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Analytical Paper

Insights on the Canadian Economy

Differences in Canadian and US Income Levels, 1961 to 2008

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Using new PPP rates, incomes per capita in Canada were 92% of the US level in 2008. This is higher than the 85% using conventional PPPs and below the 96% when converting with the exchange rate.

1 Introduction

Canada's per capita income is often compared with the United States. These comparisons focus on differences in the levels of income and whether the gap between the two countries is narrowing or widening.

Statistics Canada and the US Bureau of Economic Analysis (BEA) each produce a myriad of summary macroeconomic statistics on their respective economies. But using these statistics to compare incomes in Canada and the US is not straightforward.

Studies that compare measures of income across countries must first deal with what is meant by income and then what price to use to convert these incomes into a common unit of measure. This paper shows that a sensible metric is income measured in terms of the goods and services that can be acquired by each country's residents. However, the price indices necessary for comparing these incomes (referred to as purchasing power parities, or PPPs for short) need to be calculated, as market exchange rates can be misleading when comparing incomes.

This paper describes a new way that PPPs are calculated and presents estimates of income per capita in Canada and the US for the period 1961-2008¹

2 The Difference Between GDI and GDP

Cross-country comparisons of income often focus on Gross Domestic Product (GDP). A GDP-based concept focuses on production rather than on what that production can purchase. The measure needed for comparisons of what incomes can purchase corresponds to Gross Domestic Income (GDI). Gross Domestic Income provides a measure of the goods and services that can be purchased in Canada (including imports from abroad) with the income earned from production.

Aggregate incomes are based on GDP from the System of National Accounts (SNA). The value of GDP equals the value of GDI. This is not the case for real GDP and GDI. This is because real GDP calculations are based entirely on prices for domestic production, while real GDI has to use import prices to capture the capacity to purchase, which includes imports.

As a consequence, differences in the terms of trade (or the relative prices of exports and imports) are crucial in explaining differences between real GDP and GDI.

1. See Baldwin and Macdonald (2009) for a more extensive background paper.

3 The Canada/US Purchasing Power Parity Rate

Going from estimating income within one country to comparing across countries with different currencies and prices requires an appropriate exchange rate to convert Canadian and American incomes to a common currency.

Market-based exchange rates are an obvious source for this conversion. However, they can provide a misleading estimate when used to transform incomes into a common currency. Because exchange rates are determined in the foreign exchange market that balances the supply and demand for currencies, they are influenced by factors that do not impact purchasing power. These factors can be classified as those relating to trade in goods and services and those related to capital flows. The former by definition excludes the non-traded portion of GDP, while purchasing power parity covers both the tradable and non-tradable parts of GDP and hence is more comprehensive. Capital flows are a major source of currency in the foreign exchange market, but has no counterpart in purchasing power parities.

One commonly-used method to transform the dollar value of income measured in different currencies into a common currency is “purchasing power parity” prices. PPPs are prices that are estimated by comparing the ratios of prices for similar goods and services between countries. The price ratios for many goods and services are combined to form an aggregate PPP.

In its simplest form, a PPP is the ratio of the price of a good or service in one country in its national currency relative to the price of the same item in another country expressed in its currency. It represents a currency conversion rate that would equalize the purchasing power of those currencies for the commodity in question. For example, a PPP of 0.90 for shoes signifies that 90 cents US purchases the same quantity of shoes as \$1 Canadian.

International income comparisons need to be made in a manner consistent with the concept of either GDI or GDP. Until very recently, most estimates of PPPs were generated for comparisons of GDP and not GDI. The same conversion rate cannot be used for both measures of income. A new and different conversion rate is needed for cross-country comparisons of income for the same reasons that a different deflator is used for the creation of the volume of GDI and GDP within a country.

There are two ways of calculating PPPs.² The first uses the price deflator for GDP. Here, we make use of a 1999 benchmark derived from Baldwin and Gu (2009). We project the benchmark forward and back using the ratio of the implicit GDP deflators for Canada and the US. The second calculation takes these results but uses the price deflator for GDI rather than for GDP.

