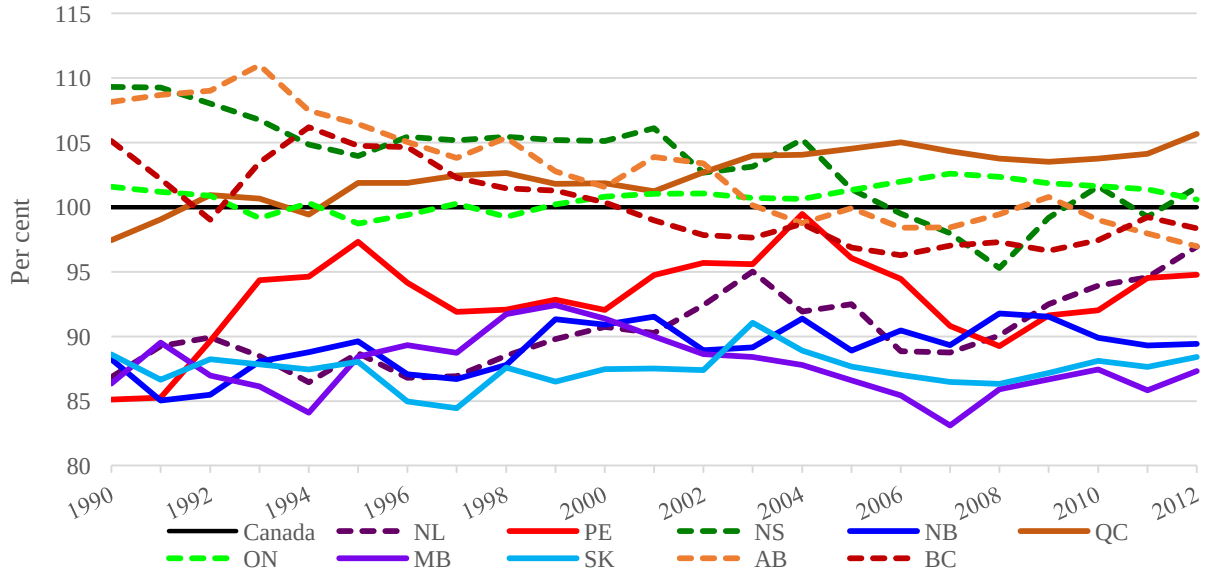


***Chart 27**: Share of the Working Age Population with a Post-secondary Degree, Certificate or Diploma for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1990-2012*

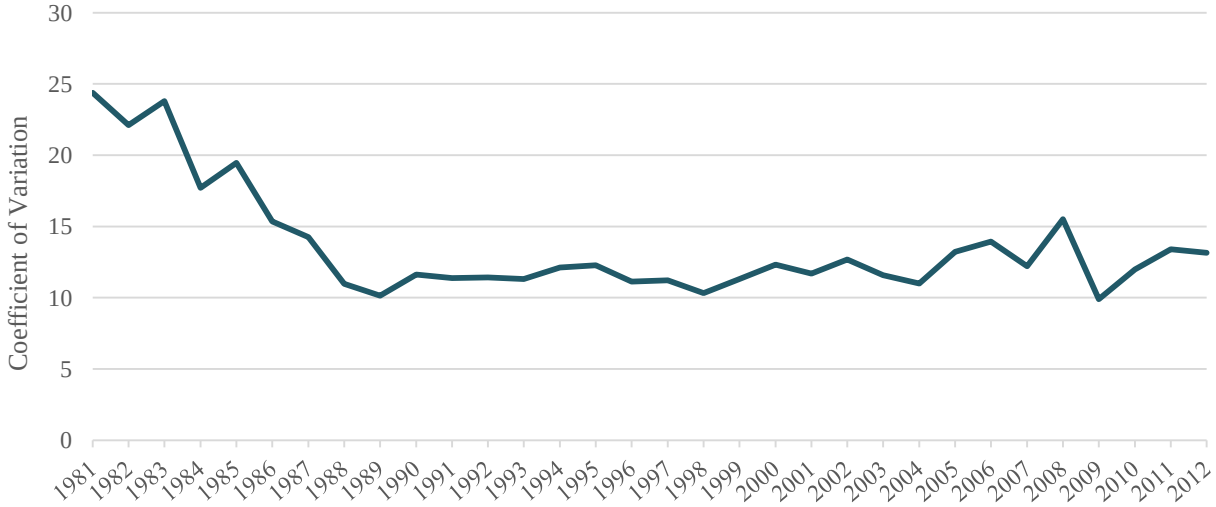


D. Composite Indices of Well-being

Convergence trends for the Index of Economic Well-being (IEWB)[12] and the Human Development Index (HDI)[13] are illustrated by Chart 28 through Chart 31. In general, it is difficult to explain trends toward or away from convergence for these composite indices, as they are made up of a great number of variables.

There was significant convergence across the provinces in terms of the IEWB; the CV for the IEWB fell from 24.4 per cent in 1981 to 13.1 per cent in 2012 (Chart 28). This convergence was concentrated in the 1981-1989 period during which Alberta, New Brunswick, Prince Edward Island and Newfoundland and Labrador converged toward the Canadian average (Chart 29). Between 1989 and 2012, on the other hand, the CV for the IEWB was relatively constant, because the following two trends offset each other: (i) Alberta diverged from 109.4 per cent of the weighted Canadian average in 1989 to 133.1 per cent in 2012; and (ii) all other provinces either converged toward or stayed close to the weighted Canadian average.

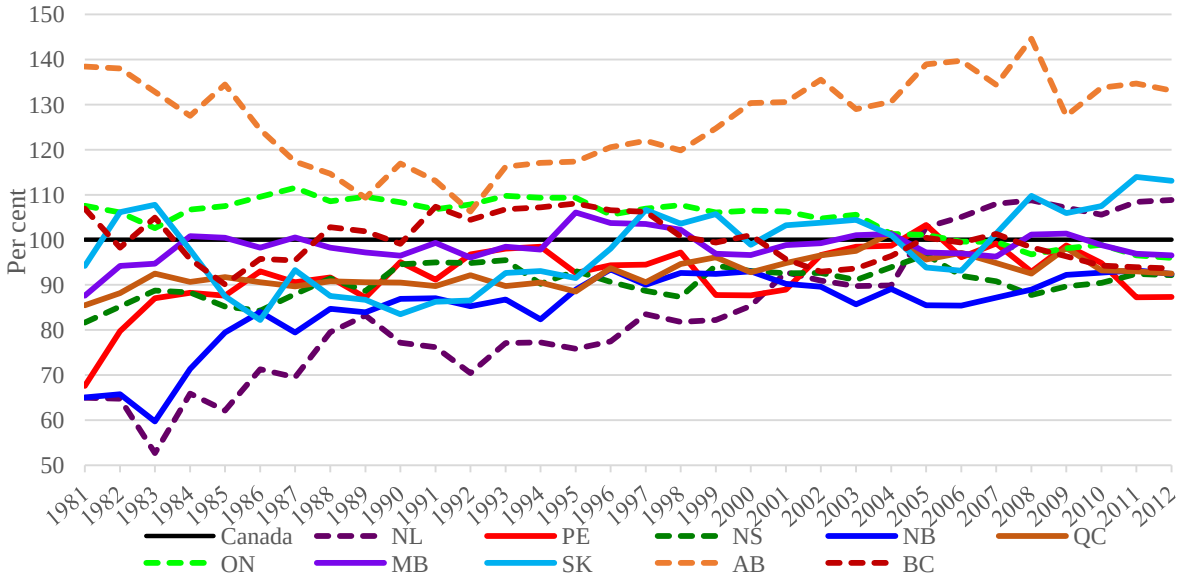
***Chart 28**: Non-weighted CVs for the Index of Economic Well-being, Equal Weighting, 1981-2012*



[12] The Index of Economic Well-being (IEWB) is a composite index developed by the Centre for the Study of Living Standards to capture trends in four dimensions of economic well-being: consumption flows; stocks of wealth; inequality; and economic security. Information on the IEWB is found on the CSLS website at http://www.csls.ca/iwb.asp. For the most recent IEWB estimates for Canada and the provinces, see Osberg and Sharpe (2011).

[13] The Human Development Index (HDI) is a composite index developed by the United Nations Development Program to capture trends in three dimensions of human development: income; health; and education. For estimates of the HDI for the Canadian provinces, see Gee, Hazell and Sharpe (2012).

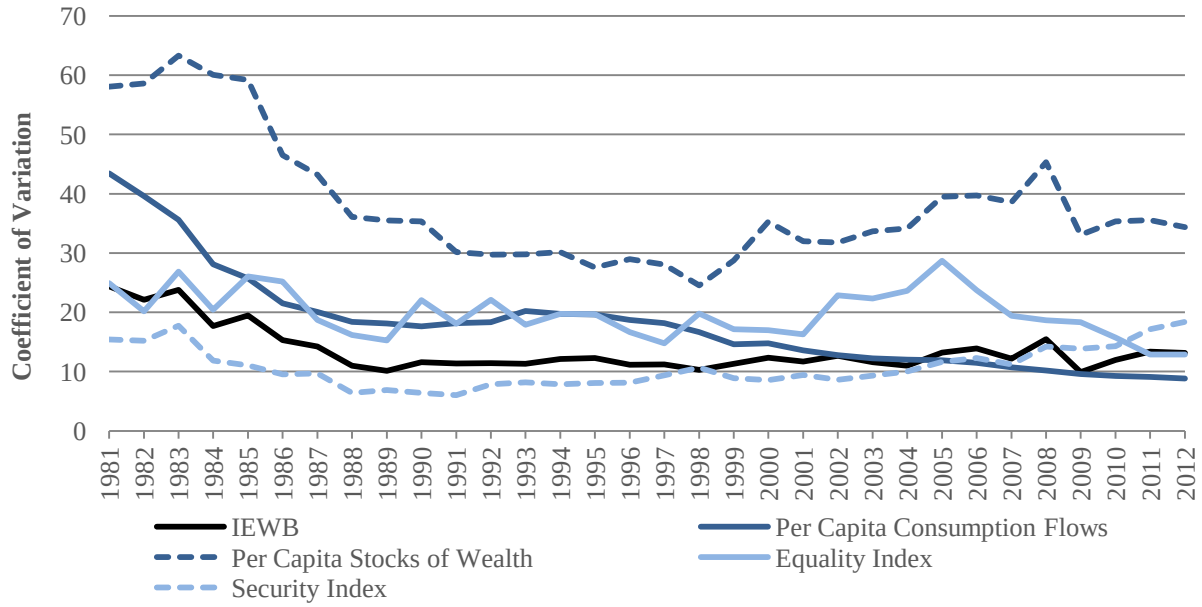
***Chart 29**: Index of Economic Well-being for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1981-2012*



The IEWB itself is composed of four sub-indices: (i) the security index; (ii) the equality index; (iii) the index of total per capita consumption flows; and (iv) the index of total per capita stocks of wealth. Chart 30 provides a breakdown the CVs for these composite indicators, highlighting the overall convergence trend.[14] The index of total per capita consumption flows has shown the greatest decrease in CV, dropping from 43.4 per cent to 8.8 per cent; most of this decrease occurred before 1990. The index of total per capita stocks of wealth also experienced significant convergence, falling from 58.0 per cent to 34.4 per cent, though it remains the most divergent of all indices. Similar to the index of total per capita consumption flows, most of the fall in this indicator's CV occurred by the early 1990s, and its CV has actually increased over the past 20 years. The CV for the equality index displays no consistent trend, decreasing from a high of 28.7 per cent in 2006 to a current low of 12.9 per cent. The security index, once the least divergent of all four sub-indices, is the only one whose CV increased between 1981 and 2012, from 15.4 per cent to 18.4 per cent, surpassing both the equality index and the index of per capita consumption flows.

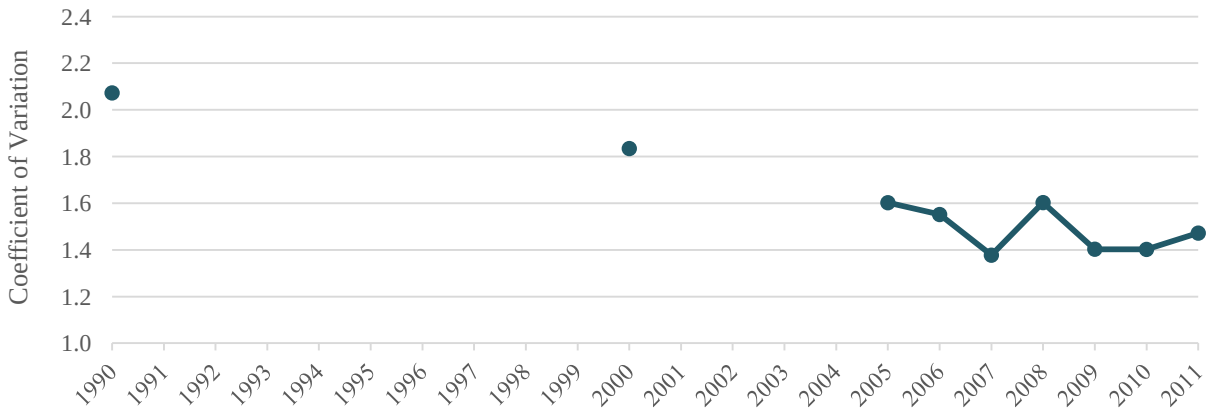
[14] Breakdowns by province for these four sub-indices are provided in Appendix IV.

***Chart 30**: Non-weighted CVs for the IEWB and Its Related Sub-Indices, 1981-2012*



Similar to the IEWB and its sub-indices, the provinces converged in terms of the HDI (albeit slightly) as the CV fell from 2.1 per cent in 1990 to 1.5 per cent in 2012 (Chart 31). Unlike the IEWB, there was little room for any reduction in provincial disparities with respect to the HDI given that its CV was already at an extremely low level in 1990.

***Chart 31**: Non-weighted CVs for the Human Development Index, 1990, 2000 and 2005-2011*



E. Fiscal Capacity

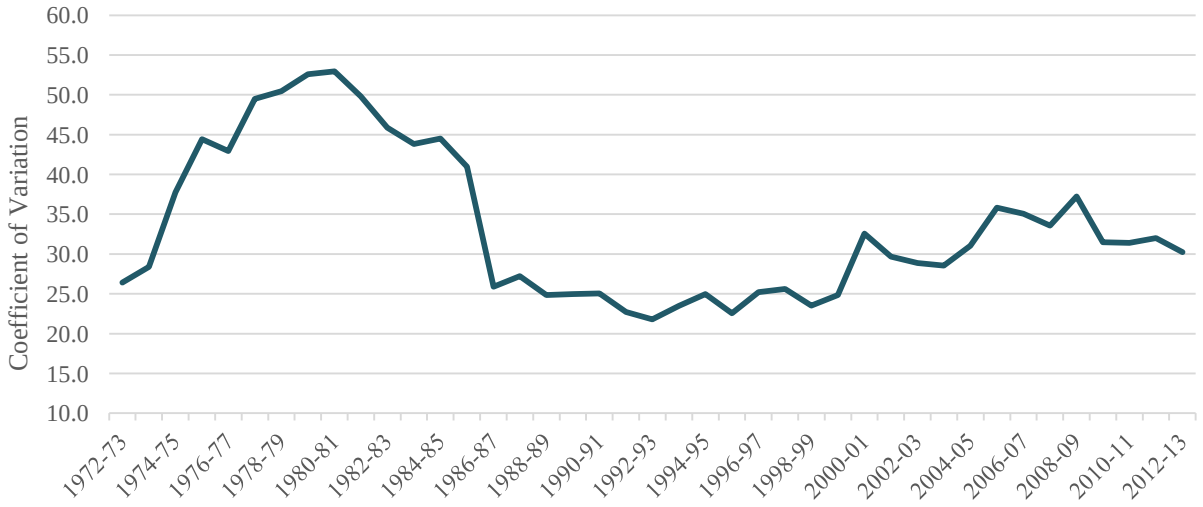
The fiscal capacity figures used in the report, which were calculated by Finance Canada and provided by the Privy Council Office (PCO), are those used to calculate equalization payments. Fiscal capacity measures the ability of a province to raise revenue from five major revenue bases – consumption, business income, property values, personal income and natural

resources. More specifically, fiscal capacity is defined as all provincial own source revenue on a per capita basis.

There has been no clear trend toward or away from convergence in fiscal capacity over the 1972-73 to 2012-13 period (Chart 32). The CV for fiscal capacity increased from 26.4 per cent in 1972-73 to 52.9 per cent in 1980-81, before falling dramatically to 25.9 per cent in 1986-87. Such volatility was due to a commodity boom brought upon by high crude oil prices, which lead to a dramatic rise in fiscal capacity in Alberta relative to the Canadian average (Chart 33). After a period of relative stability between 1986-7 and 1999-00, the CV began to rise again and reached a peak of 37.2 per cent in 2008-09 (an increase of 12.4 percentage points). Again, this upward swing was due to a commodity boom; however, this time three provinces were affected – namely, Alberta, Saskatchewan and Newfoundland and Labrador – rather than one.

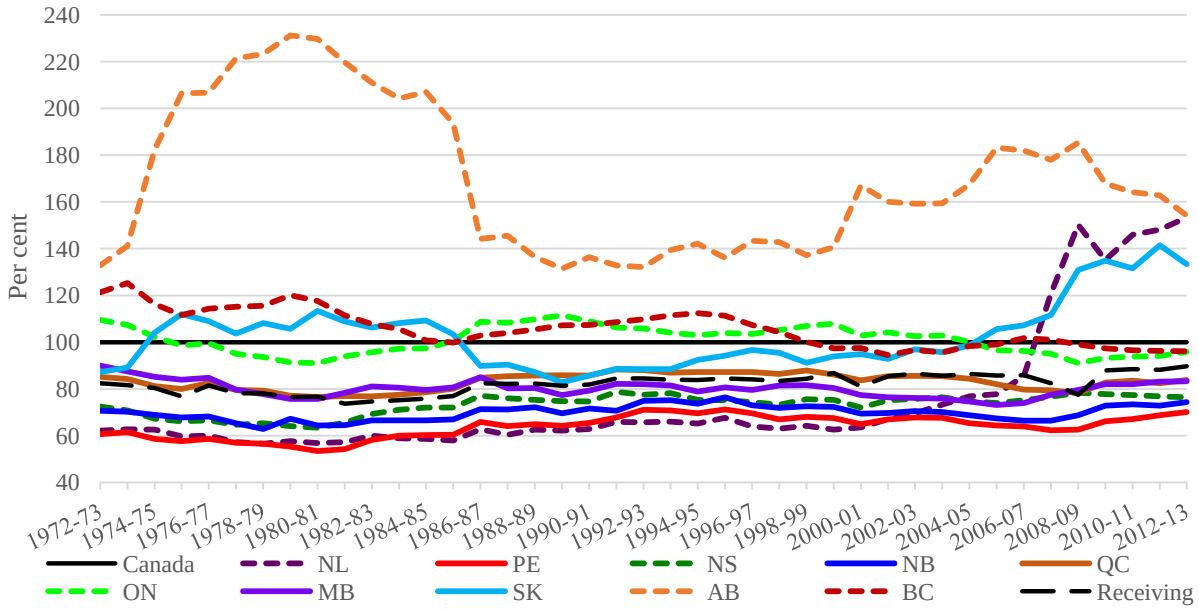
Given that *three* provinces experienced rapidly increasing fiscal capacity during the 2002-2008 commodity boom while only *one* province saw its fiscal capacity rise rapidly during the period of high oil in the early 1980s, the *non-weighted* CV rose more than the *weighted* CV in the early 1980s and the *weighted* CV rose more than the *non-weighted* CV between 1999-00 and 2008-09. Since 2008-09, the CV for fiscal capacity has declined somewhat, driven by falling fiscal capacity in Alberta. As we shall discuss later, Alberta has been damaged by the widening of the WCS-WTI-Brent crude oil price gap. Unsurprisingly, the clearest trend to emerge from Charts 32 and 33 is that commodity booms result in divergence across the provinces in fiscal capacity, as it did for nominal GDP per capita.

***Chart 32**: Non-weighted CVs for Fiscal Capacity, 1972-73 to 2012-13*



Note: Fiscal capacity is based on 100% resource inclusion.

***Chart 33**: Fiscal Capacity for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1972-73 to 2012-13*



F. Summary

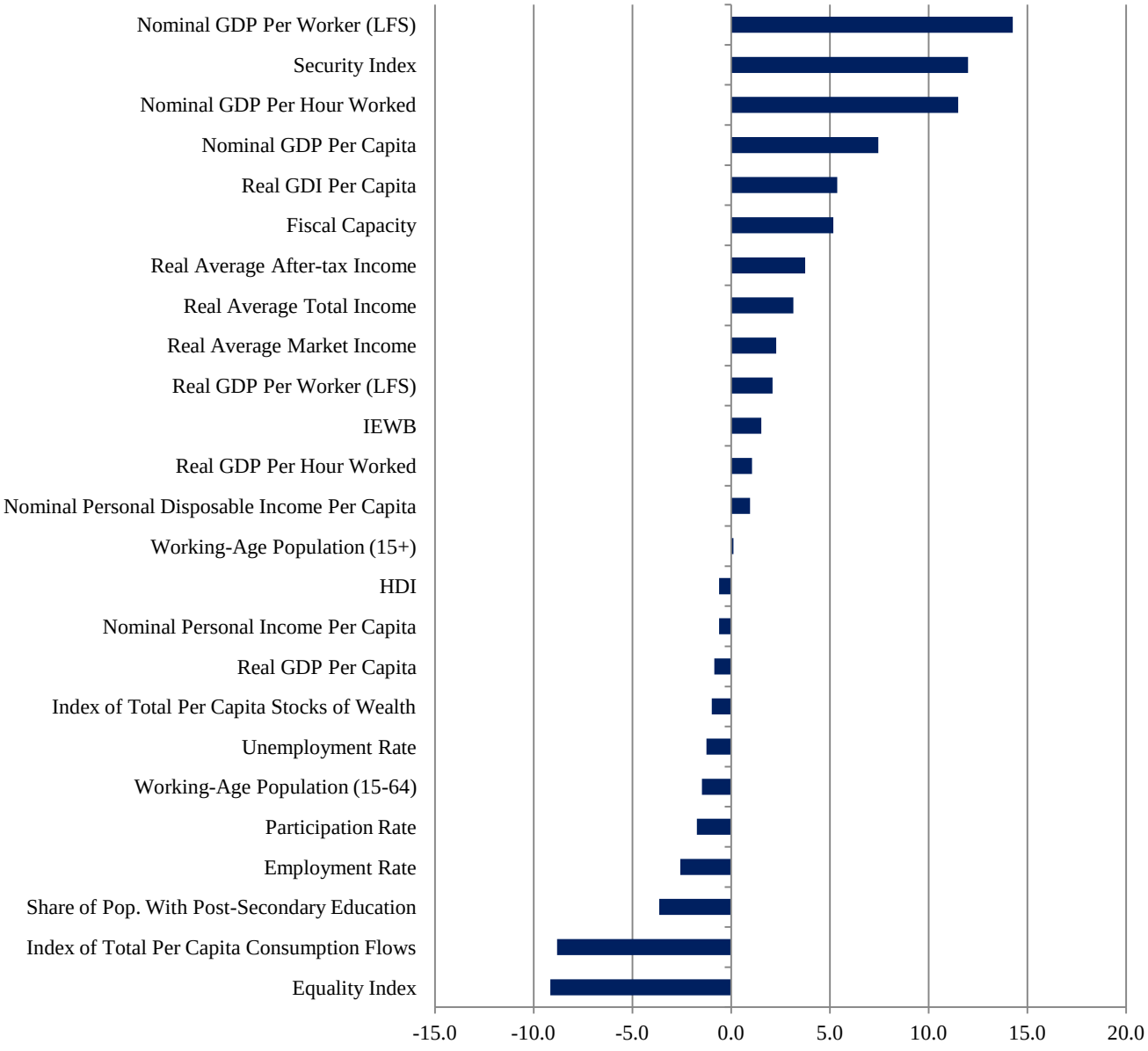
Table 3 summarizes the key findings of this section of the report. More specifically, this table provides three useful summary measures: (i) the CVs for the twenty-five economic variables studied in this report for 1990, 2000 and 2012; (ii) a comparison of the absolute change in their CVs between 1990 and 2012; and (iii) a ranking of these economic variables by their CVs for 1990, 2000 and 2012. Table 3 does not provide data before 1990 because it was the earliest year for which data were available for all economic variables.

