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Income Growth per Capita in the Provinces since 1950

by Josh Gutoskie and Ryan Macdonald

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This article in the *Economic Insights* series illustrates how real income progressed across the provinces from 1950 to 2016. The performance of the provinces is discussed using a new set of long-run estimates for real gross domestic income per capita. This new dataset allows, for the first time, trends in aggregate real income across the provinces to be examined for the last 66 years. Long-run data allow the amplitude of cycles across time to be demonstrated, and provide sufficient data to understand changes in trends in provincial economies that are sometimes subject to long commodity cycles. Provinces focused on hydrocarbon extraction had the most rapid per capita growth. Among the other provinces, those with below-average per capita incomes in 1950 had higher growth rates than provinces with higher per capita incomes. As a result, the incomes of the provincial economies tended to converge over time.

Introduction

Since 1950, two major changes have occurred across provincial incomes in Canada. First, incomes became more similar; second, provinces with economies rich in oil and gas became the highest income provinces (Table 1).¹ These changes did not occur rapidly, but were instead the result of decades-long processes that took place across both business and commodity cycles. They reflect the investment that natural resources attracted over long periods of time, as well as income convergence among provinces not focused on hydrocarbon extraction.

To recognize the scale of the changes and the importance of provincial endowments, measures of aggregate income and its components are required for many decades. The effect of shorter-term changes, particularly from commodity price cycles that may last multiple years (Macdonald 2017), can disguise the underlying long-term tendencies of provincial economic growth, even when periods of 20 years or more are examined.

Long-run data

For provinces in Canada, aggregate income estimates over extended periods of time have not been easily available. This has hindered the understanding of long-run regional growth. Breaks in time series can occur because of major conceptual changes in underlying data sources or because estimation

methodologies change. Considerable effort is required to construct long-run estimates from sometimes disjointed historical sources.

Recently, a new dataset designed to facilitate long-run examinations of regional economic performance was made available in Table 36-10-0229-01 (Statistics Canada n.d.).² This new dataset builds on the work conducted in the Canadian System of Macroeconomic Accounts and by Brown and Macdonald (2015) to extend the time component of modern measures of provincial and territorial aggregate income back to 1950. The dataset contains per capita estimates for the following: gross domestic product (GDP), including income components and final expenditure components; deflated components; real gross domestic income (GDI);³ and important ratios, such as the saving rate and the unemployment rate. These data allow major questions about regional growth over extended periods of time to be examined.

Reordering provincial income rankings

In 2016, the oil- and gas-producing provinces had the highest levels of GDP per capita (Table 1), followed by Ontario and British Columbia. The Atlantic provinces had the lowest GDP per capita. This ranking was considerably different in 1950, before the creation of the modern oil and gas industry. Ontario

1. Examining income levels through time is not straightforward and is heavily influenced by assumptions about regional price levels and the period examined. Here, the assumption that one dollar has the same purchasing power in each province is imposed to permit regional comparisons, and the first year and last year rankings available in the new, extended dataset are discussed.
2. The new dataset contains estimates of nominal-income gross domestic product (GDP) and its components, nominal expenditure-based GDP and its components, a selection of deflated expenditure-based GDP components, real gross domestic income (GDI), unemployment rates, depreciation rates, and urbanization rates. It expands upon previously released long-run estimates for household income, inflation and population (Macdonald 2018).
3. Real GDI is a measure of aggregate real income. It combines changes in real GDP with changes in relative prices, particularly the terms of trade. Real GDI correlates with changes in the ability of an economy to purchase and invest, rather than to produce, which is what real GDP captures. For more information, see Kohli (2006), Reinsdorf (2009), Macdonald and Rispoli (2016), Macdonald (2007; 2010), and Baldwin and Macdonald (2012).