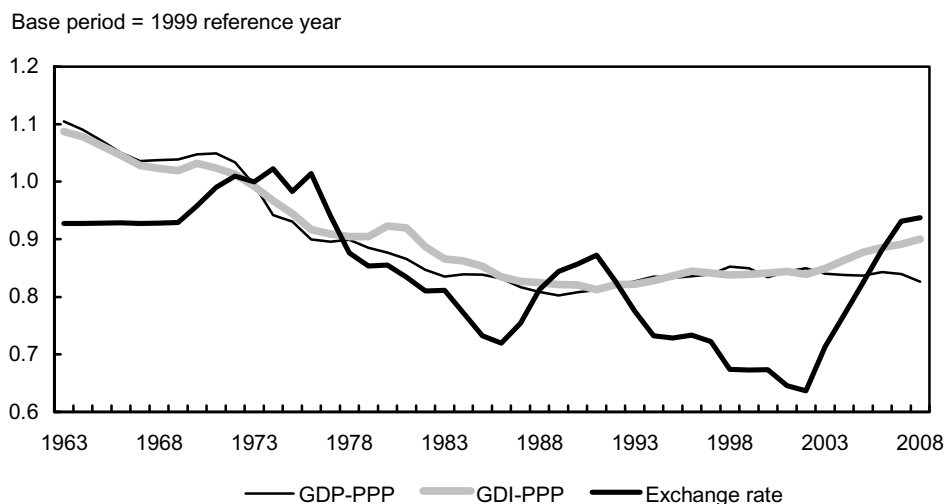
The PPP rates based on GDI and GDP are compared with the market exchange rate in Chart 1. Throughout the 1961 to 2008 period, the PPP rates are less variable than the exchange rate. More importantly for comparisons of income, they are rarely the same in absolute value. When Canada had a fixed exchange rate during the 1960s and early 1970s, the exchange rate was

2. Our estimate of long-run purchasing power parity is taken from the 1999 benchmark produced by Statistics Canada, with extrapolations forward and backward using the ratio of the GDI deflator in Canada relative to the GDI deflator for the US. The reference year makes use of a select set of prices that Statistics Canada collects for the OECD program that calculates prices for inter-country comparison of GDP. The extrapolations use the price ratios for a finer level of detail of goods and services than enter into the calculation of the reference years. The GDI purchasing power parity reference year calculation uses only final domestic expenditure prices.

below the PPP rates. Between 1972 and 1990, the PPP rates and the market exchange rates both show a decline relative to the United States, and both the PPP for GDI and the exchange rate increased during the 2003 to 2007 resource boom, although the exchange rate rose much faster. However, both PPPs edged up in the 1990s, while the exchange rate fell.

The growth rates for the two PPP rates track each other closely from the mid-1980s to the early 1990s, but they diverge during the oil price shocks in the mid-1970s and early 1980s and after 2002. In each instance, the divergence is the result of different terms of trade movements between Canada and the US.

Chart 1
\$US/\$CDN market exchange rate and PPP conversion rate



4 Comparisons of Income Per Capita

The level of income per capita derived from alternative conversion rates of Canadian incomes into US dollars is presented in Chart 2 and Table 1.

GDI per capita in Canada relative to the US has undergone several long cycles. It was about 83% of the US level in the 1960s, increased to 98% in the early 1980s, before a long decline to near 80% by the late 1990s. It then rebounded to 92% of the US level by 2008.

Income comparisons made using the PPPs for GDI illustrate the degree to which higher prices, reflecting resource booms, have contributed to changes in the gap of Canadian incomes relative to the US. Income per capita in Canada, converted using the PPPs for GDI, rose from 85% of the US level in 2002 to 92% in 2008. Measured in US dollars, Canadian income per capita increased by \$11,300 from \$31,800 to \$43,100, while US per capita incomes increased by \$10,500 from \$36,300 to \$46,800 over the same time period. Income per capita rose almost twice as much in Canada (17%) as the US (8%) between 2002 and 2008, using the PPPs for GDI.