Of the twenty-five economic variables studied, eleven saw their CVs fall between 1990 and 2012.[15] The CVs for nominal GDP per worker and nominal GDP per hour worked rose the most dramatically over this period (Chart 34). Real GDP per capita, generally considered the most important convergence indicator, experienced a slight fall of 0.9 percentage points in its CV over the 1990-2012 period. Notably, the equality index and the index of total per capita consumption flows represent the two greatest declines for the period. As a result, the aforementioned nominal variables each saw their rank, as measured by the absolute value of their CV, increase by nine and eight spots respectively, while the equality index and the index of total per capita consumption flows saw their rank fall by nine and ten spots respectively (Table 3). All other variables experienced less dramatic changes in both their rank and CVs in absolute terms. It is also interesting to note that the index of total per capita stocks of wealth, the unemployment rate and fiscal capacity – the top three ranked variables – retained their status in 1990, 2000 and

[15] The earliest year for which all twenty-five variables have available data was 1990.

2012. Similarly, our two measures of workforce participation, the participation rate, and the HDI remained in the bottom four or five for all time periods concerned.

Chart 34: *Absolute Change in Non-Weighted CVs, Percentage Points, 1990-2012*[16]



[16] Or the latest year for which data are available.

***Table 3**: Absolute Changes in CVs (Percentage Points) and Rankings of CVs (1=Highest), Select Economic Variables, 1990, 2000 and 2012*

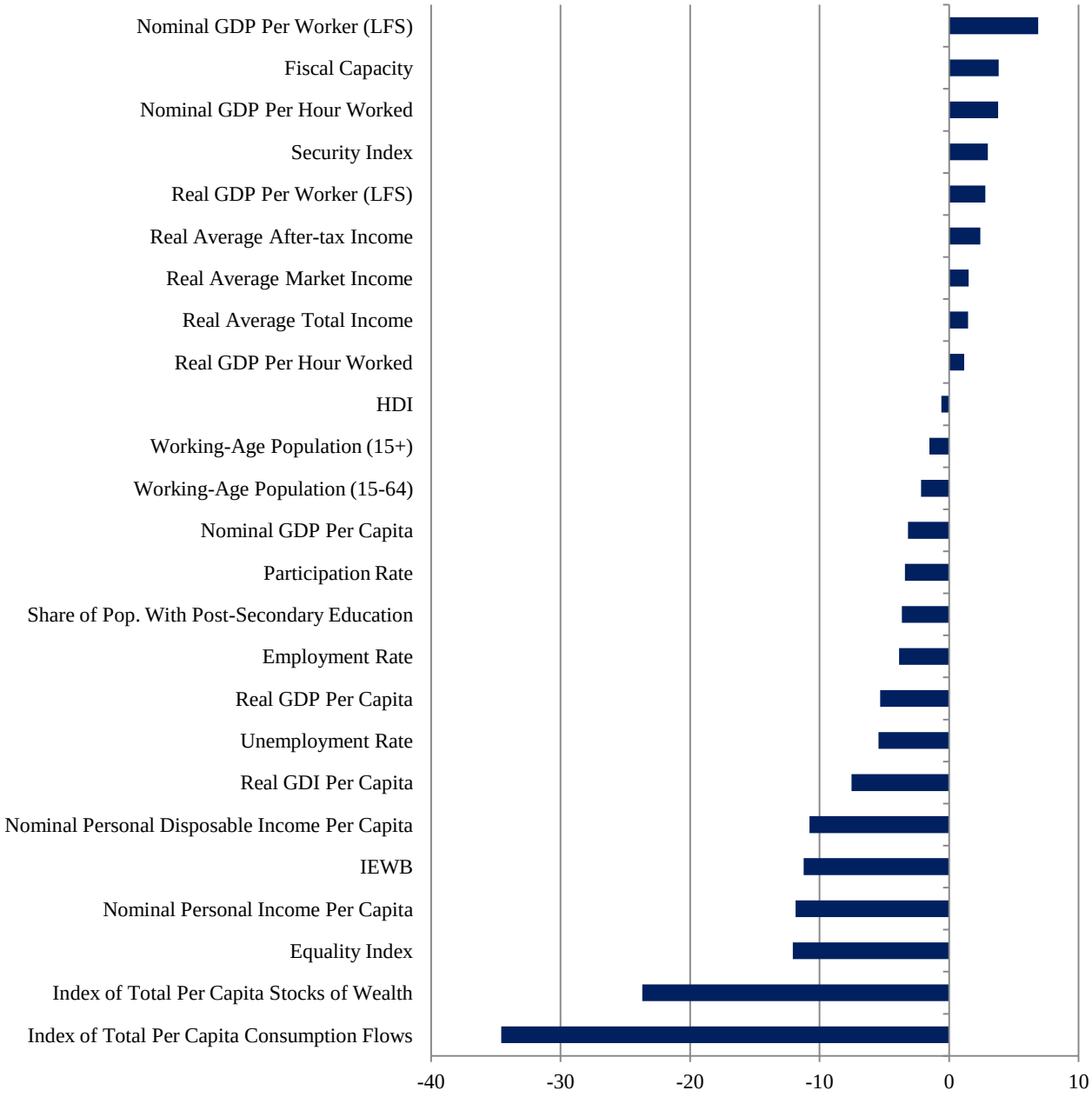
Economic Variable	1990		2000		2012		Δ90-12
	CV	Rank	CV	Rank	CV	Rank	CV
Index of Total Per Capita Stocks of Wealth	35.3	1	35.3	2	34.4	1	-1.0
Unemployment Rate	33.9	2	42.2	1	32.7	2	-1.2
Fiscal Capacity	25.1	3	32.6	3	30.2	3	5.2
Nominal GDP Per Capita	19.1	7	21.2	6	26.6	4	7.5
Real GDI Per Capita	20.3	6	22.4	5	25.7	5	5.4
Nominal GDP Per Worker (LFS)	10.5	15	14.7	12	24.8	6	14.3
Real GDP Per Capita	25.0	4	25.9	4	24.2	7	-0.9
Nominal GDP Per Hour Worked	10.4	16	14.0	13	21.9	8	11.5
Real GDP Per Worker (LFS)	18.8	8	20.8	7	20.9	9	2.1
Security Index	6.4	22	8.6	20	18.4	10	12.0
Real GDP Per Hour Worked	17.1	10	19.6	8	18.2	11	1.1
Average Market Income†	14.7	11	15.9	10	16.0	12	1.3
IEWB	11.6	13	12.3	14	13.1	13	1.5
Equality Index	22.0	5	17.0	9	12.9	14	-9.2
Real Average Total Income†	9.9	18	12.0	15	12.3	15	2.3
Nominal Personal Income Per Capita‡	12.7	12	11.2	16	12.1	16	-0.6
Nominal Personal Disposable Income Per Capita‡	10.9	14	9.9	19	11.8	17	1.0
Average After-tax Income†	8.5	20	10.9	17	11.6	18	3.1
Index of Total Per Capita Consumption Flows	17.6	9	14.8	11	8.8	19	-8.8
Employment Rate	10.0	17	9.9	18	7.4	20	-2.6
Share of Pop. With Post-Secondary Education	9.6	19	6.2	22	6.0	21	-3.6
Participation Rate	6.8	21	6.7	21	5.0	22	-1.7
Working-Age Population (15+)	1.9	25	1.7	25	2.0	23	0.1
Working-Age Population (15-64)	3.1	23	2.8	23	1.6	24	-1.5
HDI†	2.1	24	1.8	24	1.4	25	-0.7

Note: † denotes variables for which the 2012 figures are actually for 2010.

Chart 35 provides a longer time horizon on trends in convergence than Table 3 and Chart 34, providing the change in the CV for the twenty-five indicators for the longest period for which data are available. Three indicators go as far back as 1961. In contrast to overall trends since 1990 when just under half exhibited convergence for this longer period, nearly two thirds of the indicators (16 of 25) experienced a fall in their CV. The five indicators that exhibited divergence in the shorter period, but convergence in the longer period, were real GDI per capita, nominal GDP per capita, nominal personal disposable income per capita, the working-age (15 and over) share of population, and the Index of Economic Well-being. The five indicators that had the greatest increase in their CV after 1990 were also the five that had the largest increase in the longer period – namely, the three nominal productivity measures, the security index, and fiscal

capacity. The variable that had the greatest CV convergence in the shorter period, the index of total per capita consumption flows, also had the greatest convergence in the longer period.

***Chart 35**: Absolute Change in Non-Weighted CVs, Percentage Points, 1961[17] - 2012[18]*



[17] Or the earliest year for which data are available.
[18] Or the latest year for which data are available.

VI. Decomposing Provincial Disparities

We have heretofore examined indicators on an individual basis; in this section, we will focus on real and nominal GDP per capita, in light of their established links to standard of living and the level of provincial disparities with regard to these indicators.

A. Nominal GDP per Capita

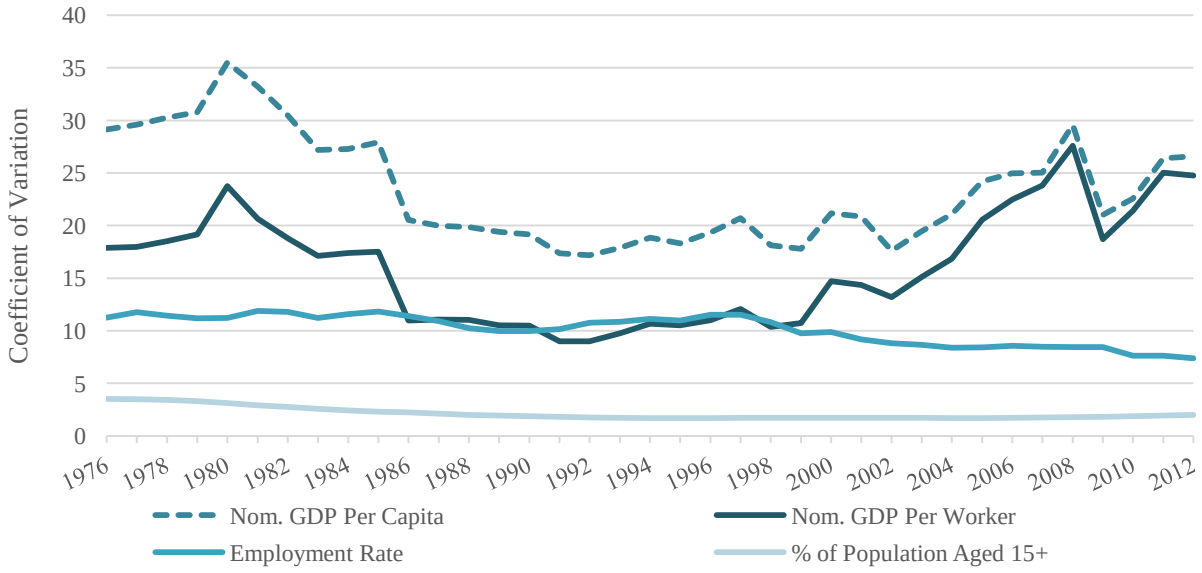
Trends in the CVs for nominal and real GDP per capita can be decomposed into four components: labour productivity; the employment rate; the average number of hours worked per person employed; and the share of the population that is of working age. We present a time series displaying these CV decompositions, where nominal GDP per capita is decomposed into nominal GDP per worker, the employment rate, and the share of the population aged 15 and over using the formula

$$\frac{GDP}{P_t} = \frac{GDP}{E} \cdot \frac{E}{P_w} \cdot \frac{P_w}{P_t}$$

where P_t is the total population, E is the level of employment and P_w is the working age population (aged 15 and over). Similarly, the CV for nominal GDP per capita can be decomposed (approximately) into the CV for nominal GDP per worker, the CV for the employment rate and the CV for the share of the population aged 15 and over by the formula described in Appendix II. More specifically, the CV for nominal GDP per capita is roughly equal to the sum of the CV for nominal GDP per worker, the CV for the employment rate and the CV for the share of the population that is of the working age population.

Provincial disparities in nominal GDP per worker drove trends in the CV for nominal GDP per capita between 1976 and 2012 (Chart 36). The CVs for these economic variables converged over this period because the level of provincial disparities fell steadily for both the employment rate and the share of the population aged 15 and over. More specifically, the difference between the CVs for nominal GDP per capita and nominal GDP per worker fell from 11.2 percentage points in 1976 to 1.8 percentage points in 2012. In addition, the CVs for the employment rate and the share of the population that is of the working age (over the age of 15) fell by 3.9 percentage points and 1.5 percentage points, respectively. It follows that the CV for nominal GDP per worker, which is greatly affected by commodity booms, has an increasingly important influence on provincial disparities in nominal GDP per capita, while labour market and demographic differences across the provinces have become less important.

***Chart 36**: Decomposition of the Non-weighted CVs for Nominal GDP per Capita, 1976-2012*



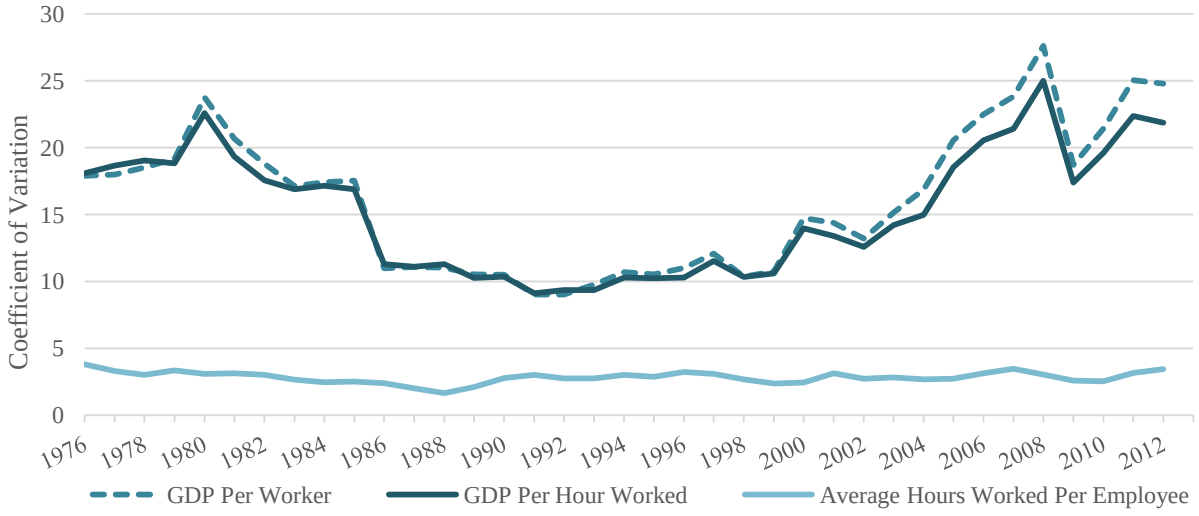
Given its importance, nominal GDP per worker can be further decomposed into nominal GDP per hour worked and the average hours worked per person employed by the formula:

$$\frac{GDP}{E} = \frac{GDP}{H} \cdot \frac{H}{E}$$

where *H* is the total number of hours worked and *E* is the level of employment. Similarly, the CV for nominal GDP per worker can be decomposed (approximately) into the CV for nominal GDP per hour worked and the CV for the average hours worked per person employed by the formula described in Appendix II. More specifically, the CV for nominal GDP per worker is roughly equal to the sum of the CV for nominal GDP per hour worked and the CV for the average hours worked per employee.

Chart 37 provides an approximate decomposition of the CV for nominal GDP per worker between 1976 and 2012. The most noteworthy observation is that the CVs for these variables are almost identical, because the CV for the average number of hours worked per employee has remained relatively stable between 2.0 per cent and 4.0 per cent over the 1976-2012 period. Thus, provincial disparities in the average number of hours worked per person employed did not have a significant impact on differences across the provinces in labour productivity as measured by GDP per worker.

***Chart 37**: Decomposition of the Non-weighted CVs for Nominal GDP per Worker, 1976-2012*



B. Real GDP per Capita

Dissimilar to nominal labour productivity, there was divergence across the provinces in terms of real labour productivity over the 1981-2012 period. However, there was also convergence in real GDP per capita over this period. To explain these trends, the CV for real GDP per capita is decomposed (approximately) into the CV for real GDP per worker, the CV for the employment rate and the CV for the share of the population aged 15 and over in the total population (Chart 38). According to our decomposition, there are two reasons for the convergence across the provinces in terms of real GDP per capita in the face of an unaltered CV for real GDP per worker: (i) a fall in the CV for the employment rate of 37.8 per cent; and (ii) a fall in the CV for the share of the population that is of the working age of 31.4 per cent. Thus, convergence in real GDP per capita was entirely due to labour market and demographic convergence given that there was divergence in real labour productivity. This differs from our decomposition of nominal GDP per worker, which indicated that convergence trends for nominal GDP per capita were driven by the evolution of nominal labour productivity disparities rather than labour market and demographic differences.

One can also examine differences between the CVs for real GDP per worker and real GDP per hour worked. Chart 39 presents an approximate decomposition of the CV for real GDP per worker into the CV for real GDP per hour worked and the CV for the average hours worked per employee; this decomposition demonstrates that the CVs for both real GDP per worker and real GDP per hour worked were extremely close between 1981 and 2012 due to the relative constancy of the CV for the average hours worked per worker.

***Chart 38**: Decomposition of the Non-weighted CVs for Real (2007 Chained Dollars) GDP per Capita, 1981-2012*

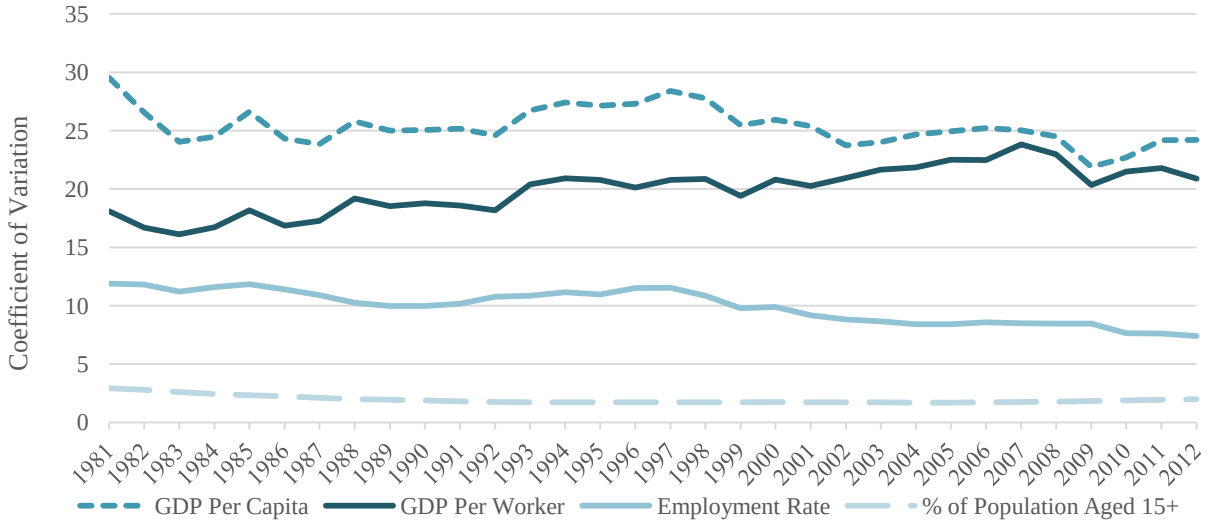
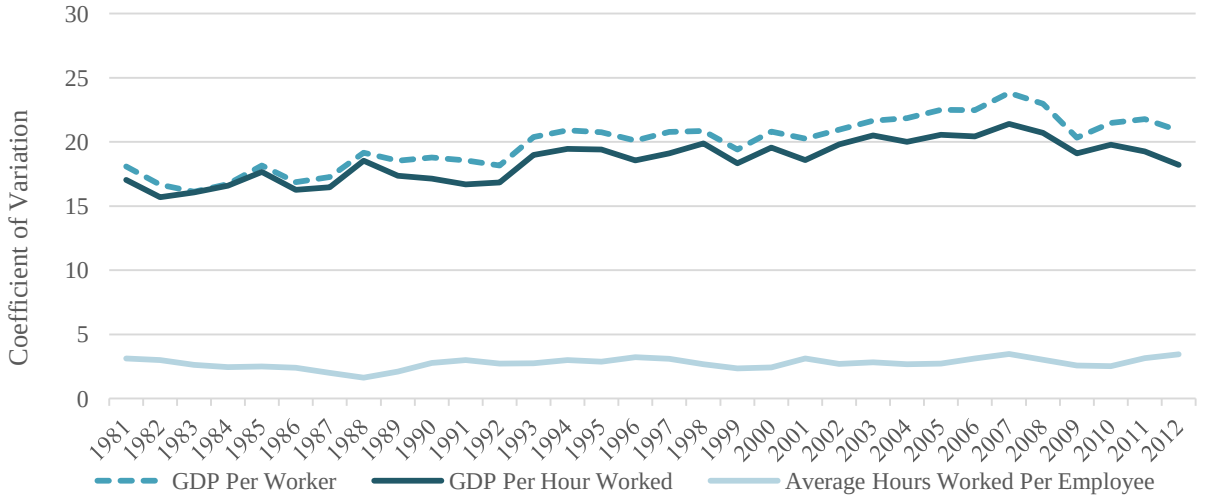


***Chart 39**: Decomposition of the Non-weighted CVs for Real (2007 Chained Dollars) GDP per Worker, 1981-2012*



Although differences across provinces in real labour productivity have remained constant over time, we will seek to explain why these differences persist by examining the drivers of provincial differences in real labour productivity (*i.e.*, real GDP per hour worked). According to neoclassical growth theory, labour productivity growth is determined by capital accumulation and technological progress (or total factor productivity). Capital accumulation includes both physical *and* human capital deepening. Although it is not easy to assess provincial disparities in terms of the level of total factor productivity (TFP), the CV for educational attainment and capital intensity is easily calculable.[19] As mentioned earlier, the CV for educational attainment

[19] Capital intensity is defined as real (2007 chained dollar) geometric (infinite) end-year net stock per total actual hours worked.

fell from 9.6 per cent in 1990 to 6.0 per cent in 2012. Dissimilarly, the CV for real (2007 chained dollar) capital intensity jumped between 1991 and 2012, rising by 8.5 percentage points (Chart 40). The CV exploded between 1981 and 1984 due to rapid real capital accumulation in Alberta in response to inflated oil prices (Chart 41). The CV began to rise in 1991, as the pace of capital intensity growth quickened in Alberta, Saskatchewan and (to a lesser extent) Newfoundland and Labrador. Theoretically, one would expect educational attainment convergence and capital intensity divergence to have conflicting effects on provincial differences in labour productivity; this may explain why the CV for real labour productivity was stable over the 1981-2010 period. Yet, more research is needed to determine the relative power of the conflicting effects of these economic variables on real labour productivity disparities.