Table 1
Nominal and real provincial per capita income measures relative to Canada in 1950 and 2016

Province	1950				2016			
	Ranking		Income relative to Canada		Ranking		Income relative to Canada	
	GDP per capita	Real GDI per capita	Relative GDP per capita ¹	Relative real GDI per capita ²	GDP per capita	Real GDI per capita	Relative GDP per capita ¹	Relative real GDI per capita ²
	number		ratio		number		ratio	
Ontario	1	1	130.7	123.0	4	3	101.3	101.2
British Columbia	2	2	124.1	116.5	5	5	98.8	100.6
Alberta	3	3	98.9	95.8	1	1	132.4	132.3
Manitoba	4	4	96.0	92.9	6	6	91.7	90.8
Quebec	5	5	93.1	86.1	7	7	84.5	85.6
Saskatchewan	6	6	70.5	65.0	2	2	116.7	112.1
Nova Scotia	7	7	63.8	61.5	9	9	78.4	79.2
New Brunswick	8	8	61.3	57.8	8	8	80.5	81.0
Prince Edward Island	9	9	44.8	42.0	10	10	75.3	75.4
Newfoundland and Labrador	10	10	44.1	40.2	3	4	104.5	100.7

1. Gross domestic product (GDP) per capita in Canada is 100.

2. Real gross domestic income (GDI) per capita in Canada is 100.

Source: Statistics Canada, authors' calculations based on Table 36-10-0229-01.

and British Columbia had the highest GDP per capita, while Alberta, Saskatchewan and Newfoundland each had GDP per capita below that for Canada overall. From 1950 to 2016, Newfoundland and Labrador (formerly Newfoundland) climbed from the province with the lowest relative GDP per capita, at 44.1% of Canadian GDP per capita, to the province with the third highest relative GDP per capita, at 104.5%. Saskatchewan moved from the province with the sixth highest relative GDP per capita, at 70.5% in 1950, to the province with the second highest GDP per capita, at 116.7% in 2016. While Alberta did not move much in rank, its GDP per capita grew significantly from 1950 to 2016, rising from 98.9% relative GDP per capita in 1950 to 132.4% in 2016.

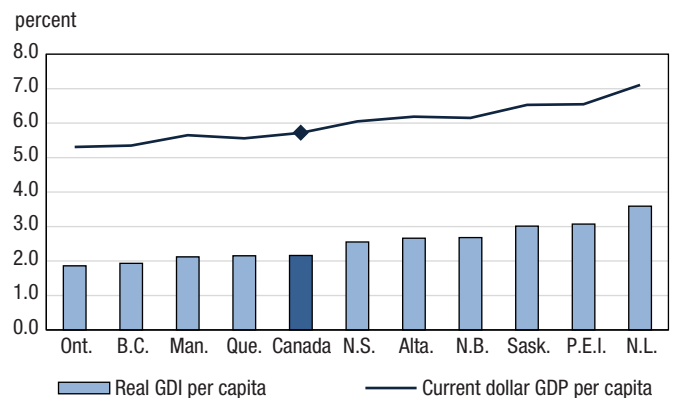
The same basic patterns are revealed in changes in provincial income rankings, where income rankings are based on the real GDI measure that accounts for provincial differences in price changes.⁴ That is, stronger price growth in oil- and gas-producing provinces was not responsible for changes in the relative ranking of provinces.

Levels of average incomes became more similar

Another notable finding in Table 1 is that the difference between the highest and lowest relative GDP per capita shrank from 86.6 percentage points in 1950 to 57.1 percentage points in 2016. This is not only because Newfoundland and Labrador's GDP per capita grew markedly, but also because the Atlantic provinces experienced higher per capita growth from 1950 to 2016 (Chart 1).

When the provinces are ranked based on average per capita income growth rates, those with large oil and gas deposits as well as those with lower per capita incomes grew the fastest. Conversely, provinces with higher per capita incomes in 1950 tended to grow relatively slowly. This occurs when either current dollar GDP per capita or real GDI per capita is examined. Ontario and British Columbia had the lowest per capita growth rates from 1950 to 2016, while Manitoba and Quebec grew just below the Canadian average. The Maritime provinces had above-average per capita income growth, as did the oil- and gas-producing provinces of Alberta, Saskatchewan, and Newfoundland and Labrador.⁵

Chart 1
Compound annual growth rate, current dollar gross domestic product (GDP) versus real gross domestic income (GDI), 1950 to 2016



