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Canadian and U.S. Real Income Growth: A Reversal of Fortunes

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Abstract

This paper shows the importance of including relative price changes and international income flows in real income measures for Canada and the US. In doing so, it examines the 1993 System of National Accounts (SNA) recommendations for calculating the trading gain. Using Kohli (2006), the apparently contradictory recommendations of the SNA 1993 are shown to be related, and are in fact equal when trade is balanced.

The adjustment for trading gains is comprised of two price ratios: the terms of trade and the relative price of traded to non-traded goods. The terms of trade is the more important price ratio for both countries, and changes in the terms of trade are shown to respond to commodity price movements. The trading gain, in large part, captures the effect of commodity price cycles and shocks on these economies.

A comparison of Canadian and US economic performance is subsequently performed. Relative measures of labour productivity, real GDP per capita and real GNI per capita are examined over the 1961 to 2007 period. From 1961 to the late 1990s or early 2000s, all measures indicate the same pattern. Canada does relatively better from 1961 to the early 1980s, then the US does relatively better until the late 1990s or early 2000s. Post-2002, however, the measures diverge significantly as relative price gains included in real GNI lead to Canada performing better than the US. At the same time, Canada's relative real GDP per capita is mostly unchanged and its relative labour productivity declines. Conclusions about which country does better post-2002 depend greatly on whether or not the impact of rising commodity prices is accounted for.

Introduction

International comparisons of real income and income convergence are often based on models that assume real GDP is a measure of real income (Bode and Ray 2006). While this is applicable to comparisons of closed economies, when open economies are examined changes in price structures can contribute importantly to real income growth – something that real GDP does not capture.

While nominal GDP is equivalent to nominal aggregate income, when deflated using a GDP deflator, the resulting volume series tracks changes in the volume of production. As such, it captures changes related to movements of an economy's production possibilities frontier (PPF). Real GDP is, therefore, the correct measure to use for examining production cycles or productivity. However, it is less than ideal for examining changes in real income.

While productivity growth is the main determinant of long-run living standards, a number of additional factors are also be important for real income growth, particularly in the short-run. Depending on who owns the capital invested in the domestic economy, and how relative prices change, the volume of goods and services that an economy can purchase can differ from its production. An economy may improve the efficiency with which it produces goods and services, but if it produces goods whose prices are falling relative to the goods it purchases, or if it increasingly remits more and more income to foreign owners of capital, it may not see much of an increase in its standard of living as measured by the purchasing power of its income. Modifications can be made to traditional estimates of GDP to account for these factors.

The 1993 System of National Accounts outlines how these modifications may proceed. First, the net flow of income from international investment, known as net income from abroad (NIFA), is added to nominal GDP to produce nominal gross national income (GNI). Second, when GNI is deflated a trading gain is included. The trading gain captures the benefit/detriment experienced by an open economy when the terms of trade or the relative price of traded to non-traded goods change.

The importance of including NIFA and the trading are illustrated by examining the relative performance of the Canadian and U.S. economies from 1961 to 2007. Special attention is given to the 2002 to 2007 period. During these years, changes in commodity prices, manufactured goods prices, the exchange rate and international investment income have all contributed importantly to real income growth in Canada while detracting from US real income growth.

Unlike Canada, rising commodity prices, particularly for energy, have reduced U.S. real income growth relative to its GDP growth. And, because the U.S. derives a smaller percentage of its national income from exporting and importing than does Canada, the influence of commodity price changes has been smaller. The contribution of international income flows also has had a more muted impact in the U.S. for the same reason.

As a result, a very different picture of relative performance of the Canadian and U.S. economies emerges when real GNI rather than real GDP or labour productivity is used. From 2002 to 2007, U.S. real GDP per capita growth averages 1.9% while Canadian GDP per capita growth averages 1.7% making it appear that the U.S. economy outperforms the Canadian. Once changes in resource prices, exchange rates and international investment income are accounted for, real GNI per capita growth in the U.S. averages 1.9%, which is similar to its GDP per capita growth. However, the Canadian adjusted measure of real GNI per capita growth averages 3.4%, twice the average per capita real GDP growth in Canada and nearly double the U.S. rate.

The remainder of this paper illustrates the relative importance of NIFA and the trading gain for real income growth in Canada and the U.S. Section 2 discusses real income measurement. It shows that the apparently disparate recommendations for calculating real income in the 1993 System of National Accounts are, in fact, closely related. Section 3 describes the data employed and analyzes the Canadian and U.S. real aggregate income measures. Section 4 provides a per capita growth comparison and section 5 concludes.

Real income measures

The income measures employed here stem from the widely recognized relationship between production and income measures outlined in the 1993 System of National Accounts (SNA 1993). The SNA 1993 outlines how income measures based on income from production (real GDP) and an income measure that is broader in scope (real GNI) relate to each other. The more broadly defined income measure incorporates net income from abroad (NIFA) and the trading gain.