***Chart 40**: Non-weighted CVs for Real (2007 Chained Dollars) Capital Intensity, 1976-2012*

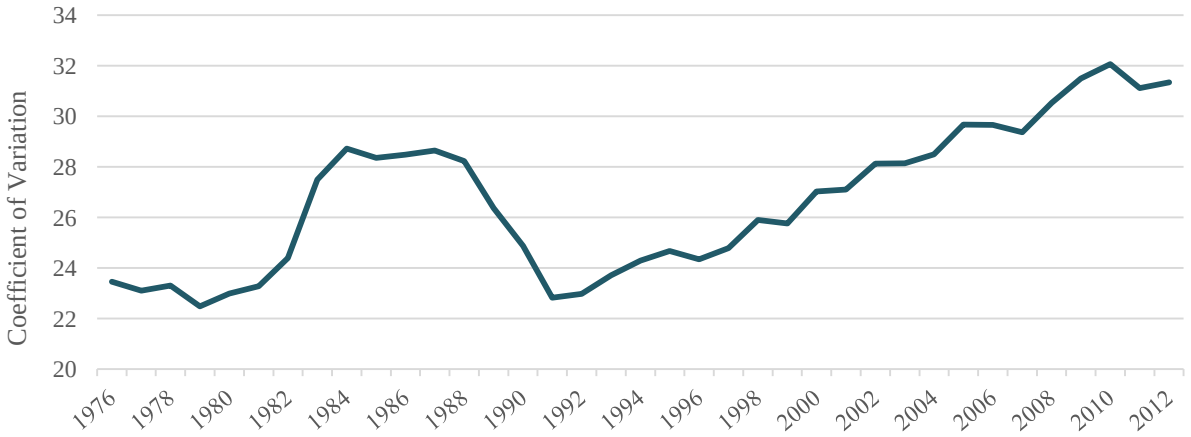
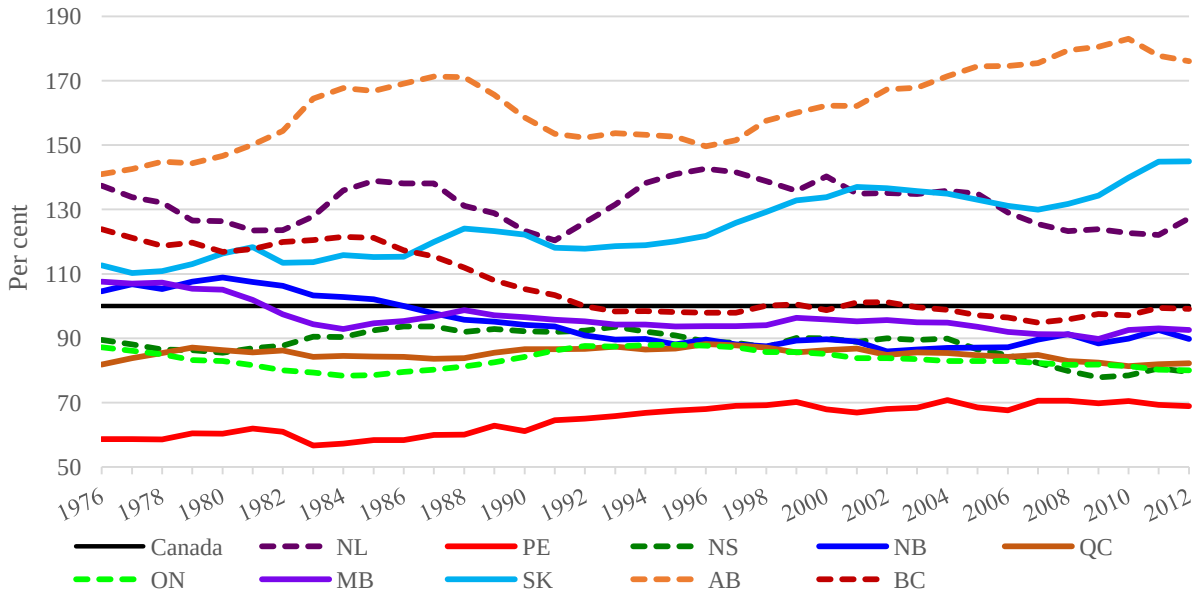


***Chart 41**: Real (2007 Chained Dollars) Capital Intensity for the Provinces Relative to the Weighted Canadian Average, per cent, Canada=100, 1976-2012*



In sum, convergence trends for nominal GDP per capita were driven by nominal labour productivity disparities while convergence trends for real GDP per capita were driven by disparities in the employment rate and the share of the population that is of working age. In fact, there has been significant convergence in the employment rate and the share of the population that is of working age. Convergence in these variables was strong enough to offset divergence in real GDP labour productivity and actually bring about real GDP per capita convergence. However, changes in the CV for nominal labour productivity were much larger than changes in the CVs for the employment rate and the share of the population that is of working age. As a result, trends in the CV for nominal GDP per capita were almost completely driven by changes in the CV for nominal labour productivity, and the provinces experienced nominal GDP per capita divergence. Commodity booms are a key factor behind trends in the CVs for nominal GDP per capita and nominal labour productivity.

VII. The Role of Commodity Booms

This section of the report examines the role of commodity booms in determining convergence and divergence trends for nominal GDP per capita and fiscal capacity. Theoretically, foreign demand-induced increases in the price of crude oil affect the Canadian economy through multiple mechanisms. First, a rise in crude oil prices increases the value of the current amount of crude oil output, thereby increasing nominal GDP and incomes in the oil-producing provinces. Second, high crude oil prices act as a signal to firms to undertake exploration activities as well as to expand output and employment at existing operations, thereby further increasing nominal GDP and incomes in the oil-producing provinces. Ultimately, foreign demand induces oil-producers to spend heavily in oil-producing provinces and these provinces enter a commodity boom.

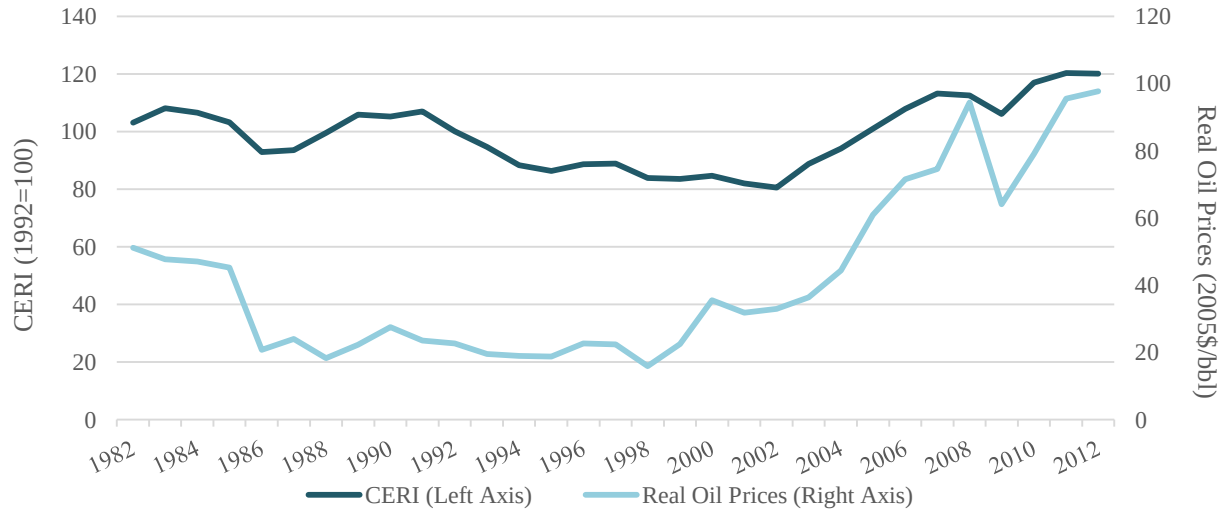
Commodity booms have been associated with an appreciation of the Canadian dollar because they increase the demand for domestic output relative to the demand for foreign output; this occurs for two reasons: (i) commodity booms are driven by an increase in foreign demand for domestic crude oil output in the first place; and (ii) commodity booms' positive effect on incomes in the oil-producing provinces increase the domestic demand for domestic output. As a result, there is a real (and therefore nominal) appreciation of the Canadian dollar, which harms other export-oriented sectors, particularly the manufacturing sector, as Canadian exports become more expensive to foreigners. In addition, capital and labour flow toward into the booming provinces from the other provinces in order to receive a higher return. The side effects of regional commodity booms exacerbate income disparities in the Canadian economy by weakening certain provinces while the oil-producing provinces prosper.

The strong correlation between real oil prices and the Canadian dollar effective (or trade-weighted) exchange rate index (CERI) demonstrates the effect of a commodity boom on the exchange rate (38). The Canadian dollar, as measured by CERI, appreciated 39.7 per cent between 2002 and 2008, driven by a 186.4 per cent increase in real oil prices. Overall, total employment increased by 11.7 per cent in Canada during the 2002-2008 period. During this period, employment in mining, quarrying, and oil and gas extraction (NAICS code 21) increased by 36.4 per cent, while manufacturing (NAICS code 31) employment fell by 14.3 per cent (or 328.3 thousand workers).

The relationship between a commodity boom and the decline of the manufacturing sector is often referred to as the Dutch disease. More specifically, the Dutch disease refers to the deterioration of manufacturing employment through a real appreciation of the domestic currency driven by rising export revenues in the resource sector. This relationship has hit Ontario and Quebec, the manufacturing hubs of Canada, the hardest. Of the 328.3 thousand manufacturing jobs that disappeared between 2002 and 2008, 60.7 per cent were lost in Ontario and 32.4 per

cent were lost in Quebec. Manufacturing employment fell in these provinces by 18.2 per cent and 16.4 per cent, respectively. It is important to note, however, that the CERI is largely driven by the Canada-U.S. dollar exchange rate (and therefore the strength of the U.S. dollar), as the United States is by far Canada's biggest trading partner. Of course, the appreciation of the Canadian dollar is not the only reason for the decline in Canadian manufacturing employment, as structural changes in the world economy driven by globalization and technological change are also responsible.

***Chart 42**: Canadian Dollar Effective Exchange Rate Index (CERI) (1992=100) and Real Oil Prices (2005 U.S. Dollars per Barrel), 1982-2012*



Note: "Real oil prices" are the average spot prices (2005$/bbl) for crude oil based on WTI, Dubai, and Brent.
Source: (i) World Bank, DataBank, Global Economic Monitor (GEM) Commodities; and (ii) Bank of Canada. CANSIM Table 176-0064.

Beine et al. (2012) attempt to separate the Canadian and U.S. components of observed exchange rates in order to estimate the impact of each component on manufacturing employment in Canada over the 2002-2008 period. They argue that much of the appreciation in the Canadian dollar between 2002 and 2008 was due the weakness in the U.S. dollar. More specifically, Beine et al. (2012) assert that 58 per cent of the appreciation of the Canada-U.S. bilateral exchange rate between 2002 and 2008 was due to the weakness of the U.S. component, while only 42 per cent was due to the strength of the Canadian component (which they argue was caused by the Dutch disease). Based on this approach, they estimate that 33 to 39 per cent of the manufacturing employment loss was attributable to the strength of the Canadian component (and therefore the Dutch disease) and 61-67 per cent was attributable to the U.S. component.

The effect of the Dutch disease on manufacturing employment in Canada is subject to heated political debate. While wading through the morass of partisan opinion, it is important to note the following: (i) the commodity-boom over the 2002-2008 period has led to massive improvement in living standards and fiscal capacity in the provinces experiencing commodity booms, namely, Alberta, Saskatchewan and Newfoundland and Labrador; (ii) these commodity

booms can have negative side effects (of debatable magnitude) on the rest of Canada related to the appreciation of the Canadian dollar; (iii) these commodity booms also have positive side-effects on the rest of Canada, such as reallocating physical and human assets across industries (which can enhance productivity) and increasing domestic demand in the oil-producing provinces (which benefits all provinces via interprovincial trade); (iv) the resource reallocation that occurs during commodity booms may have harmful effects after they end, because it will weaken other sectors of the economy; and (v) commodity booms, which are driven by commodity prices, can quickly and sharply disappear (because commodity prices are volatile), which is particularly bad for undiversified, resource-dependant countries. For the purpose of this report, it is important to emphasize that both (i) and (ii) imply that commodity booms will lead to divergence across the provinces in living standards and fiscal capacity. More research is needed to quantify the relative strength of the aforementioned consequences of commodity booms in Canada, particularly the potential positive spillover effects on the non-booming provinces via interregional trade and the potential negative long-run consequences of human and physical capital reallocation.

Generally speaking, trends in fiscal capacity are primarily determined by two factors: (i) changes in the level of economic activity and income; and (ii) changes in the provincial tax rates. By performing a simple ordinary least squares (OLS) regression of nominal GDP per capita growth (coded as "NGDP") on fiscal capacity growth (coded as "FC") using data for ten provinces over forty years, we obtained a statistically significant beta coefficient for NGDP of 0.8813 and an R^2 of 0.6044 (Figure 2). This beta coefficient predicts that a 1.0 percentage point increase in the nominal GDP per capita growth rate would result in a 0.9 percentage point increase in the fiscal capacity growth rate. This regression, which was based on annual growth rates for all ten provinces for each year between 1972 and 2012, demonstrates the consequence of the evolution in nominal GDP per capita for fiscal capacity. More econometric analysis using provincial tax data is needed to measure the effect of changing tax rates on fiscal capacity.

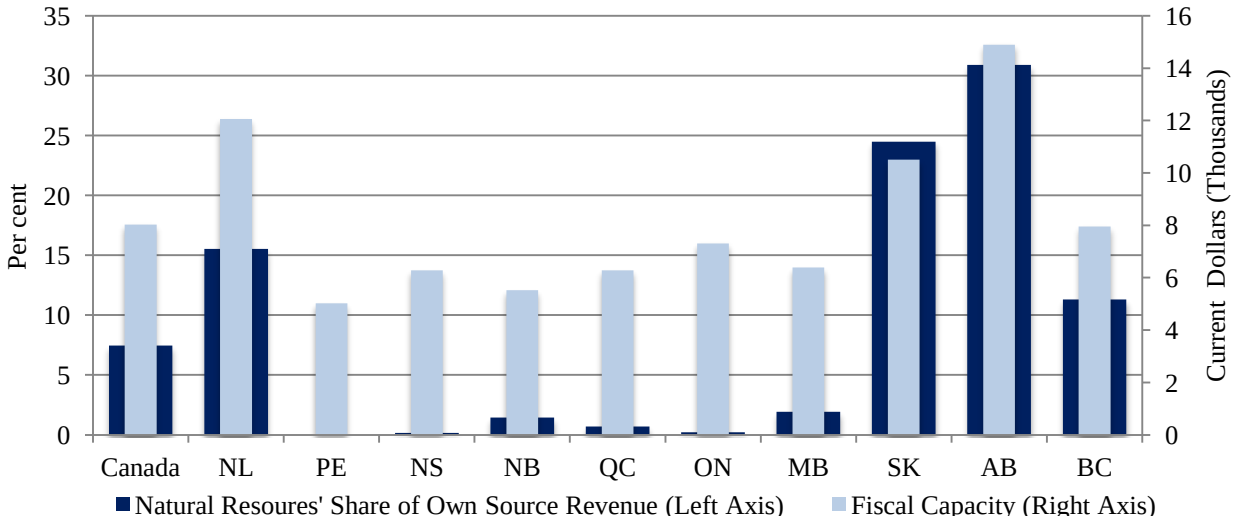
Figure 2: *Regression Results*

FC	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NGDP	0.8813907	0.035742	24.66	0.000	0.8111241	0.9516574
_cons	0.0069845	0.0033726	2.07	0.039	0.0003541	0.0136149
Number of obs.	400					

The positive impact of favourable terms of trade and commodity booms on nominal GDP per capita in the oil-producing provinces also applies to fiscal capacity. Commodity booms affect provincial fiscal capacity both indirectly and directly. With regard to the former, commodity booms indirectly raise general government revenues (*e.g.*, revenues from personal income tax, consumption tax and corporate income tax) by boosting incomes in affected provinces. With regard to the latter, commodity booms directly raise revenues from natural resource taxes,

licenses and royalties (hereinafter collectively referred to as "natural resource rents"). In Canada's case, the direct effect was very significant; this is demonstrated by the fact that the provinces with the highest levels of fiscal capacity also had the largest shares of their fiscal capacity attributable to natural resource rents (Chart 43). For example, in Alberta, which had the greatest fiscal capacity among the provinces in 2008, natural resource rents accounted for 30.9 per cent of its own source revenue.[20]

***Chart 43**: Fiscal Capacity, Current Dollars, and the Share of Natural Resource Taxes, Licences and Royalties in Total Provincial Own Source Revenue, per cent, 2008*



Source: Department of Finance (Fiscal Capacity) and Statistics Canada, CANSIM Table 385-0002 (Natural Resources' Share of Own Source Revenue)

As discussed earlier, a commodity boom can have both positive and negative spillover effects on the level of nominal GDP in provinces not directly benefiting from it. These spillover effects also influence the level of fiscal capacity in those provinces. Another positive consequence of inflated fiscal capacity in the oil-producing provinces is related to equalization payments. Since the growth of the equalization envelope is linked to nominal GDP growth (which is boosted by commodity booms), other provinces are able to qualify for more equalization payments, which have the purpose of aligning fiscal capacity across the provinces; this occurs despite the fact that some natural revenues are excluded from the calculation of fiscal capacity for the purpose of equalization.

[20] Revenues from natural resource royalties (a sort of investment income) were much higher than revenues from natural resource licenses and taxes for all of the provinces.

VIII. Factors Affecting Future Trends in Provincial Disparities

In this section, the likelihood of future convergence, or divergence, in living standards across provincial economies in Canada will be explored. To do this, we will discuss likely future developments for the main drivers of income convergence in Canada. More specifically, we will examine the probability that high crude oil prices will sustain provincial disparities in nominal variables, as well as the impact of potential changes in labour productivity, labour market participation and demographics on these disparities. The ultimate purpose of this exercise is to provide a simple analytical framework for forecasting provincial income disparities in Canada, as well as a general outlook for these disparities.

A. Analytical Framework

Nominal GDP per capita – the most important economic variable examined in this report – is the most relevant measure of living standards in the context of provincial comparisons because it is directly related to income levels and a government's ability to provide various amenities. In reality, nominal GDP per capita is only one dimension of living standards or well-being, which is affected by many factors including inequality, pollution, the quality of public services and institutions, economic security, and climate. Composite measures of well-being, such as the IEWB, are more useful for those interested in performing a more comprehensive analysis of the evolution of living standards. Nevertheless, provincial disparities in nominal GDP per capita are a useful proxy for provincial disparities in living standards in Canada. As previously demonstrated, provincial disparities in nominal GDP per capita are greatly affected by interactions between crude oil prices, the terms of trade and commodity booms. Most significantly, high crude oil prices have improved the terms of trade for Canada's oil-producing provinces, resulting in rising provincial disparities in nominal GDP per capita. In addition, high crude oil prices have important economic consequences: high energy prices, which result in a favourable terms of trade for oil-producing provinces, can have a negative impact on economic diversification in those provinces, making them vulnerable to unfavourable changes in the terms of trade; and high crude oil prices can make the exports of other provinces uncompetitive by increasing the real exchange rate. This section will examine the likelihood of real crude oil prices remaining at contemporary levels, as they can sustain above average living standards in oil-producing provinces.

It is not appropriate to use nominal GDP data when measuring the *growth* of a region's GDP per capita and labour productivity over time.[21] Unlike nominal GDP, which accounts for

[21] It is important to note that labour productivity can refer to both GDP per worker and GDP per hour worked. An effort will be made to specify which of these economic variables is being examined throughout this section. Labour productivity levels can be expressed in both real and nominal terms. Labour productivity growth, however, can only be expressed in real terms. Changes in nominal productivity levels due to relative prices changes are not considered productivity changes in the standard sense.

changes in the price and the quantity of output, real GDP only measures changes in the quantity of output by factoring out price effects. Consequently, real GDP growth is a better measure of economic growth than nominal GDP growth. However, nominal GDP is more useful when comparing *levels* of GDP per capita and labour productivity across the provinces, because nominal GDP is a better measure of a region's purchasing power than real GDP since it captures changes in relative prices. Therefore, provincial living standards and labour productivity disparities are more meaningful in nominal terms than in real terms.

As demonstrated by the decomposition analysis in the previous section, trends toward or away from convergence in nominal GDP per capita are driven by trends in provincial disparities for nominal GDP per worker and, to a lesser degree, the employment rate and the share of the total population that is of working age. To hypothesize what will happen to provincial income disparities, it is important to understand its drivers and their determinants.

First, provincial disparities in nominal GDP per worker[22] – a measure of labour productivity – are greatly affected by terms of trade and commodity booms in the short- and medium-run due to their positive effect on nominal GDP per worker in oil-producing provinces; two examples of this include the early 1980s and the 2000s. Among the three drivers of nominal GDP per capita disparities, nominal labour productivity was by far the most important determinant of nominal GDP per capita over the entire 1976-2012 period, becoming even more important as the period progressed (see Chart 36).