Chart 2
Income in Canada relative to the US

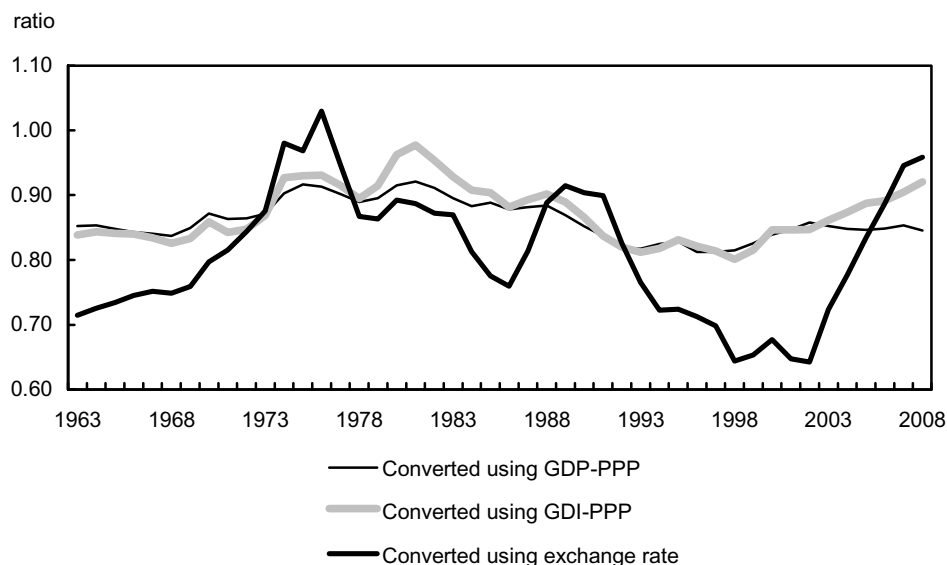


Table 1
Income per capita estimates; US and Canada

	USA			Canada			
	GDP	Income converted using the exchange rate	Ratio to US	Income converted at PPPs based on GDP	Ratio to US	Income converted at PPPs based on GDI	Ratio to share of US
	US\$		%	US\$	%	US\$	%
1961	2,964	2,213	74.7	2,500	84.3	2,461	83.0
1965	3,700	2,717	73.4	3,138	84.8	3,111	84.1
1970	5,064	4,036	79.7	4,413	87.1	4,348	85.9
1975	7,585	7,344	96.8	6,954	91.7	7,055	93.0
1980	12,249	10,929	89.2	11,209	91.5	11,793	96.3
1985	17,695	13,726	77.6	15,718	88.8	15,989	90.4
1990	23,196	20,956	90.3	19,758	85.2	20,080	86.6
1995	27,750	20,088	72.4	22,978	82.8	23,061	83.1
2000	34,761	23,544	67.7	29,169	83.9	29,426	84.7
2005	41,961	35,023	83.5	35,520	84.7	37,231	88.7
2008	46,842	44,906	95.9	39,598	84.5	43,121	92.1

In the 1970s, a similar phenomenon occurred. Canadian income per capita converted by its PPP for GDI grew 32% between 1972 and 1981 versus 14% in the US. As a result, Canadian income rose from 85% of the level of US income in 1972 to 98% by 1981, using PPPs based on GDI. Measured in US dollars, the gain translates into a per capita increase of \$6,300 in Canada from a per capita income of \$5,000 in 1972 to \$11,300 in 1981. In the US, per capita incomes rose by \$7,700 from \$5,900 to \$13,600.