Moving from real GDP to real GNI involves two steps. First, the impact of international capital ownership is incorporated into the income measure. This is accomplished by adjusting GDP for NIFA. NIFA is composed of payments made to the home country from abroad net of payments to abroad from the home country.

The second adjustment is for the trading gain. The trading gain captures changes in the purchasing power of domestic production on world markets. When the terms of trade shift, or the relative price of traded to non-traded goods prices change, the volume of goods and services that can be purchased with domestic production on international markets changes. The trading gain, therefore, captures the volume response that is generated from relative price movements.

Calculating the trading gain and deflating NIFA present the same problem. NIFA is a net measure of the payments made by residents to foreigners and the payments foreigners make to residents when they own capital outside of their respective borders. The trading gain captures changes in purchasing power and necessitates direct deflation of net exports. Both necessitate deflation of non-commodity flows.

The SNA 1993 is more explicit about how to deal with NIFA than with the trading gain. In sections 16.158 and 16.160, it states that a broad numeraire composed of final domestic expenditures should be used to adjust NIFA for price change.

Deflating net exports is more complicated because there are numerous arguments for and against different methods (see for example: Geary 1961, Stuvel 1959, Dennison 1981, Silver and Mahdavy 1989, Nicholson 1960, Courbis 1969, Kubayashi 1971, Kohli 2006, SNA 1993). Although there is disagreement about the best method, an implicit deflator is not optimal. Even though it is possible to calculate an implicit deflator for net exports in a similar manner to the implicit GDP deflator, this process can lead to unsatisfactory results. Relative price changes, rather than demand or supply changes, can induce changes in export or import volumes making it possible to have a nominal net export surplus and a real export deficit. Geary (1961) argues that:

> " . . . Accordingly, most workers in this field reject the constant-price account . . . as possibly having a negative price deflator for the [net export] surplus. The view taken is that [the net export surplus] should be deflated separately and . . . the trading gain . . . introduced . . ." Pg 4

The SNA 1993 summarizes by stating:

> There is a large but inconclusive literature [about selecting which price index to use to deflate net exports], but one point on which there is general agreement is that the choice of [that index] can sometimes make a substantial difference in the results. Thus the measurement of real [GNI] can sometimes be sensitive to the choice of [the price index] and this has prevented a consensus being reached on this issue.
>
> SNA 1993 16.153

The SNA 1993 provides several possible suggestions for deflating net exports:

1. Export or import price indices
2. Some form of an average of export and import price indices
3. Final domestic demand price index
4. Consumer price index

However, it recommends using an average of import and export prices (the Geary method) in section 16.155 C and the FDD deflator in section 16.160. The recommendations are, at first, disparate and inconclusive. However, it turns out that the trading gain generated from the average of export and import prices is a constrained version of the trading gain generated when the FDD deflator is employed.

To illustrate the relationship between export and import price, and FDD based trading gains a Tourquist index is used to decompose real GNI into its constituent pieces. By making use of the results from Kohli (2006), it is then possible to illustrate that real GNI deflated using only the FDD deflator is a preferable method for calculating the trading gain.

Throughout the derivation, the GDP and the FDD deflators are used to illustrate the impact of relative price shifts. This amounts to comparing a deflator that adjusts for all relative price changes (the GDP deflator) against a deflator that adjusts only for relative price changes in the domestic economy. In all cases NIFA is deflated by the FDD deflator.

When the Tornquist index is employed, the GDP deflator is calculated as the weighted average of movements in FDD prices (ie consumption prices, investment prices and government expenditure prices), export prices and import prices where import prices enter with a minus sign.

By denoting $\ln(P_{Y,t/t-1})$ as the Tornquist index value for the GDP deflator, it can be written as:

$$\ln(P_{y,t/t-1}) = \sum_i \overline{v}_{i,t/t-1} \ln(P_{i,t/t-1}) \quad i = FDD, X, M$$

where FDD, X and M represent final domestic demand, exports and imports; and, the weights are calculated as each aggregate's share of nominal GDP.

$$v_{i,t} = \frac{\gamma_i}{GGP} \quad \gamma_i = FDD, X, M$$

which are averaged across t and $t-1$

$$\overline{v}_{i,t/t-1} = \frac{(v_{i,t} + v_{i,t-1})}{2} \quad i = FDD, X, M .^{1}$$

Using the GDP deflator, it is possible to calculate a version of real GNI that does not include a trading gain. This version of real GNI, denoted y_Y, is calculated as:

$$\ln(y_{Y,t/t-1}) = v_{GDP,t}\left(\ln(GDP_{t/t-1}) - \ln(P_{GDP,t/t-1})\right)$$
$$+ \underbrace{(v_{\text{Receipts},t}\left(\ln(\text{Reciepts}_{t/t-1}) - \ln(P_{FDD,t/t-1})\right) - v_{\text{Payments},t}\left(\ln(\text{Payments}_{t/t-1}) - \ln(P_{FDD,t/t-1})\right))}_{\text{Net Income From Abroad (NIFA)}}$$

and the corresponding weights are the shares of GDP, receipts from abroad and payments to abroad in nominal GNI.