Even though favourable terms of trade can increase a region's *nominal* labour productivity in the short- and medium-run, it is widely accepted that *real* labour productivity growth determines a region's living standards in the long run. Therefore, provincial disparities in real GDP per capita will normally be determined by real labour productivity growth in the long-run rather than commodity booms and favourable terms of trade. According to neoclassical growth theory, real labour productivity growth is driven by capital deepening, the expansion of human capital, and total factor productivity growth (which measures the change in the efficiency of transforming inputs into output and is the result of both embodied technological progress and increasing economic efficiency). There is disagreement among economists concerning the relative importance of these factors, but all economists recognize that each of these factors contribute to real labour productivity growth. Nonetheless, it is important to recognise that relative prices favourable for certain provinces (*e.g.,* the oil-producing provinces) can sustain high income disparities among the provinces for very long periods of time.

[22] Nominal GDP per worker is driven by nominal GDP per hour worked and the average number of hours worked per worker. However, there is no reason to analyze trends below the nominal GDP per worker level in this section, because the CVs for nominal GDP per worker and nominal GDP per hour worked experienced very similar trends and the CV for the average number of hours worked per worker has remained relatively stable and low.

Second, differences between the Canadian provinces in the employment rate directly affect nominal GDP per capita disparities, as it determines the share of the working age population that is producing output for the entire population. Generally speaking, provincial disparities in the employment rate have fallen significantly between 1976 and 2012, which implies that differences in the employment rate account for a shrinking share of nominal GDP per capita disparities.

Third, provincial inequalities in the share of the total population that is of working age also partially determines nominal GDP per capita disparities across the Canadian provinces. However, this driver accounts for the smallest portion of nominal GDP per capita disparities. In addition, provincial disparities in the working age population's share of the total population fell between 1976 and 2012. In fact, among all of the drivers of nominal GDP per capita disparities, only nominal GDP per worker disparities increased between 1976 and 2012. Between 1976 and 2012, the CV for nominal GDP per worker increased by 6.9 percentage points, while the CV for the employment rate and the share of the population aged 15 and over fell by 3.9 percentage points and 1.5 percentage points, respectively.

For the purpose of this section, the future prospects for differences between the provinces in fiscal capacity are considered to be derived from trends in nominal GDP per capita disparities. Trends in fiscal capacity are necessarily highly correlated with trends in nominal GDP per capita, as nominal GDP per capita represents, generally speaking, what is available to be taxed.

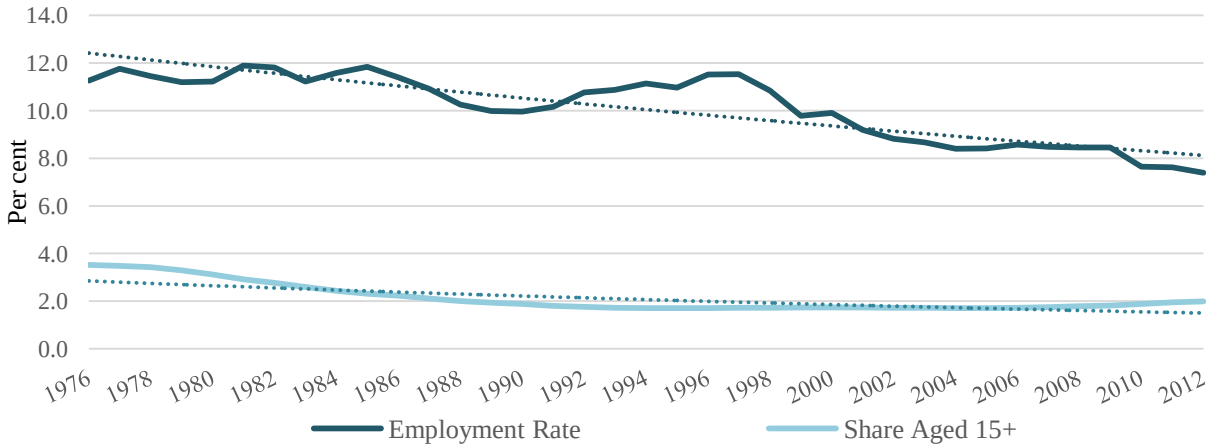
B. Demographics, Labour Market Participation and Convergence

As previously shown, the effect of demographic structures and labour market participation on provincial income disparities has diminished, because there has been convergence in the employment rate and the share of population aged 15 and over (as previously noted). This is demonstrated by falling CVs for the employment rate and the share of the population aged 15 and over between 1976 and 2012 (Chart 44). With a CV of 2.0 per cent in 2012, provincial disparities in the proportion of the population that is of working age (over 15 years old) are particularly negligible. Provincial disparities in the employment rate are also low (with a CV of 7.4 per cent in 2012) compared to nominal GDP per worker disparities (with a CV of 24.8 per cent in 2012), but they remain an important element of nominal GDP per capita disparities.

Based on the historic trends in the CVs for employment rate and the share of the population of the working age, we can form a basis for forward-looking scenarios. In Chart 44, the trend line for the CV for the share of the population of working age suggests that provincial disparities for this driver have levelled off and are not likely to impact future trends in income convergence. In addition, there is little room for further demographic convergence. However, there appears to be more room for convergence in the employment rate, which is likely to

continue to have a positive effect on convergence in nominal GDP per capita. Further research is needed to identify the factors behind these convergence trends in order to assess whether they are likely to continue. Nonetheless, it is important to remember that provincial nominal labour productivity disparities are (and will continue to be) a significantly more important factor behind trends toward or away from convergence in nominal GDP per capita.

Chart 44: *Trends in CVs for the Employment Rate and the Share of Population Aged 15 and Over, 1976-2012*



C. Oil Prices and Convergence

Historically, provincial disparities in nominal labour productivity (and, as a result, nominal GDP per capita) have been driven by crude oil prices, particularly in the early 1980s and the 2000s when ballooning crude oil prices led to significant divergence among provincial economies. Therefore, the most important question posed by this report is whether elevated crude oil prices are likely to sustain provincial income disparities. In an attempt to answer this question, this section will discuss the current state of the Canadian oil sector as well as experts' outlooks concerning global supply conditions, global demand conditions and crude oil prices.

According to a long-term outlook for the Canadian crude oil sector published by Canadian Association of Petroleum Producers (CAPP) (2013), Canadian oil production will continue to grow between 2012 and 2030 driven by the continued development of the Western Canadian oil sands. The CAPP's supply projections are primarily based on interviews with and surveys of Canadian oil producers, and its demand projections are developed using surveys of Canadian and U.S. oil refiners as well as U.S. Energy Information Administration (EIA) data. Given the uncertainties involved, the CAPP does not make crude oil price projections.

CAPP (2013: i) estimates that total Canadian crude oil production will increase from 3.24 million barrels per day (b/d) in 2012 to 6.74 million b/d in 2030; this will be driven by an increase in oil sands production from 1.80 million b/d in 2012 to 5.21 million b/d in 2030.

Conventional crude oil production in Western Canada, which has benefited from the emergence of fracking technology, is projected to merely rise from 1.25 million b/d in 2012 to 1.44 million b/d in 2030 (CAPP, 2013: i). For all intents and purposes, oil sands production is isolated to Alberta. Western Canadian conventional crude oil production, however, takes place in Alberta (at 44.5 per cent of the total in 2012) and Saskatchewan (at 37.6 per cent of the total in 2012), and, to a lesser extent, British Columbia, Manitoba and the Northwest Territories.

In Eastern Canada, on the other hand, oil production is expected to increase from 0.20 million b/d in 2012 to 0.25 million b/d in 2020 before falling to 0.09 million b/d in 2030 (CAPP, 2013: i). The vast majority of Eastern Canada's crude oil production is sourced from three oil projects off the shores of Newfoundland and Labrador – namely, Hibernia, Terra Nova and White Rose. Hebron, the fourth major offshore project in Eastern Canada, is expected to commence production in late 2017, which will compensate for declining production at the three older projects (CAPP, 2013: iii).

"At an aggregate level," according to CAPP (2013: 19), "demand for oil in North America is either flat or even declining but the demand for crude oil and petroleum products in the Asia-Pacific countries comprises the fastest growing in the world." Most importantly, India and China, whose combined oil imports are forecast to increase from 9.2 million b/d in 2012 to 15.7 million b/d in 2030, is potentially a huge source of demand for Canadian oil, provided that Canadian oil producers are able to access that market (CAPP, 2013: iii).

According to the International Energy Agency (IEA) (2013), global oil demand is forecast to increase by 6.9 million b/d between 2012 and 2018. While oil demand is forecast to fall in Organisation for Economic Co-operation and Development (OECD) economies during this period (-250 thousand b/d per annum), oil demand growth is expected to be strong in non-OECD economies led by Asia (700 thousand b/d per annum), the Middle East (260 thousand b/d per annum), Africa (160 thousand b/d per annum) and Latin America (150 thousand b/d per annum) (IEA, 2013: 19). Over the 2012-2018 period, global supply capacity is expected to increase by 8.4 million b/d, 1.5 million b/d more than global oil demand. Of this total, almost 40 per cent is forecast to come from North American light, tight oil (LTO) production and Canadian oil sands production (IEA, 2013: 41).

Given that the IEA projects that global supply capacity growth will outstrip projected global demand growth, crude oil prices are likely to fall, *ceteris paribus*. However, crude oil prices are extremely hard to predict due to coordination among Organization of Petroleum Exporting Countries (OPEC) members and the frequency of global supply and demand shocks due to conflict, embargoes, natural disasters, and so on. See Box 2 for further discussion of crude oil prices.

Box 2 : What Determines Crude Oil Spot Prices? [1]

Generally speaking, the market for crude oil is global. Multiple crude oil prices exist due to the presence of many crude oil streams and refinery hubs (Chart 45). Nevertheless, these prices follow highly similar trends, and differences between these prices are minimal due to arbitrage. Despite this, persistent price differentials do occur and are the result of differential oil quality. Factors other than quality have temporary impacts on price differentials. Lack of pipeline capacity has been affecting the relative price of WTI and WCS for the last few years (see Box 3).

Essentially, crude oil prices are determined by *current* and *expected future* global supply and global demand. Over time, supply and demand respond to *actual* and *expected* price movements, "with considerable complexity in the evolution of underlying supply and demand expectations" (U.S. Energy Information Administration, 2013: 6). According to the U.S. Energy Information Administration (EIA) (2013: 6), the basic drivers of crude-oil prices are represented by three broad categories: the economics of non-OPEC supply; OPEC investment and production decisions; and world demand for petroleum and other liquids.

On the supply side, according to the IEA, there are Organization of the Petroleum Exporting Countries (OPEC) members and non-OPEC oil producers. OPEC coordinates its members' crude oil output by setting production targets; the ultimate purpose of this behaviour is to maintain crude oil prices at an optimal level. Therefore, a reduction in OPEC production targets generally leads to rising global crude oil prices, *ceteris paribus*. OPEC is able to do this because of its market share: its members produce about 40 percent of the world's crude oil and account for about 60 percent of the world's crude oil exports. Nonetheless, OPEC members do not always follow their production targets, which can have a significant impact on crude oil prices. Unlike OPEC members, non-OPEC oil producers are not subject to coordination and are largely seen as price takers. Therefore, non-OPEC oil producers by and large "produce at or near full capacity and so have little spare capacity," in stark contrast with OPEC members. Similar to a reduction in OPEC production targets, a decrease in non-OPEC supply raises prices, *ceteris paribus*, by decreasing global supply; this would also put pressure on OPEC to raise production targets to stabilize crude oil prices.

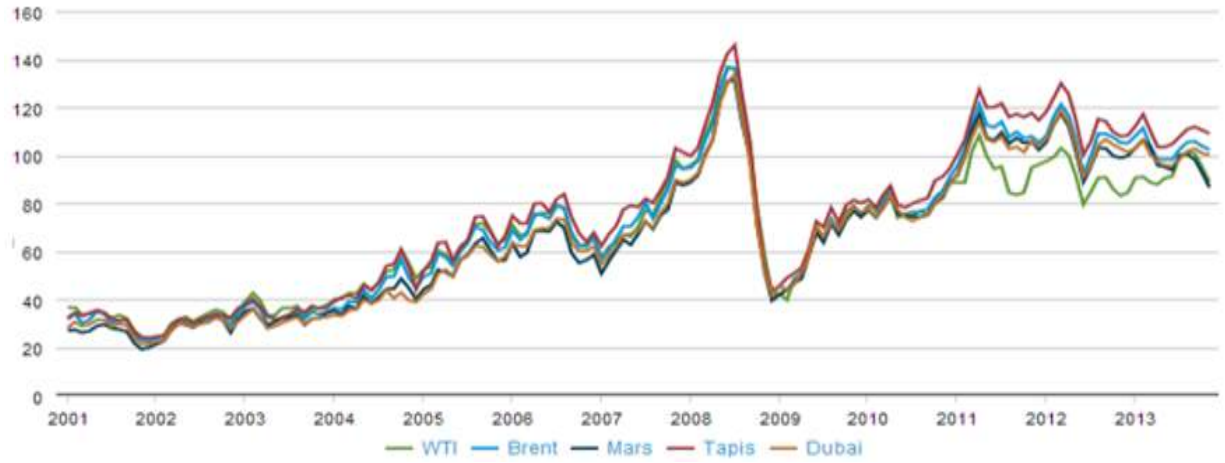
On the demand side, according to the IEA, there are OECD (or developed) and non-OECD (or developing) countries. Between 2000 and 2010, oil consumption rose in non-OECD countries by more than 40 per cent while it fell in OECD countries. The most important drivers of global demand growth are population growth and income growth.

Expectations about the future of supply and demand also affect crude oil prices. For example, OPEC adjusts its members' production targets based on the projected growth of global demand and non-OPEC supply. In addition, lowered expectations for non-OPEC production between 2005 and 2008 also contributed to upward pressure on crude oil prices.

As demonstrated by Chart 45, crude oil prices are extremely volatile; this is largely the consequence of the inelasticity of supply and demand in the short-run and the frequency of shocks. For example, booming global demand for crude oil between 2003 and 2008 was not matched by global supply (as it is quite inelastic in the short-run), which sent crude oil price skyrocketing. Oil production in non-OPEC countries did not keep up with expectations, putting pressure on OPEC to utilize its spare capacity to maintain crude oil prices. However, OPEC's spare capacity reached historic lows (at about 3 per cent of global supply during this period), preventing it matching global demand growth. Skyrocketing oil prices also had the effect of spurring investment in new oil fields and refineries in OPEC and non-OPEC countries, such as Canada's oil sands and North American light, tight oil, which partially explains the relative weakness of crude oil prices since 2011.

[1] The following source was consulted to write this box: U.S. Energy Information Administration, "What Drives Crude Oil Prices?" http://www.eia.gov/finance/markets/supply-opec.cfm.

***Chart 45**: Trends in Crude Oil Spot Prices, U.S. Dollars per Barrel, 2001-2013*

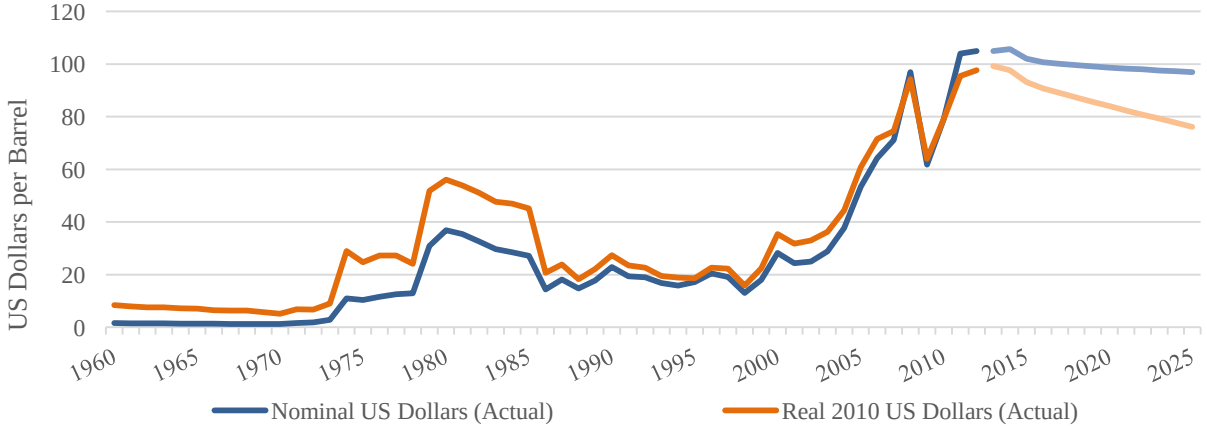


Source: U.S. Energy Information Administration

While the IEA (2013) did not provide a forecast for crude oil prices, their analysis is based on certain assumptions about the future of Brent crude oil spot prices (the international marker). More specifically, IEA (2013: 8, 18) assumed that Brent crude oil spot prices would fall from around US$109 per barrel in 2012 to US$93 in 2018, a decrease of 17.2 per cent. This is due to the expectation that global supply growth (projected at 8.4 million b/d) will surpass global demand growth (projected at 6.9 million b/d).

Charts 46 and 47 provide recent short- and medium-term projections for crude oil spot prices. According to World Bank (2013), average nominal crude oil spot prices will fall by 7.6 per cent between 2013 and 2025, while average real crude oil spot prices fall by 23.2 per cent (Chart 46). Though for a longer time period, the outlook of the World Bank (2013) is consistent with the assumption about the Brent rate made by IEA (2013).

***Chart 46**: World Bank's Crude Oil Spot Price Projections, US Dollars per Barrel, 1960-2025*

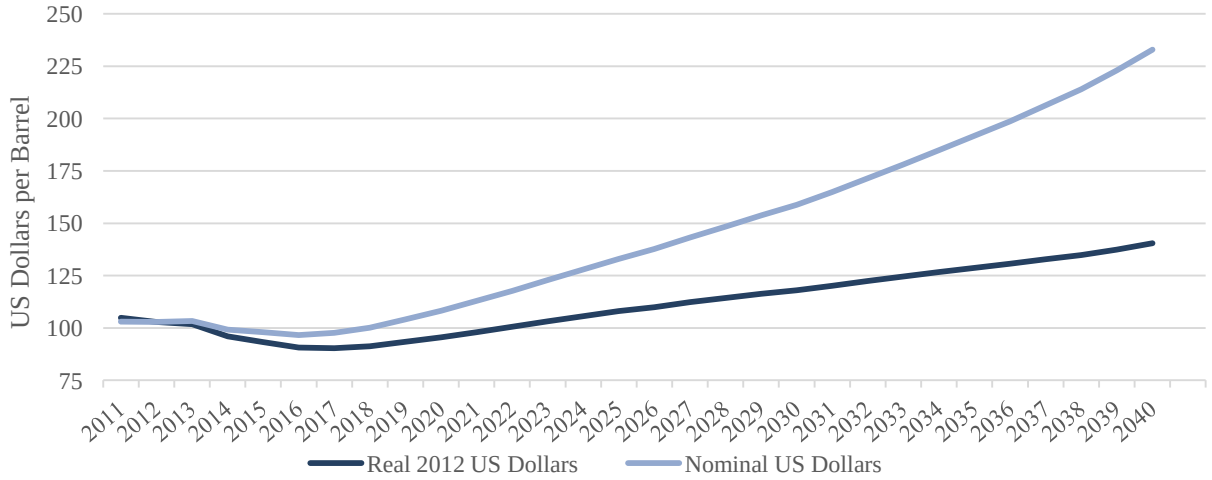


Note: Crude oil prices are the average spot price of Brent, Dubai and West Texas Intermediate, equally weighed.
Sources: World Bank, "World Bank Commodities Price Forecast" and DataBank

The most recent forecast, provided by the U.S. Energy Information Administration (EIA)'s *Annual Energy Outlook* for 2014, tells a different story (Chart 47). According to the EIA (2013)'s reference case projections, average real and nominal crude oil spot prices will fall by 3.1 per cent and 10.4 per cent (respectively) between 2013 and 2018; however, EIA (2013) expects average real and nominal crude oil spot prices to be 28.7 per cent and 6.0 per cent (respectively) higher than their 2013 levels by 2025, and 125.3 per cent and 37.9 per cent (respectively) higher than their 2013 levels by 2040. EIA (2013: 6) projects that crude oil prices will rise significantly in the long-run because "growing demand leads to the development of more costly resources."

These forecasts indicate that while it is generally accepted that crude oil prices will remain weak in the short- and medium-term, there is little agreement concerning their long-run trajectory.[23] Uncertainty still exists in the short- and medium-term because no one knows how OPEC will react to the evolution of global demand or the rapid growth of supply in non-OPEC countries, particularly in Brazil, the Caspian Sea, West Africa, and North America (World Bank, 2013: 5). In recent times, OPEC has altered its supply of crude oil to maintain prices in the $100-110 per barrel range (World Bank, 2013: 1). However, according to World Bank (2013: 1, 5), "this approach may not be sustainable" because OPEC is "sensitive to allowing prices to rise too high, for fear of inducing innovations that would fundamentally alter the long-term path of oil prices." Ultimately, crude oil prices are a matter of global supply and global demand, and forecasting these variables is extremely challenging.

***Chart 47**: U.S. Energy Information Administration's Crude Oil Spot Price Projections, US Dollars per Barrel, 2011-2040*



Note: Crude oil prices are the average spot price of Brent and West Texas Intermediate, equally weighed.
Source: U.S. Energy Information Administration, "Annual Energy Outlook 2014 – Early Release"

[23] It is important to note that World Bank (2013) provided forecasts for crude oil prices defined as average spot price of Brent, Dubai and West Texas Intermediate, equally weighed, whereas the EIA (2013) provided forecasts for crude oil prices defined as the average spot price of Brent and West Texas Intermediate, equally weighed.