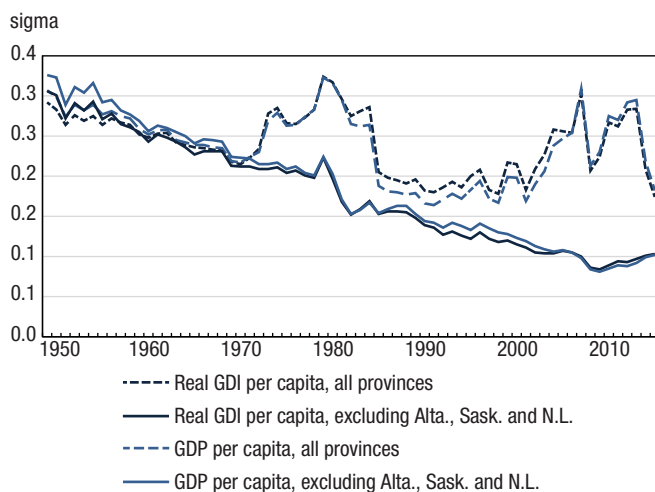
Source: Statistics Canada, authors' calculations based on Table 36-10-0229-01.

- It is difficult to determine how to adjust for different price levels when comparing income levels across regions. In Nunavut, the prices for goods and services are higher than in Alberta, making it difficult to directly compare the incomes between the two jurisdictions. Ideally, a purchasing power parity (PPP) would be used to adjust for differences such as a dollar in Nunavut not being able to buy the same volume of goods and services as a dollar in Alberta. However, a PPP is not available. As a result, it is necessary to assume that a dollar buys the same amount in all jurisdictions. Because this assumption is strong, and demonstrably wrong for the territories, only incomes from the provinces are included.
- Previous work has shown the same pattern in household income measures (Brown and Macdonald 2015).

Convergence patterns over time

Average income levels have become more similar, resulting from differences in the pattern of long-run growth rates over the entire period.⁶ Convergence patterns over time can be illustrated using the standard deviation (sigma) of the income levels per capita across provinces (Chart 2). If sigma is declining through time, this indicates that incomes are becoming more similar; if sigma is increasing, this indicates that incomes are becoming less similar. Sigma calculated for all provinces declined from 1950 to the early 1970s. At that point, it notably increased, reflecting the different effects of rising oil prices on the economies of Alberta and Saskatchewan compared with the remaining provinces. In 1986, this increase was largely undone as energy prices declined sharply. It did not revert to a declining trend in the following decades. Rather, it slowly rose until the early 2000s, when energy prices began to rapidly increase again. When Alberta, Saskatchewan, and Newfoundland and Labrador are excluded, the change in trajectory during the early 1970s does not emerge. Instead, sigma excluding these provinces declined from the 1950s to around 2010.

Chart 2
Sigma convergence by province group, real gross domestic income (GDI) per capita versus gross domestic product (GDP) per capita



Source: Statistics Canada, authors' calculations based on Table 36-10-0229-01.

The same pattern present in GDP per capita and real GDI per capita also appears in real household disposable income per capita (Brown and Macdonald 2015). However, household

income measures do not adjust by the same amount as the newly available GDP per capita and real GDI per capita measures. This happens for two main reasons. First, GDP per capita and real GDI per capita include the effects of rising prices on wages and profits rather than only the effects on wages. The implication is that profits are more sensitive than labour remuneration to price increases and decreases. Second, real GDI per capita adjustments reflect a rising ability to purchase investment goods rather than only consumption goods. Investment goods are more sensitive, overall, to the type of adjustments that occur when energy prices rise (Macdonald 2010). As a result, GDP per capita and real GDI per capita provide a more complete image than real household disposable income per capita of the effect that changing energy prices have on differences in regional income growth patterns.

Resource price cycles

The difference between the sigma measure across all provinces and across the group excluding major oil and gas producers reflects a permanent difference that is exacerbated by cycles. This effect has accumulated over time, as cyclical upswings produced innovation and increased infrastructure investment that is not removed during cyclical downswings.⁷

For oil- and gas-producing provinces, cyclical activity also creates an important dynamic. Commodity cycles, more so than business cycles, produce periods of acceleration, deceleration and reversal of long-run tendencies, and the scale of the effects is not constant across cycles. Moreover, the degree to which long-term growth patterns can be influenced by cyclical changes can differ across commodity price cycles. Despite significant declines in oil prices returning the price of oil to pre-boom levels, the commodity cycle during the 2000s resulted in Alberta's real GDI per capita increasing 11.2% from 2002 to 2016. Newfoundland and Labrador (35.7%) and Saskatchewan (35.8%) fared better than Alberta and experienced larger overall increases.