Both of the periods when Canadian income rose relative to the US were characterized by resource booms. In both periods, the terms of trade changes were favourable to Canada and unfavourable to the US. Export prices increased relative to import prices, allowing Canadian

production to be exchanged on increasingly favourable terms for foreign goods. This gave an extra boost to income in Canada converted with PPPs based on GDI than PPPs based on GDP.

Over the whole period between 1961 and 2008, the gap between Canadian and US GDI per capita declined. Higher energy prices raised Canadian income relative to American income in both the 1970s and after 2000. Incomes in Canada reached their highest relative level at 98% of American incomes in the early 1980s and have recently returned to levels over 90%. However, whether this increase is the result of an emerging trend or is just the result of a short-run commodity cycle depends on the future course of world commodity prices.

If market exchange rates were used rather than PPPs, nominal income per capita in Canada reached nearly the US level in 2008, reflecting the rapid rise in the exchange rate (Chart 2). As noted earlier, however, this increase is exaggerated by attributing the rising purchasing power of the Canadian dollar to all purchases made in Canada when this really applies only to imports. As well, inflation was higher in Canada in the 1970s and 1980s, which inflated nominal incomes.

In conclusion, since 1961 Americans have had higher incomes than Canadians. After adjusting for differences in the purchasing power of the Canadian and American currencies, American incomes per capita using PPPs based on GDI were higher than Canadian income per capita in every year. But the size of the difference varies over time. During resource booms, Canadian incomes rose relative to American incomes as the terms of trade boosted Canadian purchasing power and lowered US purchasing power. During periods of declining resource prices, Canadian income growth did not keep pace with American income growth.

5 Technical Appendix – Why PPPs were Revised

Purchasing power parities are estimates of relative purchasing power between two or more currencies. By adjusting to a common currency and a common set of prices, they can be used to make international comparisons of the relative volume of goods and services.

PPP data are typically built up from detailed final demand categories, with adjustments for inventories to portray the data in terms of total GDP. In nominal terms, GDP equals gross domestic income (GDI), and the two terms are often used interchangeably. In real terms, however, there is an important distinction between GDP and GDI which arises primarily from changes in the prices of the commodities a country exports and imports. These terms of trade adjustments can affect the relative purchasing power of a country's currency and thus represent income changes without necessarily directly impacting output.

With the release of updated bilateral PPP estimates for Canada and the US, an improvement to the methodology to extrapolate to non-benchmark years has been incorporated. This new method, which considers only domestic prices in calculating PPPs based on GDI, yields an upward trend in PPP for the total economy in the last few years. This is in sharp contrast to the downward trend of previously published data, which were calculated using PPPs based on GDP after the 2002 benchmark year. This difference arises because the aggregate PPP now captures the income gains associated with terms of trade improvements affecting Canada in recent years. The terms of trade adjustments are no longer treated as price changes and thus contribute to income growth. The new method is more consistent with how PPPs are calculated in the benchmark year. This should reduce future revisions to the data when new benchmarks are introduced.

The change in methodology affects the deflation of net exports. PPP studies typically make use of exchange rates as proxies for net export prices. This is primarily because comparative import and export prices are difficult to collect, given that countries do not tend to import and export the same goods and services. However, this approach is not without criticism. It assumes that exchange rate changes are immediately and fully reflected in market prices of traded goods and services, which is not supported by empirical evidence.³ Instead, a PPP aggregate for domestic consumption and investment is now used for the trade balance. This is because a measure of relative domestic prices is more appropriate for use in estimating purchasing power of the income generated through trade. This is similar to the procedure used in country comparisons for the Penn World Tables⁴ and is consistent with the calculation of quarterly real GDI for Canada.⁵

3. Baldwin, J.R. and B. Yan, 2004, "The Law of One Price: A Canada-US Exploration." 50, 1: 1-10.

4. See Deaton, Angus and Heston, Allan, "Understanding PPPs and PPP-Based National Accounts", Cambridge, MA; National Bureau of Economic Research, Working Paper 14499, November 2008.

5. CANSIM Table 380-0062.

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