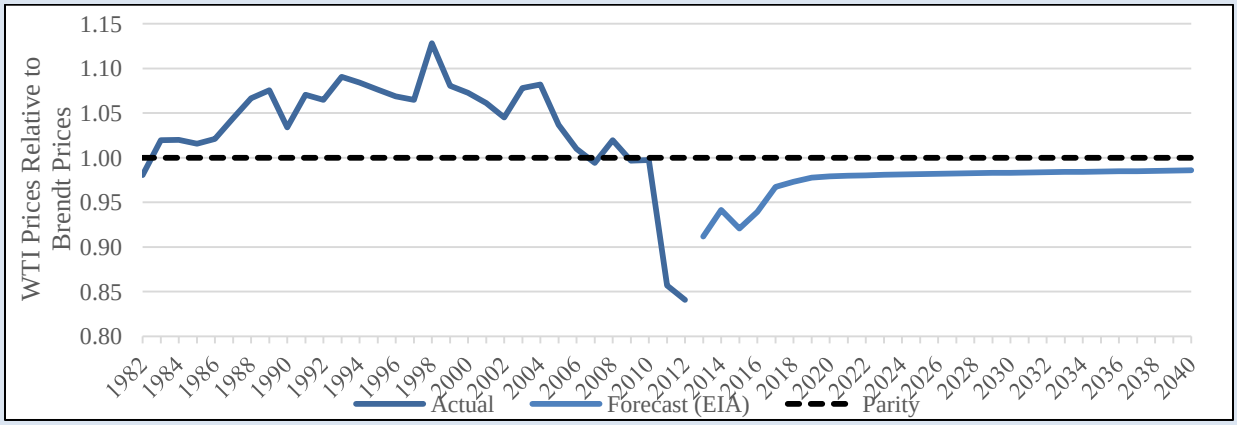
Currently, Western Canada's largest market is by far the U.S. Midwest, which has over 3.8 million b/d of refining capacity of which 1.7 million b/d is currently used to refine foreign-sourced oil (which almost entirely comes from Canada) (CAPP, 2013: 14). The U.S. Gulf Coast region, which has refining capacity of 9.4 million b/d, refined 2.2 million b/d of foreign-sourced heavy crude oil in 2012 (largely from Latin America) (CAPP, 2013: 14). To maintain the demand for Canadian crude oil production, argues CAPP (2013: 19), better access to the Gulf Coast refineries and the Asian market is required. Such access is also needed to halt the build-up of crude oil stocks in the U.S. Midwest, which has led to a reduction in the price that Western Canadian crude sells at. Box 3 discusses this issue further.

There exists a great deal of uncertainty concerning the future of the Canadian oil sector. Whether Alberta, Saskatchewan and Newfoundland and Labrador are likely to sustain their respective commodity booms ultimately depends on the future of crude oil prices, which are notoriously hard to predict, and their ability to get their product to key markets. Therefore, a great deal of uncertainty exists concerning the future of provincial disparities in Canada. Nonetheless, recent forecasts suggest that after a 3-5 year period of relative weakness, crude oil prices are projected to be on an upward trend. In addition, it is likely that the WCS-WTI-Brent gap will narrow as oil sands production becomes less land-locked and pipelines are further developed. If these two premises are true, we can conclude that the price Canadian oil producers receive for their oil will rise in the long run, putting upward pressure on provincial disparities.

Box 3: The WCS-WTI-Brent Crude Oil Spot Price Gap

Recently, a glut of oil in the United States – more specifically, in the Midwest – has caused West Texas Intermediate (WTI, the U.S. mid-continent crude oil price) to diverge from Brent (the international marker) (Chart 48). WTI spot prices were typically 5-10 per cent higher than the Brent rate during the 1988-2004 period. However, WTI spot prices fell relative to the Brent rate between 2004 and 2007, when they reached parity. The discount of WTI crude to Brent widened in 2011 and 2012, as nominal WTI spot prices fell to 85.7 per cent and 84.1 per cent of the Brent rate in 2011 and 2012, respectively.

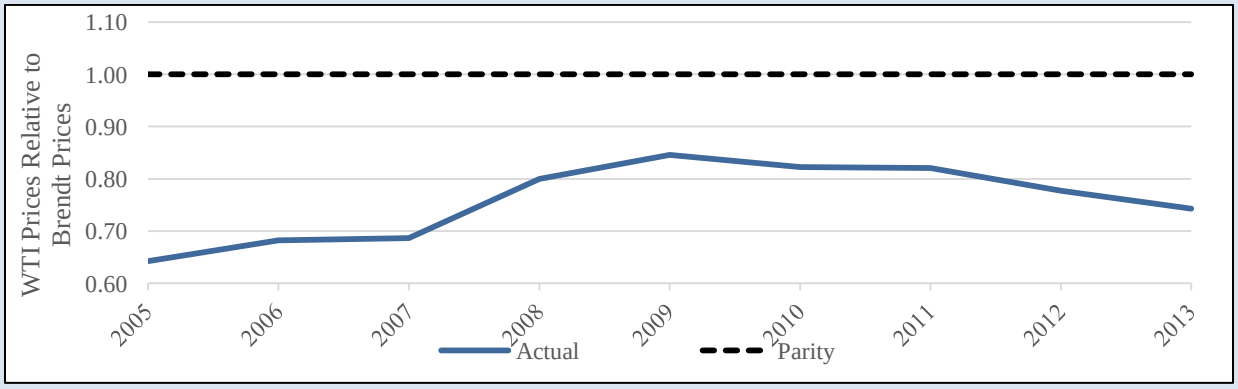
Chart 48: Nominal WTI-Brent Crude Oil Spot Price Gap, WTI Prices Relative to Brent Prices, 1982-2025



Sources: World Bank DataBank, Baytex Energy Corp., and EIA (2013)

In addition, the price of heavy crude exported from the Canadian oil sands (Western Canadian Select, or WCS) has fallen relative to WTI spot prices due to a lack of pipeline capacity (Chart 49); this is putting even greater downward pressure on Canadian crude benchmarks.[1] The discount of Canadian crude oil due to the widening of the WCS-WTI-Brent gap has harmed Canadian oil producers and "reduces Alberta and Canadian government revenues" (IEA, 2013: 42). The glut of crude oil in the Midwest is due to substantial imports of Canadian crude oil (especially from oil sands), as well as rapidly rising LTO production in North America due to the emergence of fracking technology (World Bank, 2013: 3). If more Canadian crude oil has access to other parts of the United States like the Gulf of Mexico, such as through the construction of the Keystone XL pipeline, these price gaps will likely be eliminated (World Bank, 2013: 3).

Chart 49: Nominal WCS-WTI Crude Oil Spot Price Gap, WCS Prices Relative to WTI Prices, 2005-2013



[1] RBC Economics (2013), "Macroeconomic impact of the WCS/WTI/Brent crude oil price differentials," http://www.rbc.com/economics/economic-reports/pdf/other-reports/wcs-price-spread-impact.pdf

IX. Implications of Trends in Convergence and Divergence of Economic Variables

The report has found that, from a long-term perspective, the ten Canadian provinces have experienced convergence for most of the economic indicators included in the analysis (16 of 25 variables), at least as measured by trends in the coefficient of variation (CV). This is a positive development for Canada as it means that the provinces are increasingly experiencing a comparable level of economic development, reflecting in large part the convergence of the educational attainment, the employment rate and demographic structures across the provinces. It is also important to note that this convergence is largely due to the provinces that perform below average on the indicators rising toward the national average, as opposed to the provinces that perform above average falling to the national average.

Generally speaking, there was divergence in economic variables related to income, productivity and fiscal capacity, while there was convergence in economic variables related to the labour market and demographics. Economic variables expressed in current prices or nominal terms experienced greater divergence. This was particularly the case for nominal productivity measures and nominal GDP per capita since 1990. This development reflects increased oil prices, which has resulted in the nominal GDP increasing at a much faster rate than real GDP in the three oil-producing provinces.

Whether this divergence in these nominal indicators, driven by the movement away from the national average by the three oil producing provinces, is a positive or negative development depends on one's perspective. The increased nominal GDP means that there is greater total income or purchasing power within the country and this higher GDP can translate into higher living standards and greater tax revenues for all levels of government. But this greater income will be largely concentrated in the oil-producing provinces, as reflected in the greater income disparities.

Nevertheless, there will be benefits for other provinces. The increased tax base in the oil-producing provinces resulting from the higher incomes means that more personal and corporate income taxes and consumption taxes will be paid to the federal government. This gives the federal government the possibility of increasing spending (or cutting taxes), which will benefit Canadians in all provinces.

In addition, based on the formula for equalization payments, the greater growth in nominal GDP in the oil-producing provinces results in the federal government sending greater equalization payments to the non-oil producing provinces.

The non-oil producing provinces also benefit from increased demand for the goods and services they produce from the oil-producing provinces, resulting in increased income and employment. The greater investment and employment opportunities in the oil producing provinces can result in the movement of capital and persons to these provinces. This can be a mixed blessing for the non-oil producing provinces for they lose the investments in human capital they made in the out-migrants, but do benefit from the fall in the unemployment rate and the costs associated with unemployment. From the national perspective, this increased interprovincial migration in response to rising disparities is a welcome development as it boosts national income and productivity.

In other words, the growing disparities in fiscal capacity and nominal GDP per capita since 1990 related to higher crude oil prices present both challenges and opportunities. The oil producing provinces may wish to retain as much of their increased resources as possible within the province, while the federal government would like to see these resources benefit all Canadians. These different perspectives can potentially create tensions between two levels of government (they certainly have in the past), although current fiscal arrangements appear acceptable to both levels of government. But since the growing income disparities reflect the growing economic pie, this development represents an opportunity. More resources are available at the national level for both private and public uses.

X. Conclusion and Future Work

The main conclusion of this report is that, from a long-term perspective, the ten Canadian provinces have experienced convergence for most of the economic indicators included in the analysis. There was convergence in real GDP per capita, a key variable and the most widely studied indicator in the convergence literature. Likewise, the employment rate and educational attainment, two key drivers of long term GDP growth, also displayed convergence for all periods observed. From an economist's perspective, the convergence of real GDP per capita is a positive development for Canada. However, it is important to emphasize that real GDP per capita convergence was exclusively due to convergence in the employment rate and the share of the population that is of working age, as there was divergence in real labour productivity.

Generally speaking, there was divergence in economic variables related to income, productivity and fiscal capacity, while there was convergence in economic variables related to the labour market and demographics. Economic variables expressed in current prices or nominal terms experienced greater divergence, especially since the early 2000s. This was particularly the case for nominal productivity measures and nominal GDP per capita. This development reflects the increased crude oil prices, which has resulted in the nominal GDP increasing at a much faster rate than real GDP in the three oil-producing provinces, increasing the degree of dispersion across the provinces. The increased disparities in income and fiscal capacity represent a challenge for managing relations between the federal government and the provinces, but it is a positive challenge in the sense that it flows from a growing economic pie.

This study has identified a number of areas where additional work on the convergence issue would be useful. Examples of such research include: the use of other convergence metrics, such as econometric-derived estimates; estimation of contribution of public policy to the convergence of the employment rate and educational attainment levels; investigation of the existence of convergence clubs among the provinces; calculation of convergence in income based on provincial purchasing power parities that capture differences in the cost of living across provinces; econometric analysis to explain the evolution of disparities, including the role of intergovernmental transfers and interprovincial migration; and additional research to quantify the consequences of commodity booms, particularly the potential positive spillover effects on the non-booming provinces via interregional trade and the potential negative long-run consequences of human and physical capital reallocation.

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Appendices

Appendix I: Statistical Measures

Find a list of the statistical measures used in this report below. It is important to note that population means and population standard deviations were used in this report rather than sample means and sample standard deviations because our data set consisted of the entire population of interest, the Canadian provinces. In addition, the weights used to calculate weighted statistical measures corresponds to the denominator of the variable of interest. For example, the weights used to calculate weighted unemployment rates were shares of the national labour force, and the weights used to calculate weighted levels of GDP per hour worked were shares of the total number of hours worked in Canada.

Arithmetic Mean

Suppose we have a data set containing the values $x_i,\ldots, x_n$. The arithmetic mean μ is defined by the formula

$$\mu = \frac{\sum_{i=1}^{N} x_i}{N}$$

where x is the data set of interest.

Weighted Arithmetic Mean

Suppose we have a data set containing the values $x_i,\ldots, x_n$. The weighted arithmetic mean μ_w is defined by the formula

$$\mu_w = \frac{\sum_{i=1}^{N} w_i x_i}{\sum_{i=1}^{N} w_i}$$

where x is the data set of interest and w is the weight.

Standard Deviation

Suppose we have a data set containing the values $x_i,\ldots, x_n$. The standard deviation σ is defined by the formula

$$\sigma = \sqrt{\frac{\sum_{i=1}^{N}(x_i - \mu)^2}{N}}$$

where x is the data set of interest and μ is the arithmetic mean.

Weighted Standard Deviation

Suppose we have a data set containing the values $x_i, \ldots, x_n$. The weighted standard deviation σ_w is defined by the formula

$$\sigma_w = \sqrt{\frac{\sum_{i=1}^{N} w_i(x_i - \mu_w)^2}{\sum_{i=1}^{N} w_i}}$$

where x is the data set of interest, w is the weight, and μ_w is the weighted arithmetic mean.

Coefficient of Variation

The coefficient of variation cv is defined by the formula

$$cv = \frac{\sigma}{\mu}$$

where σ is the standard deviation and μ is the arithmetic mean.

Weighted Coefficient of Variation

The coefficient of variation cv_w is defined by the formula

$$cv_w = \frac{\sigma_w}{\mu_w}$$

where σ_w is the weighted standard deviation and μ_w is the weighted arithmetic mean.

Appendix II: Decomposing the Coefficient of Variation

GDP Per Capita

GDP per capita can be decomposed into GDP per worker, the employment rate and the share of the population aged 15 and over by the formula

$$\frac{GDP}{P_t} = \frac{GDP}{E} \cdot \frac{E}{P_w} \cdot \frac{P_w}{P_t}$$

where P_t is the total population, E is the level of employment and P_w is the working age population (aged 15 and over).

The CV for GDP per capita can be decomposed (approximately) into the CV for GDP per worker, the CV for the employment rate and the CV for the share of the population aged 15 and over by the formula

$$cv^{\frac{GDP}{P_t}} \approx cv^{\frac{GDP}{E}} + cv^{\frac{E}{P_w}} + cv^{\frac{P_w}{P_t}} \pm \epsilon$$

where P_t is the total population, E is the level of employment, P_w is the working age population (aged 15 and over), and ϵ is an error term.

GDP Per Worker

GDP per worker can be decomposed into GDP per hour worked and the average hours worked per employee by the formula

$$\frac{GDP}{E} = \frac{GDP}{H} \cdot \frac{H}{E}$$

where H is the total number of hours worked and E is the level of employment.

The CV for GDP per capita can be decomposed (approximately) into the CV for GDP per hour worked and the CV for average hours worked per employee by the formula

$$cv^{\frac{GDP}{E}} \approx cv^{\frac{GDP}{H}} + cv^{\frac{H}{E}} \pm \epsilon$$

where H is the total number of hours worked, E is the level of employment, and ϵ is an error term.

Appendix III: Charts and Tables Depicting Time Series for Weighted CVs

Table III-1: Summary of Weighted CVs

Year	Index of Total Per Capita Consumption Flows	Index of Total Per Capita Stocks of Wealth	Unemployment Rate	Nominal Personal Income Per Capita	Nominal Personal Disposable Income Per Capita	IEWB	Equality Index	Real GDI Per Capita	Employment Rate
1961	..	..	..	17.7	16.6	..	..	..	..
1972	..	..	..	14.9	13.4	..	..	..	..
1976	..	..	28.0	11.2	10.9	..	..	..	7.8
1977	..	..	29.4	10.9	10.9	..	..	..	8.2
1978	..	..	28.5	10.6	10.5	..	..	..	8.2
1979	..	..	29.4	10.7	10.7	..	..	..	8.2
1980	..	..	29.0	11.3	11.3	..	..	..	8.1
1981	34.5	49.5	31.4	12.0	11.4	17.5	18.1	24.0	8.7
1982	33.8	50.1	22.0	11.5	10.9	16.1	15.3	22.7	9.2
1983	30.0	55.1	17.7	11.4	10.9	15.1	15.1	21.1	8.5
1984	23.7	51.8	23.1	10.9	10.3	12.9	16.7	21.2	8.6
1985	21.4	50.5	26.6	11.2	10.7	14.8	18.7	21.8	8.7
1986	17.5	37.1	27.6	10.8	10.0	12.6	18.3	15.7	8.3
1987	17.6	33.4	29.9	11.3	10.2	12.0	17.6	15.1	7.9
1988	16.3	26.0	32.2	11.8	10.6	9.6	13.8	14.8	7.9
1989	16.2	26.0	31.8	12.0	10.6	9.4	14.5	14.7	7.7
1990	15.8	26.8	27.9	10.5	9.6	10.1	16.7	14.6	7.3
1991	16.4	21.4	17.8	9.9	9.3	9.5	13.6	13.6	6.9
1992	15.9	21.1	16.1	9.8	9.4	8.7	15.0	13.2	7.1
1993	15.8	21.9	17.1	9.1	8.6	10.1	13.2	13.9	7.2
1994	15.3	22.0	19.7	8.7	8.2	10.2	12.6	14.3	7.2
1995	15.3	19.7	20.0	8.5	7.9	10.6	15.3	14.1	7.1
1996	14.3	21.9	22.0	8.0	7.1	8.4	9.0	15.0	7.6
1997	14.8	21.4	25.0	8.8	8.2	9.6	10.8	15.6	7.6
1998	14.2	18.2	26.2	8.8	8.3	8.2	13.0	14.0	7.2
1999	13.3	23.4	25.5	8.6	8.2	8.6	12.9	13.9	6.7
2000	12.8	31.7	27.9	9.1	9.1	10.5	14.9	17.5	6.5
2001	12.0	28.6	26.1	9.3	9.1	10.3	17.4	17.5	6.4
2002	11.3	28.4	22.1	8.5	8.3	11.5	20.1	15.2	5.7
2003	10.6	30.6	23.7	7.9	7.7	9.9	18.0	17.5	5.8
2004	10.4	31.1	23.0	8.3	8.1	9.5	16.5	19.1	5.6
2005	10.2	34.7	26.0	9.4	9.1	12.3	17.2	22.3	5.4
2006	10.0	36.3	29.5	10.7	10.6	12.8	15.8	22.1	5.7
2007	9.9	33.0	27.3	11.2	10.7	11.5	11.3	20.9	5.6
2008	9.2	42.8	26.4	11.9	11.7	15.4	16.4	24.8	5.7
2009	8.0	29.6	17.6	10.0	10.3	9.5	13.5	17.0	5.5
2010	7.6	33.5	15.9	10.3	10.8	12.0	14.7	18.6	4.8
2011	7.1	33.9	16.2	..	..	12.8	13.4	21.2	5.3
2012	6.6	32.8	19.9	..	..	12.6	13.4	21.2	5.4
Δ76-12	n.a.	n.a.	-8.1	-0.9	-0.1	n.a.	n.a.	n.a.	-2.4
Δ81-12	-27.9	-16.7	-11.5	-1.7	-0.7	-4.9	-4.7	-2.8	-3.3
Δ90-12	-9.2	6.0	-7.9	-0.2	1.1	2.6	-3.2	6.6	-1.9
Δ00-12	-6.2	1.1	-7.9	1.3	1.7	2.1	-1.5	3.6	-1.1
Δ61-12*	-27.9	-16.7	-8.1	-7.4	-5.8	-4.9	-4.7	-2.8	-2.4
Δ90-10	-8.3	6.7	-12.0	-0.2	1.1	1.9	-1.9	4.0	-2.5
	Per cent change								
61-12*	-80.9	-33.8	-28.8	-41.9	-35.0	-28.0	-25.9	-11.8	-31.0
90-10	-52.2	25.0	-43.1	-1.9	11.5	19.3	-11.6	27.8	-34.2

*Or nearest possible year

Table III-2: Summary of Weighted CVs (continued)

Year	Participation Rate	Real GDP Per Capita	Working-Age Share of Population (15-64)	Share of Pop. With Post-Secondary Education	Working-Age Share of Population (15+)	HDI	Real GDP Per Hour Worked	Real GDP Per Worker (LFS)
1961	..	..	..	..	..	..	..	..
1972	..	..	2.6	..	2.3	..	..	..
1976	6.0	..	2.7	..	2.2	..	..	..
1977	5.9	..	2.7	..	2.2	..	..	..
1978	5.8	..	2.7	..	2.2	..	..	..
1979	6.0	..	2.7	..	2.1	..	..	..
1980	6.0	..	2.6	..	2.0	..	..	..
1981	6.3	21.4	2.6	..	1.9	..	13.2	14.8
1982	6.9	19.8	2.6	..	1.9	..	12.6	13.9
1983	6.5	18.2	2.5	..	1.9	..	12.7	13.5
1984	6.4	18.3	2.4	..	1.8	..	12.6	13.5
1985	6.2	19.8	2.4	..	1.8	..	13.8	15.0
1986	5.9	18.0	2.3	..	1.8	..	12.5	13.8
1987	5.7	17.5	2.3	..	1.7	..	12.8	13.9
1988	5.6	19.1	2.3	..	1.7	..	14.4	15.4
1989	5.4	18.8	2.3	..	1.7	..	13.4	15.0
1990	5.1	19.0	2.2	5.9	1.6	1.6	12.9	15.3
1991	5.1	19.7	2.2	5.5	1.6	..	13.3	15.7
1992	5.4	19.5	2.1	5.4	1.5	..	13.3	15.3
1993	5.3	21.4	2.0	5.7	1.5	..	15.5	17.3
1994	5.2	21.9	2.0	5.7	1.5	..	15.6	17.7
1995	5.3	22.1	2.0	4.9	1.4	..	15.5	17.7
1996	5.5	22.2	1.9	5.1	1.4	..	14.6	17.1
1997	5.3	23.0	1.9	5.0	1.4	..	15.3	17.7
1998	5.0	23.0	1.8	4.4	1.4	..	16.3	17.9
1999	4.8	20.8	1.8	3.8	1.4	..	14.8	16.2
2000	4.7	21.0	1.7	3.7	1.4	1.4	14.8	16.8
2001	4.5	20.6	1.7	3.9	1.4	..	13.4	16.1
2002	4.1	19.5	1.6	4.2	1.4	..	13.8	15.9
2003	4.0	19.9	1.5	3.9	1.3	..	13.8	16.2
2004	3.9	20.6	1.4	4.1	1.3	..	14.5	16.9
2005	3.8	20.7	1.4	4.6	1.3	1.2	14.4	17.1
2006	4.1	21.6	1.4	5.1	1.3	1.1	14.4	17.4
2007	4.2	21.0	1.4	5.3	1.3	1.1	13.7	17.2
2008	4.3	20.7	1.4	4.8	1.3	1.1	13.8	16.8
2009	4.3	19.0	1.3	4.4	1.4	1.0	13.3	15.4
2010	3.8	19.6	1.3	4.2	1.4	1.0	14.4	16.8
2011	4.2	20.9	1.2	4.4	1.4	1.0	14.1	17.1
2012	4.0	21.3	1.2	4.6	1.5	..	13.9	17.3
Δ76-12	-2.0	n.a.	-1.5	n.a.	-0.8	n.a.	n.a.	n.a.
Δ81-12	-2.3	-0.1	-1.4	n.a.	-0.5	n.a.	0.7	2.5
Δ90-12	-1.0	2.3	-1.0	-1.3	-0.2	-0.6	1.0	1.9
Δ00-12	-0.7	0.2	-0.5	0.9	0.1	-0.4	-1.0	0.5
Δ61-12*	-2.0	-1.7	-1.4	-1.3	-0.8	-0.6	1.2	2.0
Δ90-10	-1.3	0.7	-1.0	-1.6	-0.2	-0.6	1.5	1.4
	Per cent change							
61-12*	-32.9	-8.1	-52.6	-21.8	-34.7	-38.9	9.0	13.5
90-10	-25.6	3.5	-43.3	-27.9	-14.7	-38.4	11.5	9.3

*Or nearest possible year.