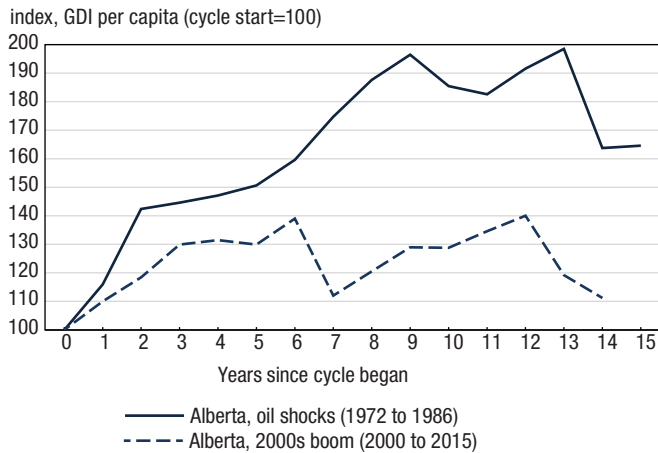
However, the latest commodity cycle had a smaller magnitude than the previous cycle in the 1970s. Chart 3 shows the compound growth rate of real GDI per capita in Alberta beginning in 1972 (i.e., the cyclical upswing associated with the two oil shocks) and in 2002 (i.e., the cyclical upswing associated with the 2000s commodity cycle).⁸ The two cyclical upswings lasted approximately the same length of time: 14 years, from 1972 to 1986; and 13 years, from 2002 to 2015. In addition, both upswings had recessions during the cycle, and both cycles concluded with a rapid drop in oil prices (1986 and 2014/2015). In percentage terms, the 1970s upswing was about 10% larger until the second oil shock in 1979, after which

6. Income differentials and convergence patterns across Canadian provinces have been studied for many years. See Breau and Saillant 2016; Darku 2011; Coulombe 2011, 2006, 2003, 2000; DeJuan and Tomljanovich 2005; Kaufman, Swagel and Dunaway 2003; Coulombe and Day 1999; Coulombe and Tremblay 1998; Afxentiou and Serletis 1998; Gunderson 1996; Helliwell 1996; Lee 1996; Coulombe and Lee 1995; McLinnis 1968.
 7. Baldwin and Macdonald (2012) demonstrate that Canada undergoes a series of resource price cycles that produce permanent growth across cycles, rather than only cyclical changes.
 8. For a discussion on commodity cycles important to Canada, see Macdonald (2017).



it was about 50% larger than the 2000s upswing. Similarly, real GDI per capita declined 17.5% in 1986, a larger decline than in 2014/2015, when GDI per capita declined 14.9%. However, while the most recent cycle saw real GDI per capita increase by a little over 11%, the 1970s cycle saw real GDI per capita increase over 60%.

Chart 3
Commodity cycle comparison for Alberta, 1972 to 1986 and 2000 to 2015



Note: GDI: gross domestic income.

Source: Statistics Canada, authors' calculations based on Table 36-10-0229-01.

Analysis of regional growth in Canada

This article demonstrates some of the regional analysis made possible by the release of the long-run provincial and territorial data in Table 36-10-0229-01 (Statistics Canada n.d.). The newly available long-run data will also make it easier to examine the extent to which differential income growth translates into differential consumption growth, and the role of saving and investment in long-run income growth patterns by province.

In Canada, regional growth has not been equal across provinces since 1950. Provinces with below-average per capita incomes tended to grow more rapidly, as did provinces with significant oil and gas deposits. These differences manifested themselves in measures of aggregate income (real GDI per capita and real GDP per capita), but also in measures of household income (Brown and Macdonald 2015). The differences in provincial growth patterns led to a reordering across provinces in terms of highest per capita incomes. Ontario and British Columbia were displaced by Alberta, Saskatchewan, and Newfoundland and Labrador for highest per capita income. Among the remaining provinces, per capita incomes became more similar. The reordering and the long-run nature of the underlying tendencies that produce it are apparent in long-run income estimates across governments, commodity price cycles and business cycles, policy changes related to deficits and the interest rate, the introduction and dissolution of international agreements (e.g., Bretton Woods or the Auto Pact), and events specific to particular regions (e.g., the sequence of softwood lumber disputes or the collapse of fisheries on the Atlantic and Pacific coasts).

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