Table III-3: Summary of Weighted CVs (continued)

Year	Nominal GDP Per Capita	Security Index	Average Total Income	Nominal GDP Per Hour Worked	Fiscal Capacity	Average After-tax Income	Average Market Income	Nominal GDP Per Worker (LFS)
1961	19.7	..	..	..	..	..	..	..
1972	17.5	..	..	..	18.2	..	..	..
1976	18.1	..	8.2	10.8	33.3	7.1	10.2	10.8
1977	18.3	..	6.9	11.0	38.9	6.3	9.2	10.8
1978	18.7	..	7.2	11.2	40.1	6.7	9.7	11.4
1979	20.0	..	6.5	11.8	43.2	6.3	8.6	12.9
1980	22.7	..	8.1	13.9	43.4	8.0	10.7	15.6
1981	23.4	10.7	8.3	14.3	40.6	7.8	10.8	16.1
1982	22.1	9.7	8.7	13.5	38.0	8.4	11.8	15.1
1983	20.0	9.4	7.9	13.0	35.9	7.7	10.8	13.9
1984	19.6	8.0	7.4	12.5	36.3	7.1	10.4	13.6
1985	19.8	8.4	8.6	12.0	32.3	8.0	11.7	13.4
1986	14.7	8.7	9.6	6.5	19.0	8.8	12.6	7.3
1987	14.4	8.8	10.2	6.3	19.4	9.6	13.0	7.1
1988	14.5	6.0	11.6	6.5	17.7	10.9	14.6	7.1
1989	14.6	7.7	11.4	6.8	17.6	10.7	14.2	7.4
1990	13.8	5.7	11.1	6.4	17.7	10.4	14.0	7.3
1991	12.7	3.8	10.4	6.5	15.6	10.0	13.3	7.0
1992	12.2	5.5	10.3	6.8	15.3	9.3	13.2	6.8
1993	12.6	6.7	10.7	6.5	16.9	10.4	13.7	7.2
1994	13.1	6.1	10.2	7.1	17.7	9.9	12.7	7.9
1995	12.9	6.1	10.8	7.1	16.1	10.4	13.4	7.9
1996	13.6	5.9	10.8	6.4	17.7	10.3	13.3	8.0
1997	14.4	6.5	11.5	7.3	17.8	11.3	14.2	8.7
1998	13.2	6.4	11.6	6.7	16.3	11.8	14.1	7.9
1999	13.4	5.2	12.6	7.3	17.7	12.8	14.9	8.4
2000	16.2	5.6	13.1	9.7	24.6	13.1	15.4	11.4
2001	16.2	5.9	12.5	8.7	22.5	12.5	15.0	11.1
2002	14.2	7.2	11.9	8.3	22.0	11.8	14.3	10.2
2003	15.9	6.9	12.1	9.4	22.1	12.0	14.3	11.7
2004	17.3	7.6	11.8	10.8	24.5	11.6	14.0	13.3
2005	20.5	9.5	12.1	13.9	29.7	11.9	14.8	16.6
2006	21.3	10.4	12.0	14.2	29.8	11.9	14.4	17.2
2007	21.0	9.7	12.6	13.7	28.9	12.3	15.4	17.2
2008	25.6	11.7	12.7	18.5	32.5	12.3	15.5	21.7
2009	17.6	10.4	11.7	11.9	26.3	11.2	14.3	14.1
2010	19.2	10.6	11.8	14.0	25.3	11.5	14.2	16.5
2011	21.9	13.3	12.4	15.5	25.6	12.0	15.2	18.6
2012	22.0	14.5	..	15.1	22.7	..	..	18.6
Δ76-12	4.0	n.a.	4.2	4.3	-10.6	4.9	5.0	7.8
Δ81-12	-1.3	3.8	4.1	0.8	-17.9	4.1	4.4	2.5
Δ90-12	8.3	8.8	1.3	8.7	5.0	1.6	1.2	11.3
Δ00-12	5.8	8.9	-0.7	5.4	-1.9	-1.2	-0.2	7.2
Δ61-12*	2.3	3.8	4.2	4.3	4.5	4.9	5.0	7.8
Δ90-10	5.4	4.9	0.7	7.6	7.6	1.1	0.2	9.2
	Per cent change							
61-12*	11.7	35.2	51.4	39.4	24.9	69.1	49.1	72.0
90-10	39.2	86.2	6.7	118.2	43.0	10.5	1.4	126.1

*Or nearest possible year.

Chart III-1: Weighted CVs for Labour Market Variables, 1976-2012

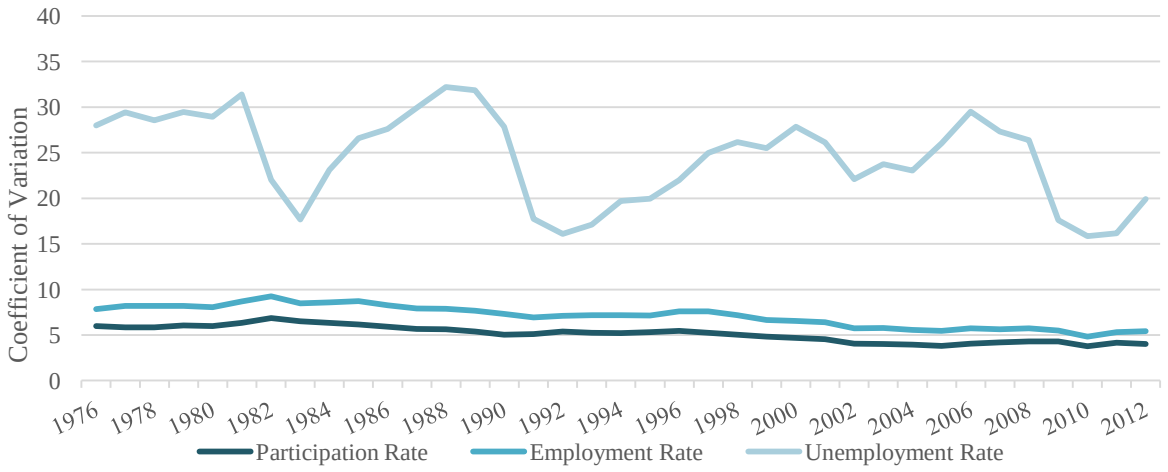


Chart III-2: Weighted CVs for the Share of the Working Age Population with a Post-secondary Degree, Certificate or Diploma, 1990-2012

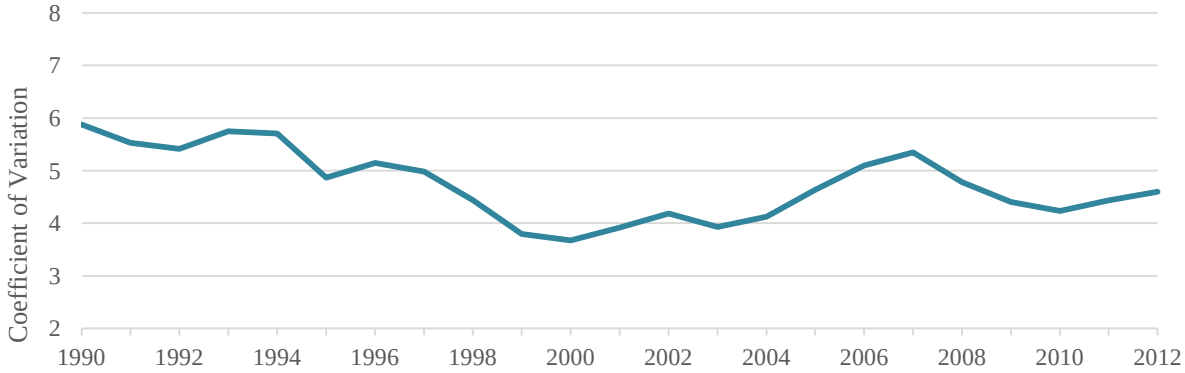


Chart III-3: Weighted CVs for Nominal GDP per Capita, 1961-2012

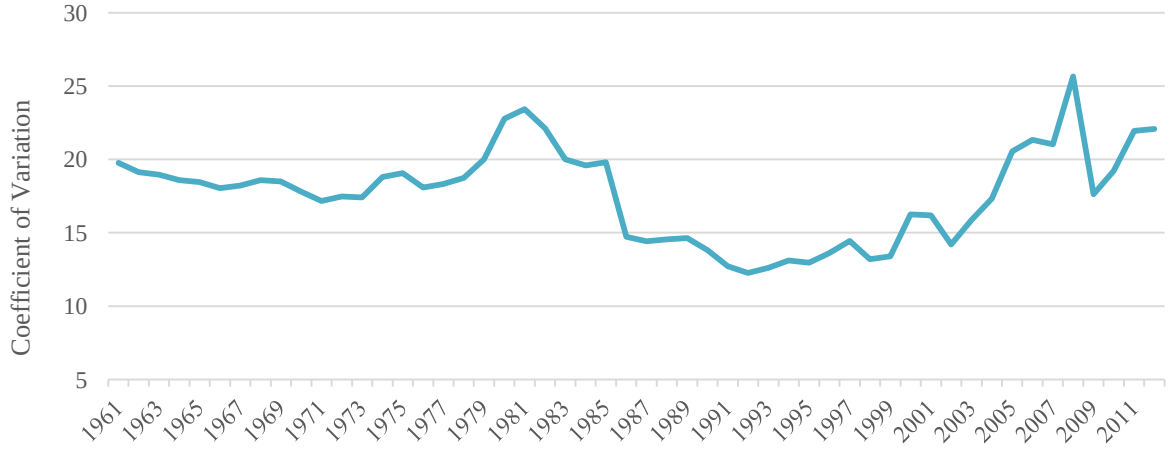


Chart III-4: Weighted CVs for Real (2007 Chained Dollars) GDP per Capita, 1981-2012

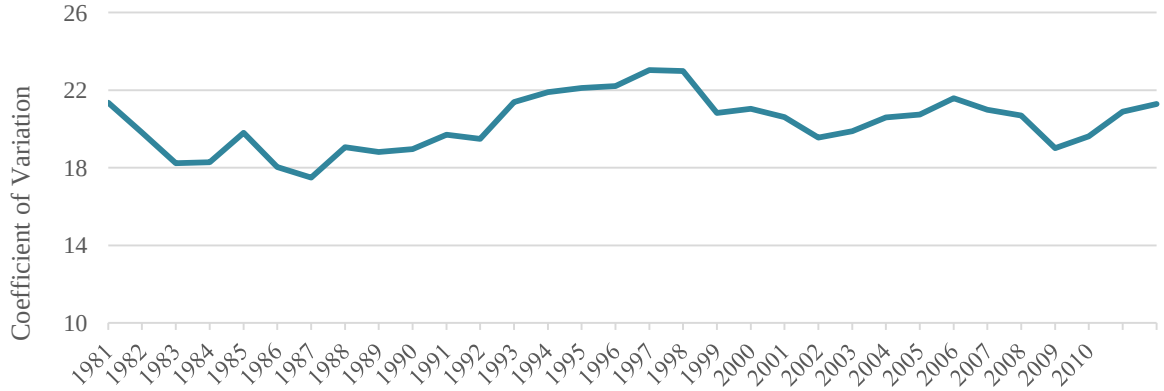
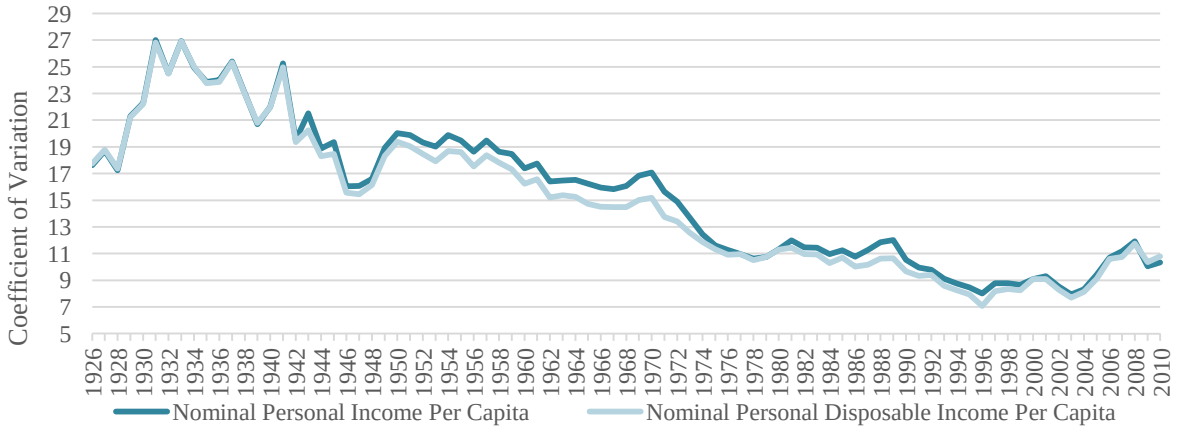


Chart III-5: Weighted CVs for Nominal Personal Income per Capita and Nominal Personal Disposable Income per Capita, 1926-2010



Note: Newfoundland and Labrador is not included in the coefficient of variation prior to 1949.

Chart III-6: Weighted CVs for Average Market, Total and After-tax Family Income, 2011 Constant Dollars, 1976-2011

Chart III-7: Weighted CVs for the Index of Economic Well-being, Equal Weighting, 1981-2012

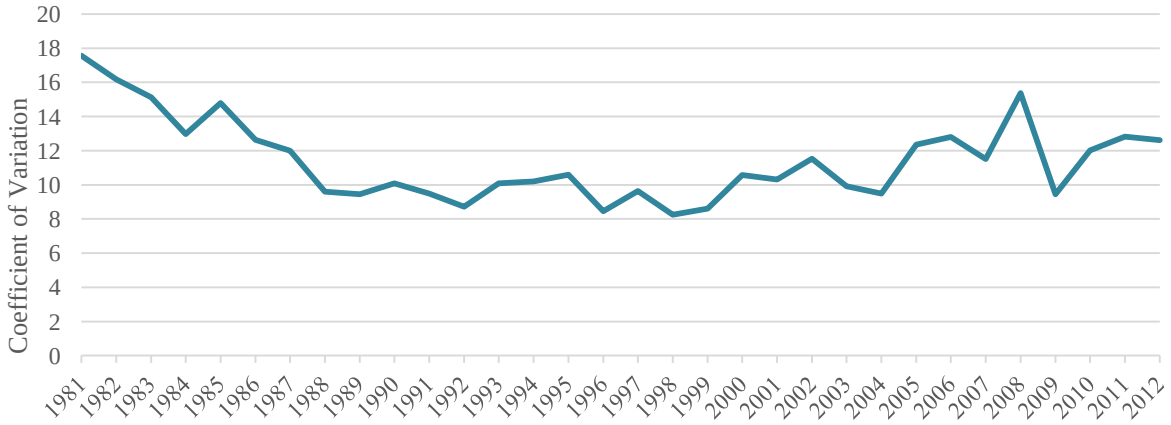
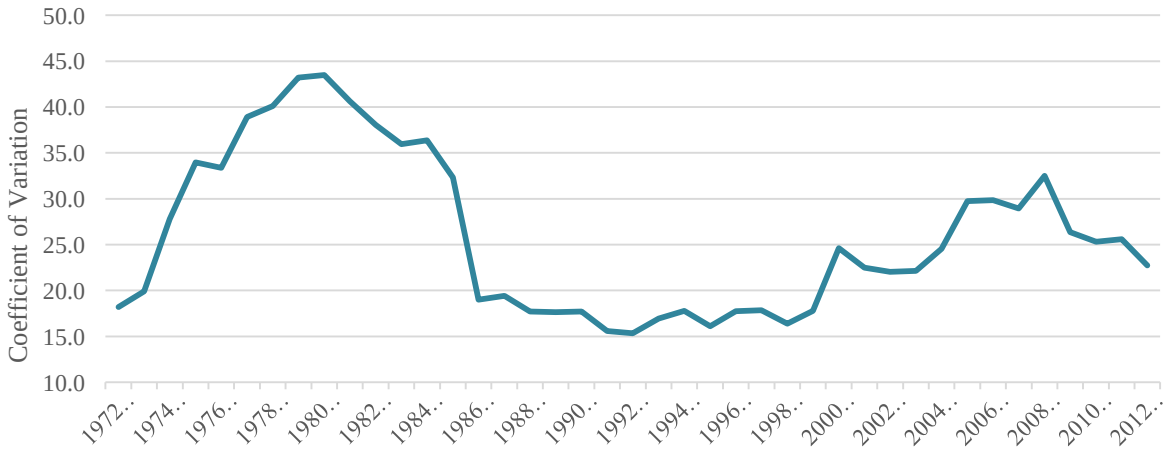


Chart III-8: Weighted CVs for Fiscal Capacity, Own Source Revenues, 1972-73 to 2012-13



Note: Fiscal capacity is based on 100% resource inclusion.

Chart III-9: Weighted CVs for Nominal Labour Productivity Measures, 1976-2012

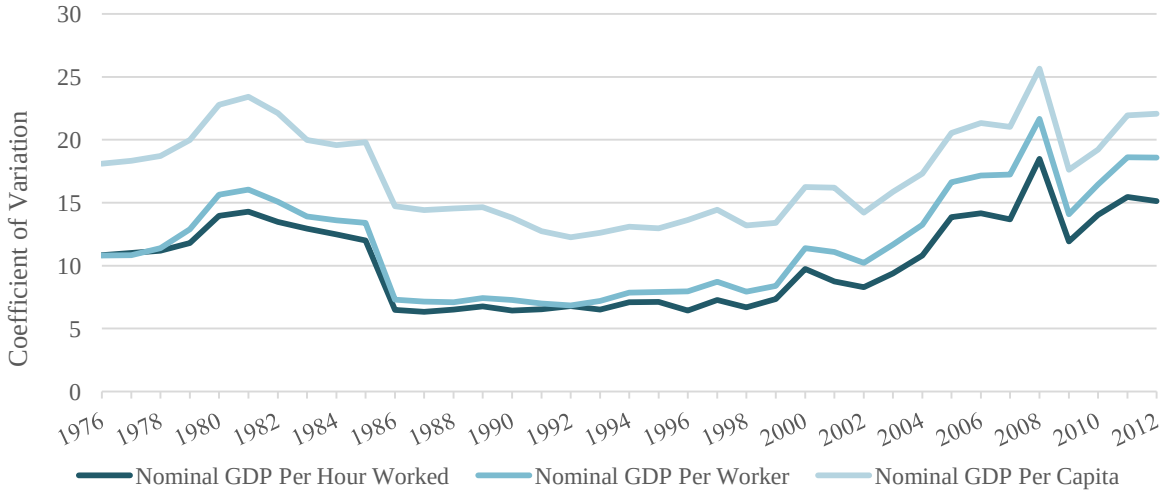


Chart III-10: Weighted CVs for Real (2007 Chained Dollars) Labour Productivity Measures, 1981-2012

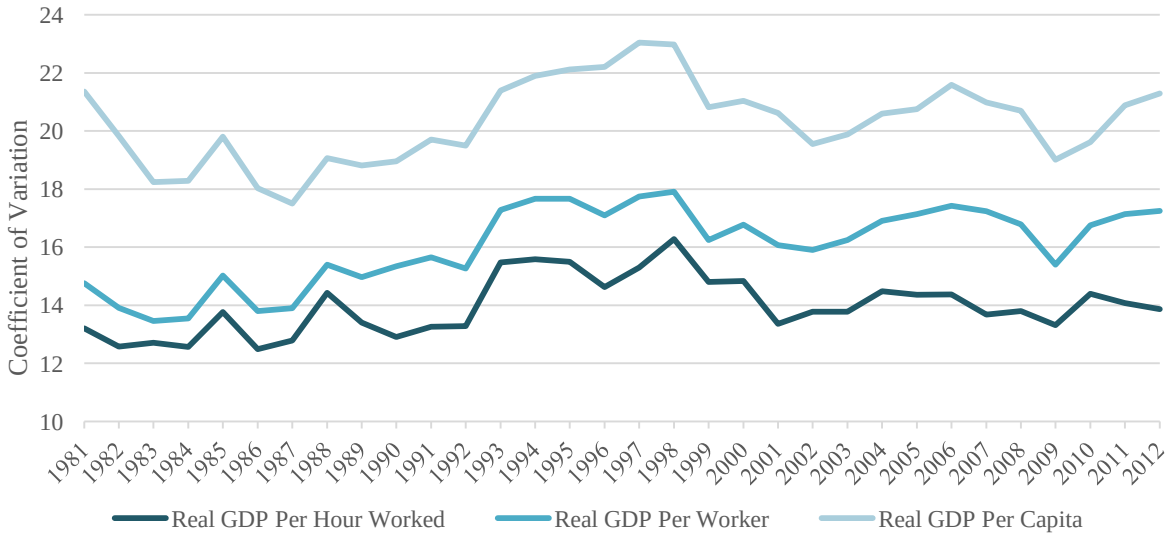
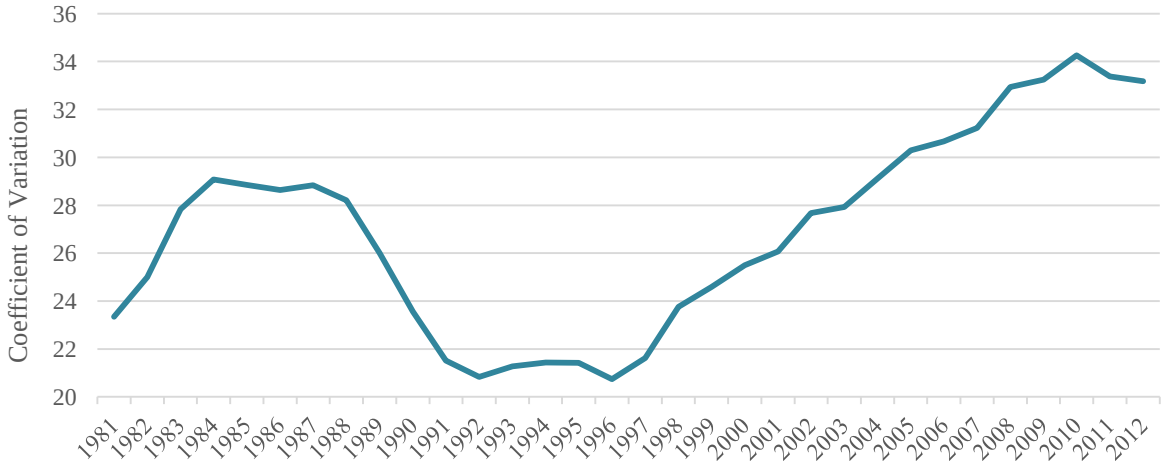


Chart III-11: Weighted CVs for Real (2007 Chained Dollars) Capital Intensity, 1981-2012



Note: "Capital intensity" is defined as real (2007 chained dollars) geometric (infinite) end-year net stock per total actual hours worked.

Appendix IV: Charts Depicting Time Series for Absolute Values

Chart IV-1: Participation Rate for the Provinces, per cent, 1976-2012

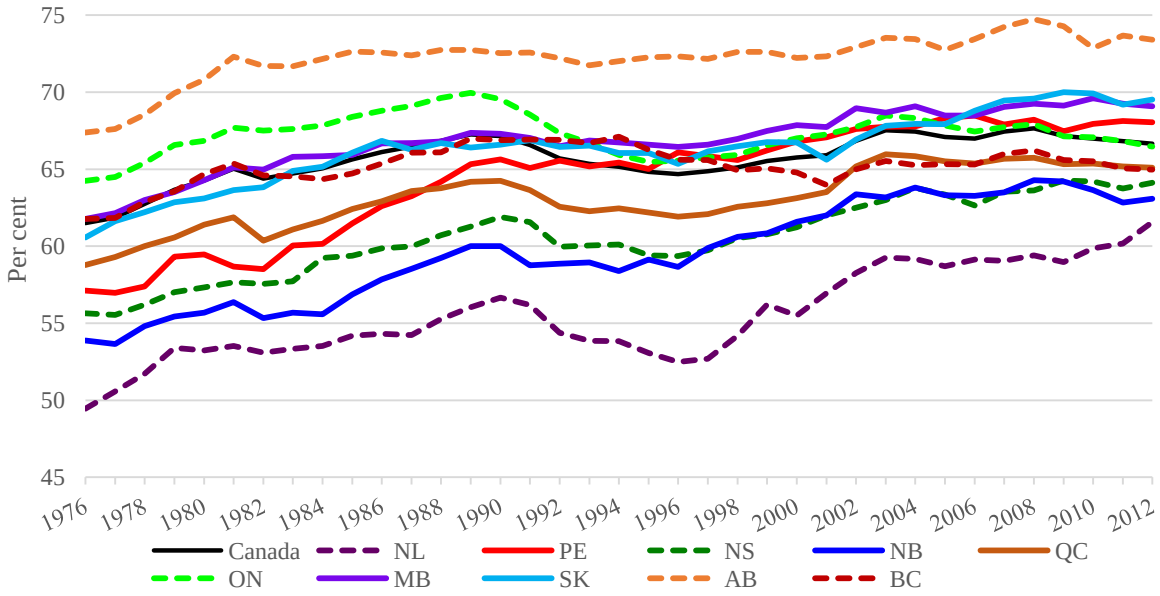


Chart IV-2: Employment Rate for the Provinces, per cent, 1976-2012

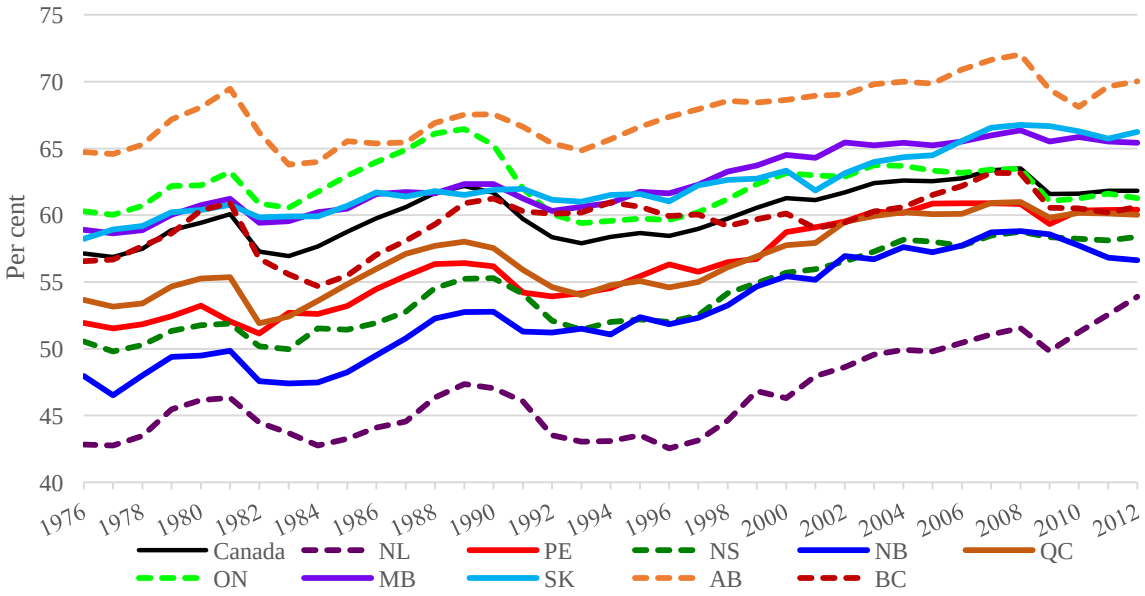


Chart IV-3: Unemployment Rate for the Provinces, per cent, 1976-2012

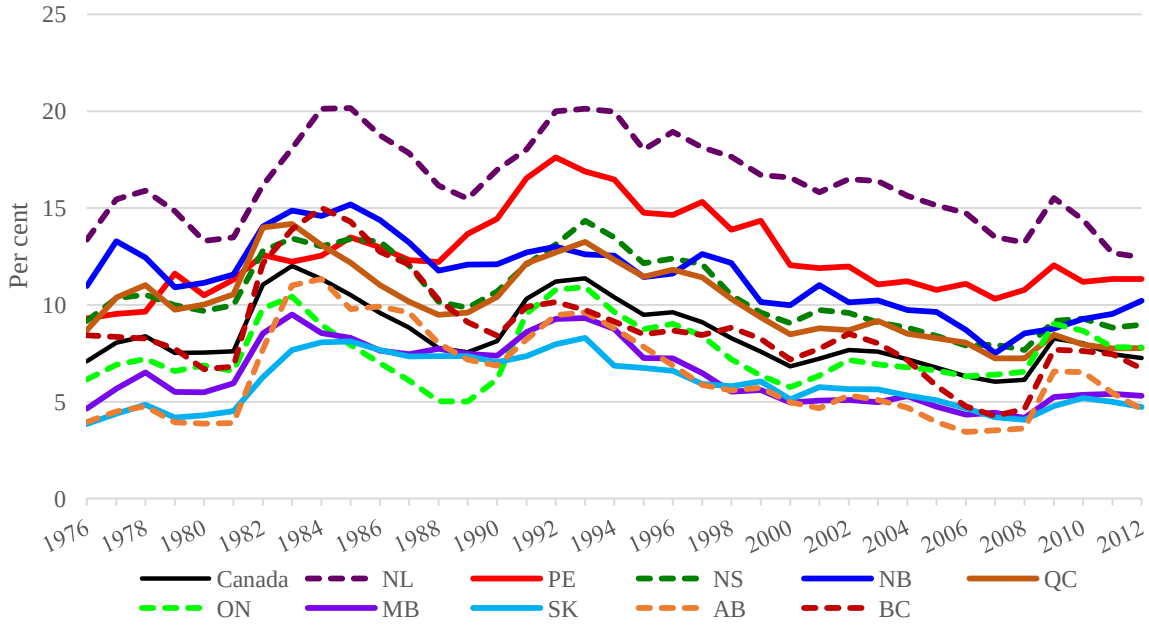


Chart IV-4: Share of the Working Age Population with a Post-secondary Degree, Certificate or Diploma for the Provinces, per cent, 1990-2012

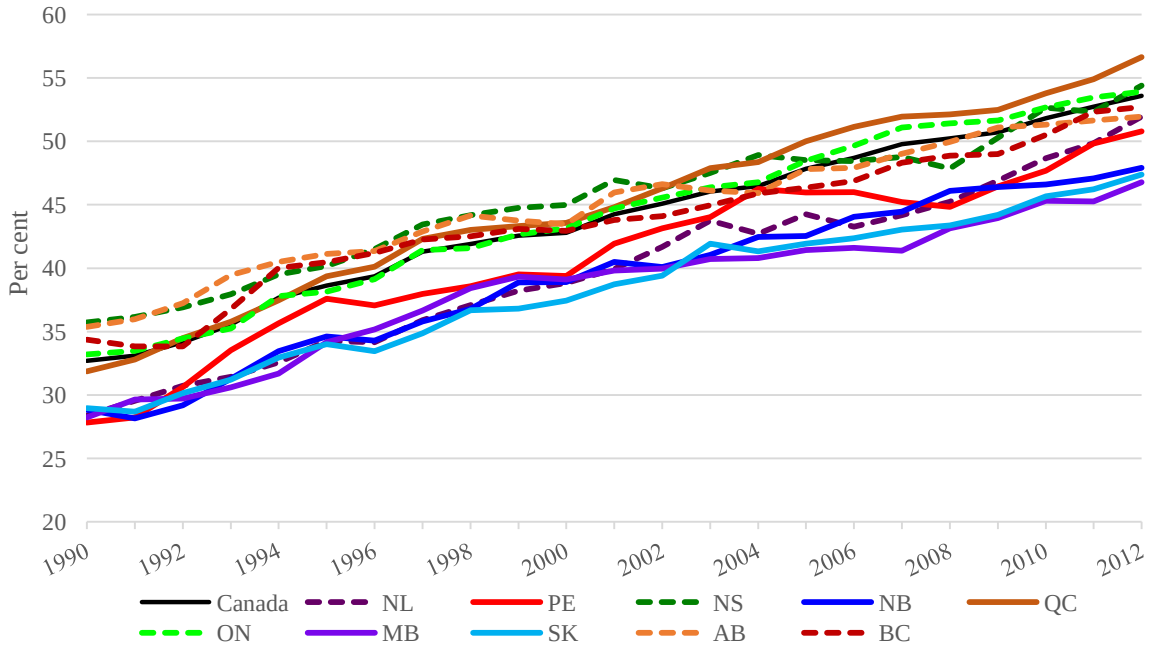


Chart IV-5: Nominal GDP per Capita for the Provinces, Thousands of Current Dollars, 1961-2012

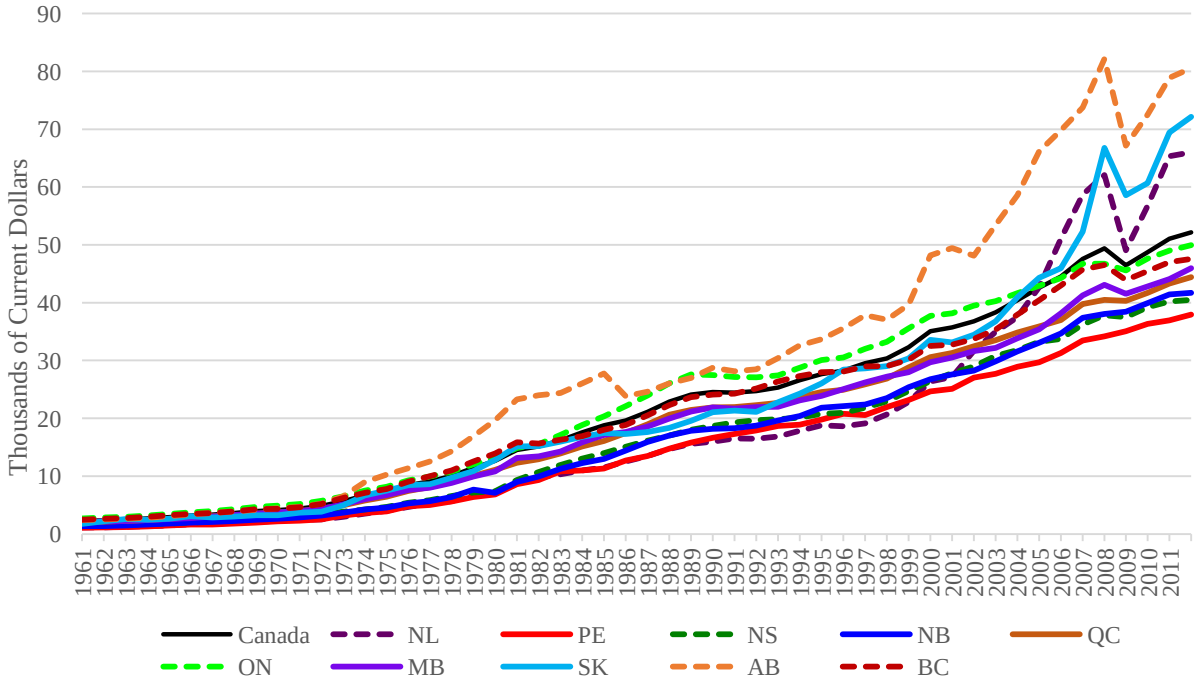


Chart IV-6: Real GDP per Capita for the Provinces, Thousands of 2007 Chained Dollars, 1981-2012

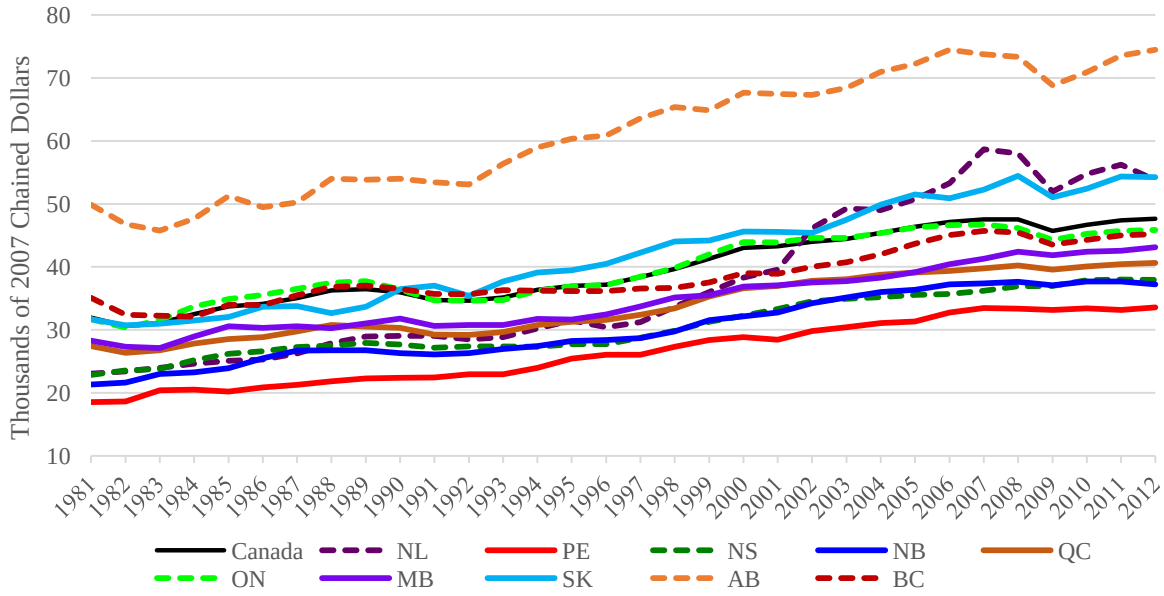


Chart IV-7: Real GDI per Capita for the Provinces, Thousands of 2007 Chained Dollars, 1981-2012

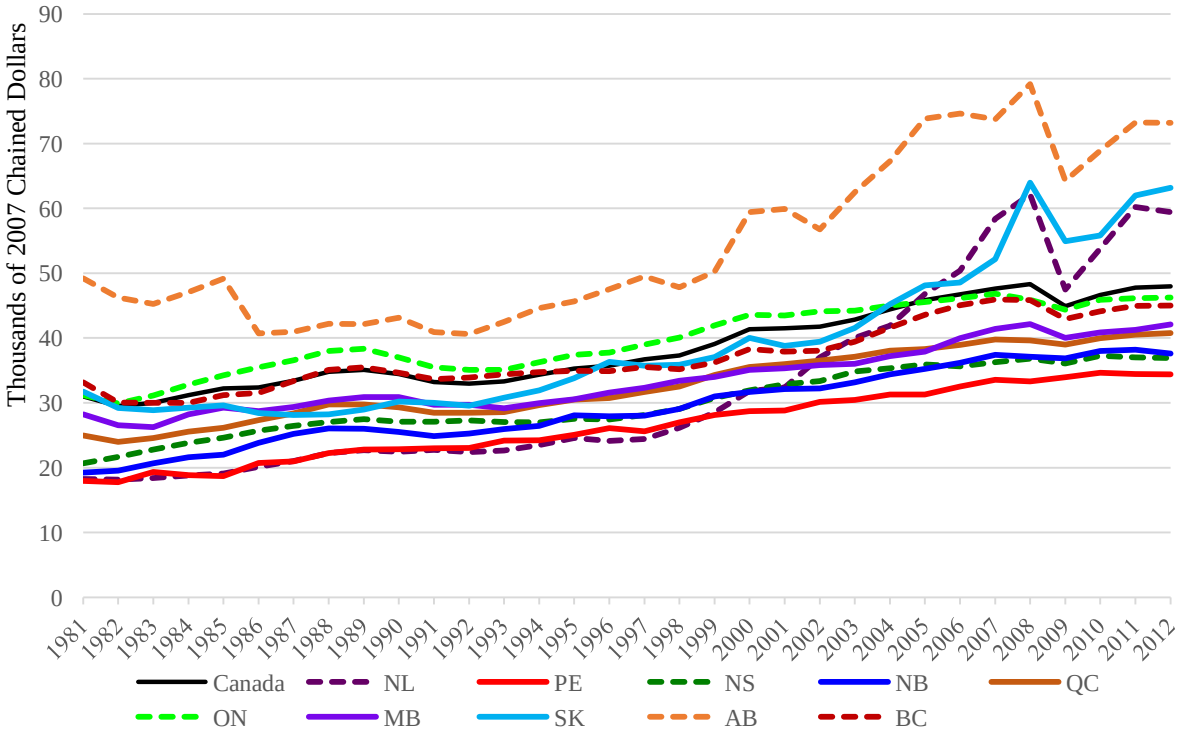


Chart IV-8: Nominal personal Income per Capita for the Provinces, Log Scale for Thousands of Current Dollars, 1926-2010

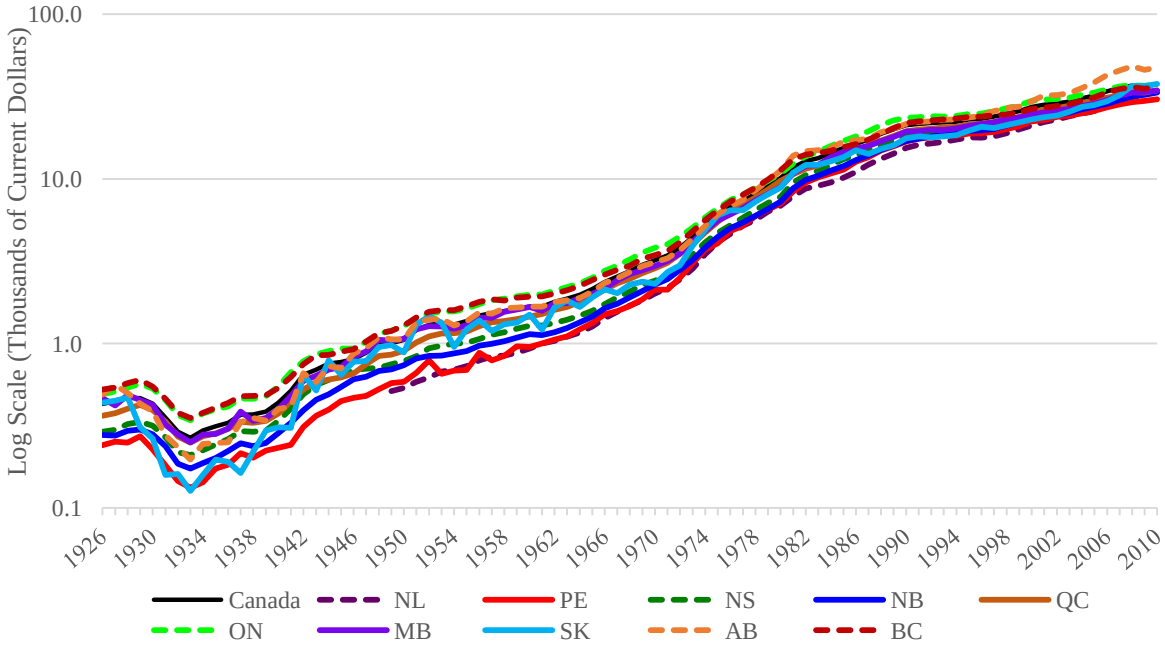


Chart IV-9: Nominal personal Disposable Income per Capita for the Provinces, Log Scale for Thousands of Current Dollars, 1926-2010

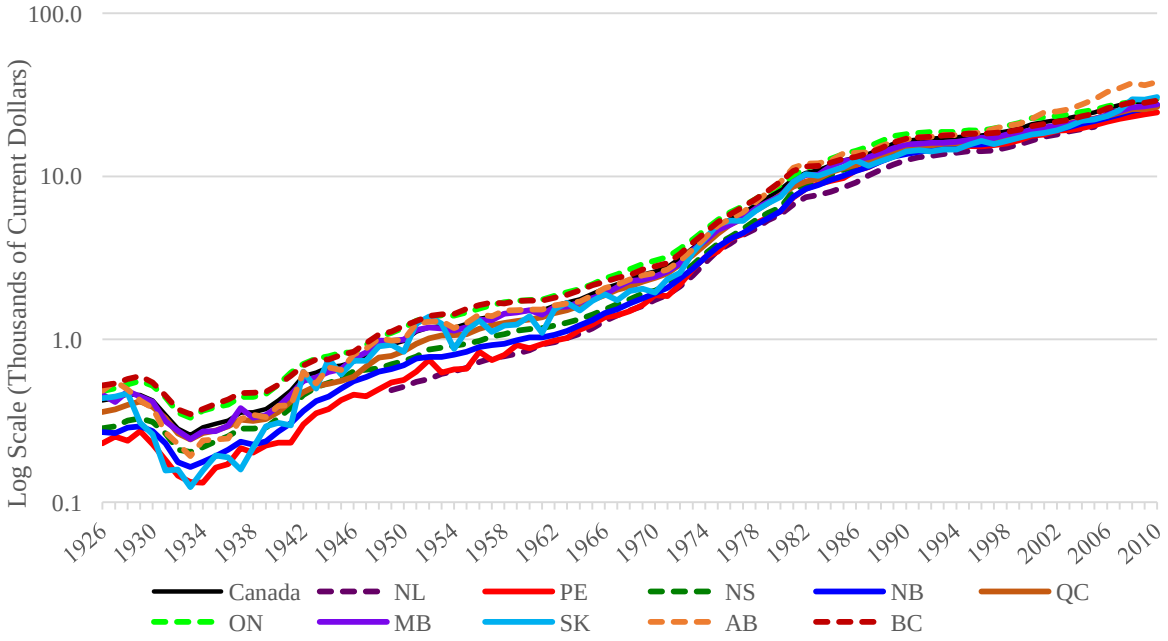


Chart IV-10: Index of Economic Well-being for the Provinces, 1981-2012

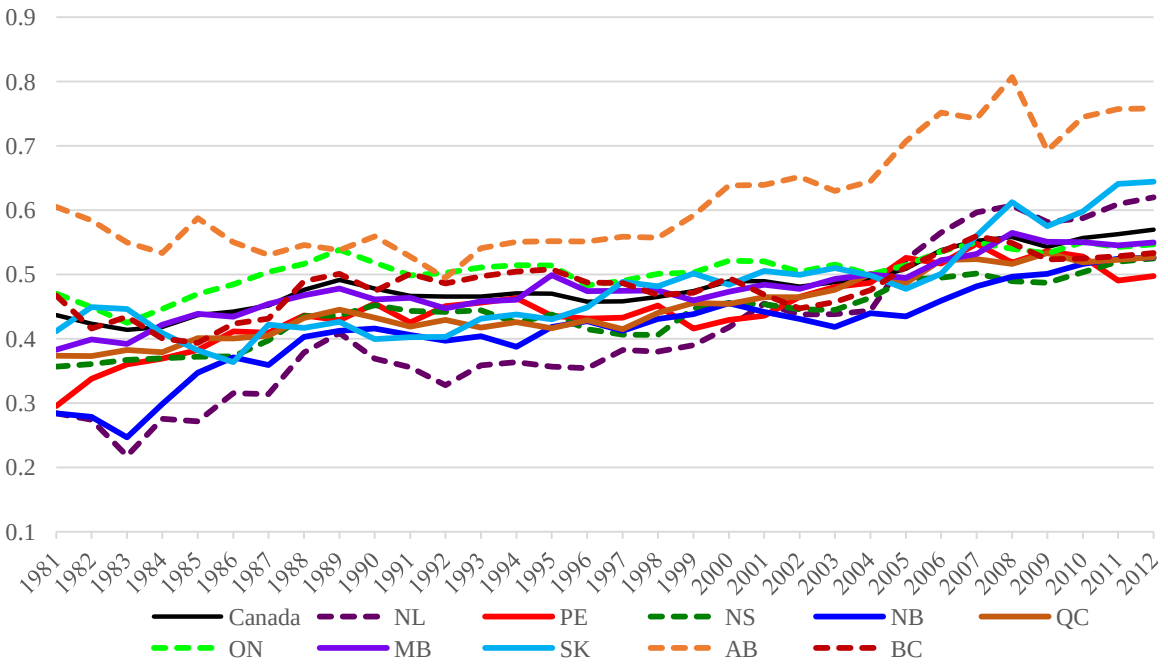


Chart IV-11: Index of Total Per Capita Consumption Flows for Canada and the Provinces, 1981-2012

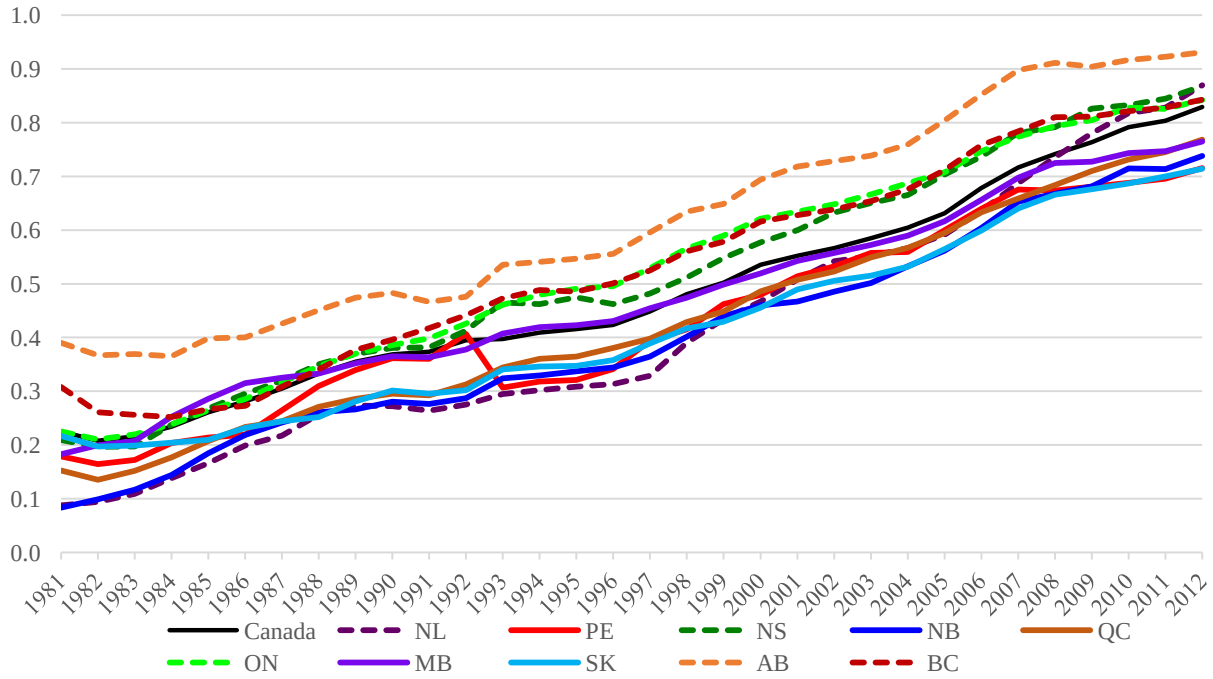


Chart IV-12: Index of Total Per Capita Stocks of Wealth for Canada and the Provinces, 1981-2012

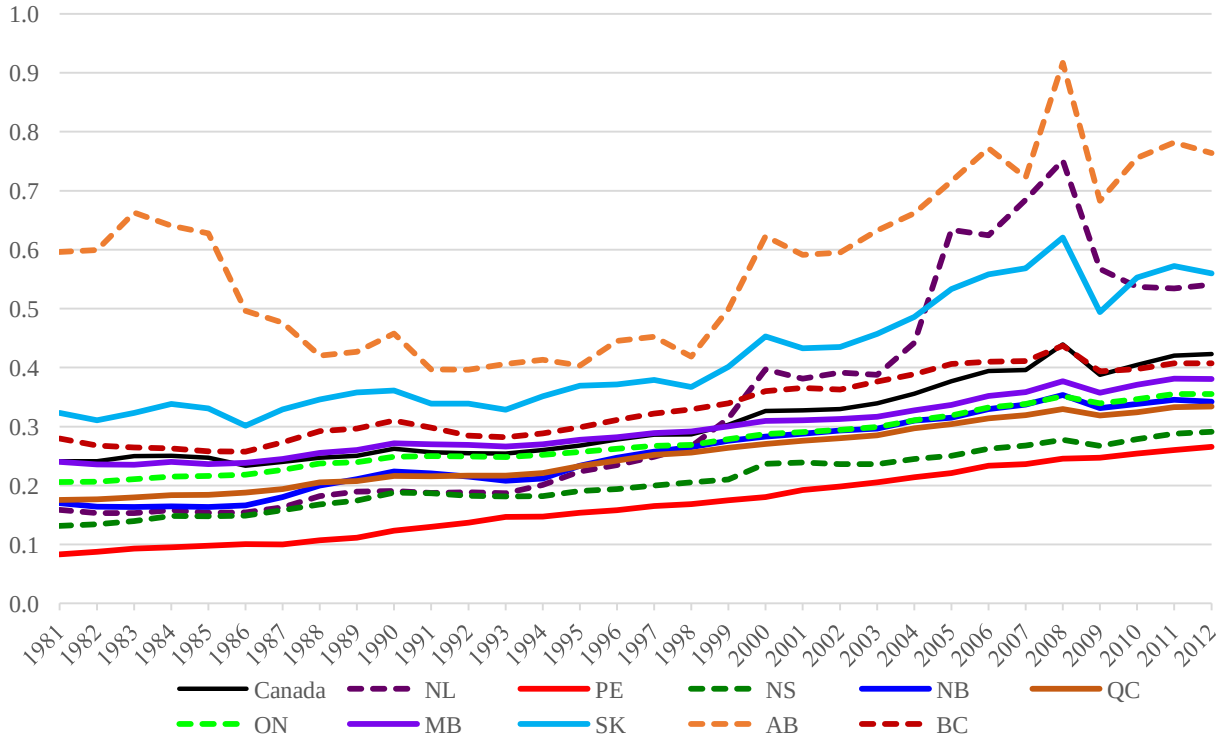


Chart IV-13: Index of Equality for Canada and the Provinces, 1981-2012

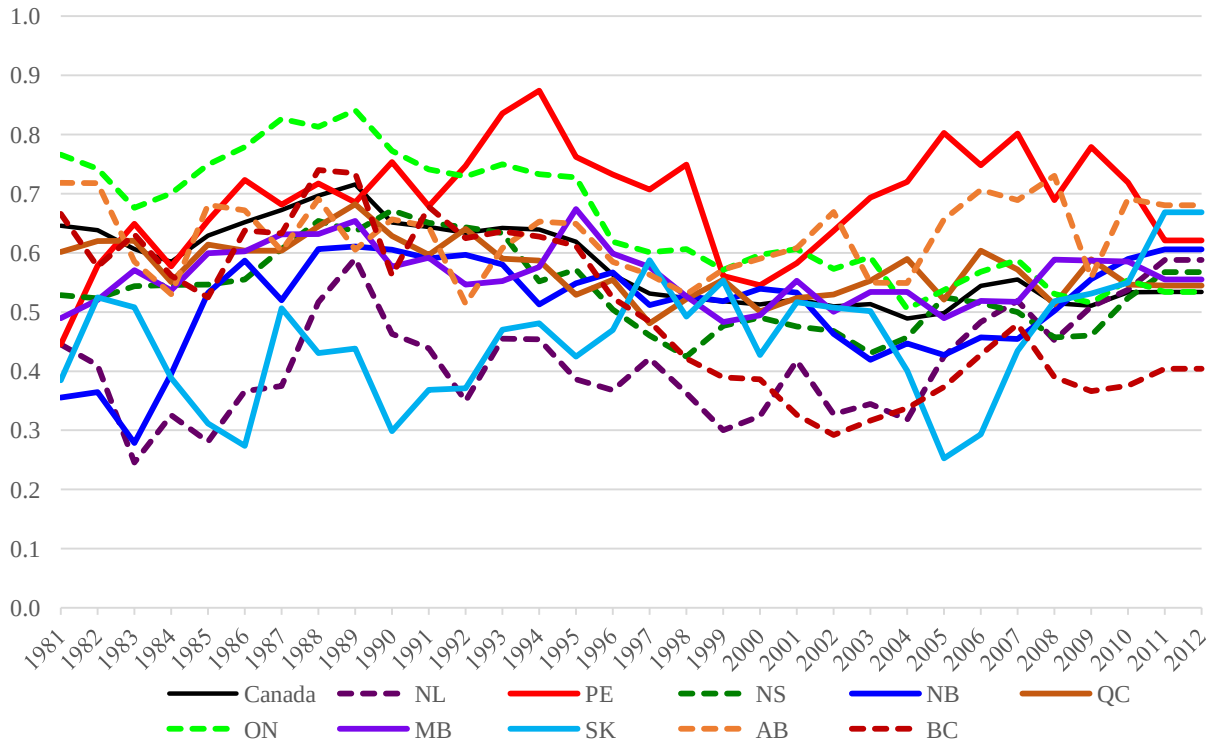


Chart IV-14: Index of Security for Canada and the Provinces, 1981-2012

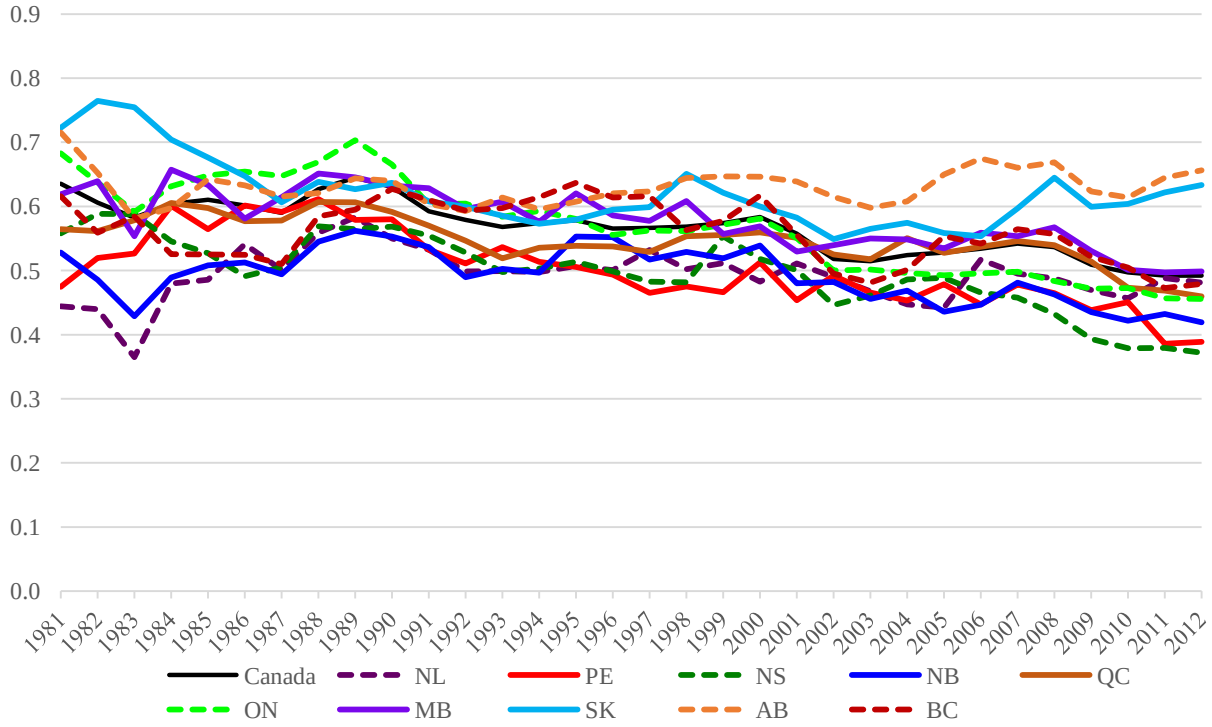


Chart IV-15: Fiscal Capacity for the Provinces, per cent, 1972-73 to 2012-13

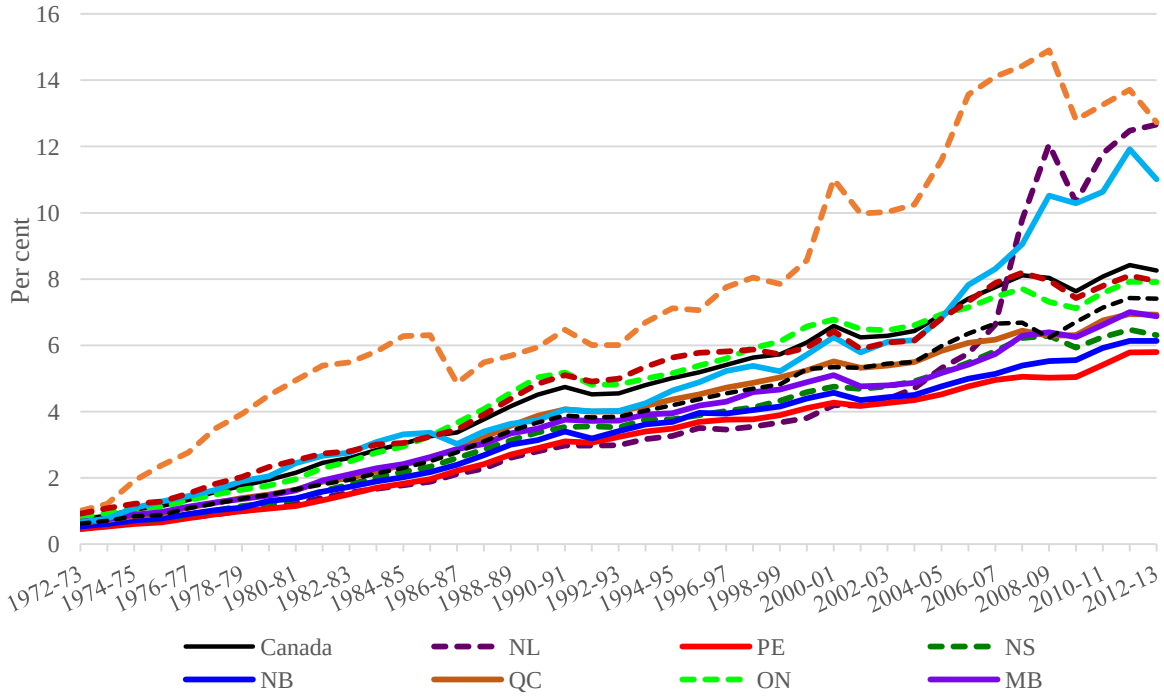


Chart IV-16: Nominal GDP per Hour Worked for the Provinces, Current Dollars, 1976-2012

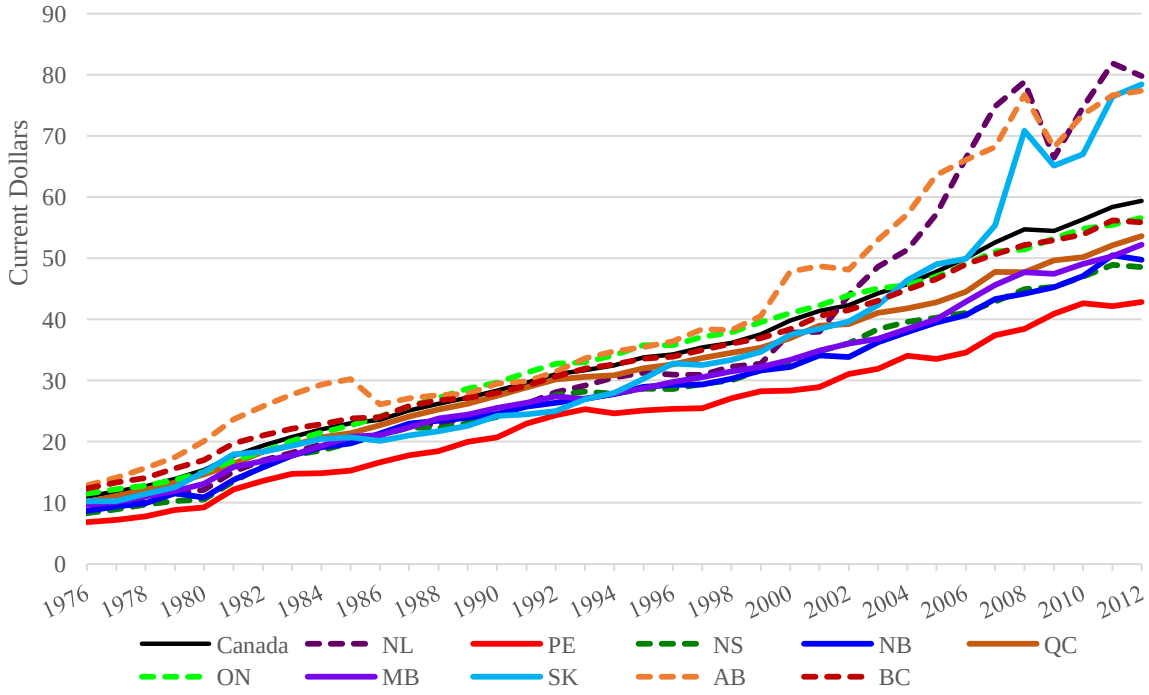


Chart IV-17: Real GDP per Hour Worked for the Provinces, 2002 Chained Dollars, 1981-2012

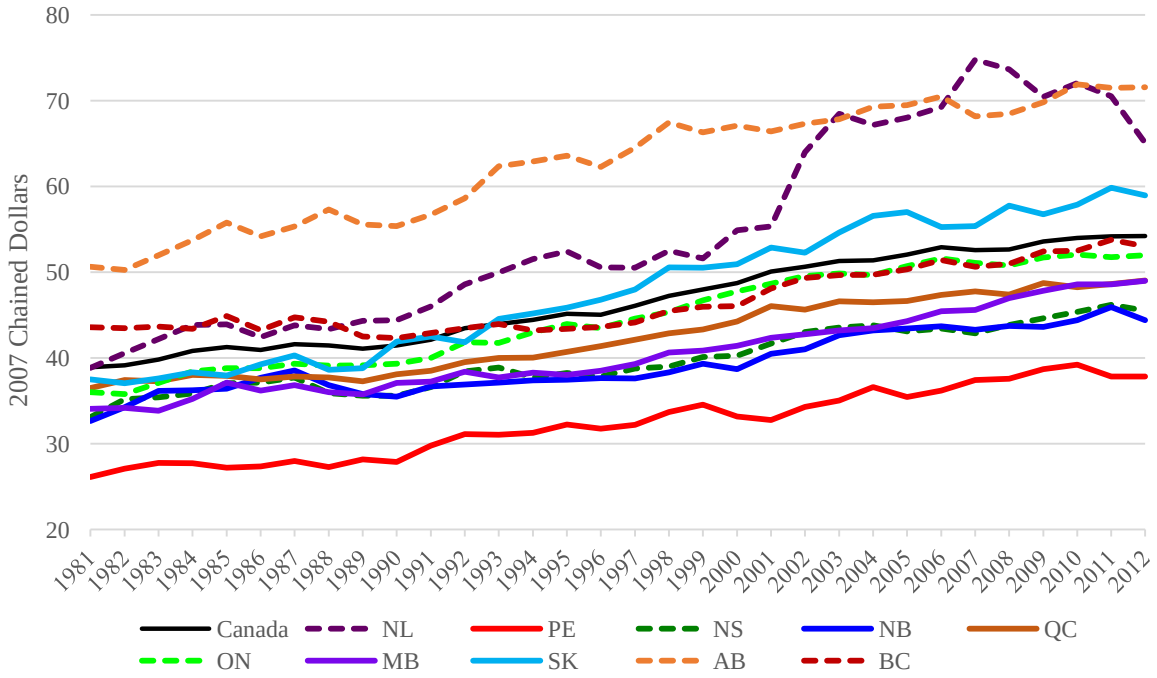


Chart IV-18: Real (2007 Chained Dollars) Capital Intensity for the Provinces, 2007 Chained Dollars, 1976-2012