To include the trading gain in real GNI, it is necessary to move to a deflator that allows relative price movements to affect real income. In practice, this means deflating net exports rather than imports and exports separately. This trading-gain inclusive measure of real GNI, denoted y_{GNI}, is:

[1] The GDP deflator also includes inventories and a statistical discrepancy. These are omitted from the analytical section.

$$\ln(y_{GNI,t/t-1}) = \nu_{GDP,t}\left(\ln(GDP_{t/t-1}) - \ln(P_{FDD,t/t-1})\right)$$
$$+\underbrace{\left(\nu_{\text{Receipts},t}\left(\ln(\text{Reciepts}_{t/t-1}) - \ln(P_{FDD,t/t-1})\right) - \nu_{\text{Payments},t}\left(\ln(\text{Payments}_{t/t-1}) - \ln(P_{FDD,t/t-1})\right)\right)}_{\text{Net Income From Abroad (NIFA)}}$$

The trading gain is the difference between real GNI which uses the real GDP deflator and real GNI which uses only the real GNI deflator.

$$\ln(T_{t/t-1}) = \ln(y_{GNI,t/t-1}) - \ln(y_{Y,t/t-1}) \quad (1)$$

which reduces to the difference between GDP deflator growth and GDI deflator growth – i.e. to the difference between domestic price and import/export prices:

$$\ln(T_{t/t-1}) = \ln(P_{Y,t/t-1}) - \ln(P_{GDI,t/t-1})$$

Using (1), real GNI growth including the trading gain can be re-written as the contribution from changes in production (real GDP), from relative prices and from NIFA:

$$\ln(y_{GNI,t/t-1}) = \nu_{GDP,t}\left(\ln(GDP_{t/t-1}) + \ln(T_{t/t-1})\right) + \ln(NIFA_{t/t-1}) \quad (2)$$

The trading gain can be further decomposed into a terms of trade effect and a Salter ratio effect (Kohli 2006). To illustrate this,

- Define terms of trade growth as :
$$\ln(ToT_{t/t-1}) = \ln(P_{X,t/t-1}) - \ln(P_{M,t/t-1});$$
- Define growth in traded prices as:
$$\ln(P_{T,t/t-1}) = \frac{1}{2}\left(\ln(P_{X,t/t-1}) + \ln(P_{M,t/t-1})\right); \text{ and,}$$
- Define growth in the Salter ratio[2]:
$$\ln(E_{t/t-1}) = \ln(P_{T,t/t-1}) - \ln(P_{FDD,t/t-1}).$$

Using these definitions and (3) it can be shown that trading gains are the weighted sum of the Salter ratio and terms of trade movements:

$$\ln(T_{t/t-1}) = (\bar{\nu}_X - \bar{\nu}_M)\{\ln(E_{t/t-1})\} + \frac{1}{2}(\bar{\nu}_X + \bar{\nu}_M)\{\ln(ToT_{t/t-1})\} \quad (3)$$

Combining (2) and (3) shows that real GNI is equal to weighted sum the of real GDP growth, the Salter ratio and terms of trade adjustments, and NIFA:

$$\ln(y_{GNI,t/t-1}) = \nu_{GDP,t}\left(\ln(GDP_{t/t-1}) + \left[(\bar{\nu}_X - \bar{\nu}_M)\{\ln(E_{t/t-1})\} + \frac{1}{2}(\bar{\nu}_X + \bar{\nu}_M)\{\ln(ToT_{t/t-1})\}\right]\right)$$
$$+\ln(NIFA_{t/t-1}) \quad (4)$$

[2] The ratio of traded to non-taraded goods prices is often referred to as a real exchange rate. This nomenclature can be misleading as most practitioners do not use this definition of the real exchange rate. To avoid confusion, I follow Cordern (1992) and use the term Salter ratio.

It is important to note that the weights have economic interpretations. The sign of the Salter ratio weight, $(\bar{v}_X - \bar{v}_M)$, is positive (negative) when the trade balance is in surplus (deficit), while its magnitude captures the size of the surplus (deficit) relative to nominal GDP. The weight attached to terms of trade growth, $\frac{1}{2}(\bar{v}_X + \bar{v}_M)$, is the average value of trade as a proportion of nominal GDP. As a result, real GDI in economies that are more open to trade is more susceptible to terms of trade shifts while a larger trade imbalance makes real GDI more susceptible to Salter ratio movements.

Importantly for reconciling the recommendations of the SNA 1993, the trading gain that is generated if the average change in import and export prices is used to deflate net exports is:

$$\ln(T_{t/t-1}) = \left(\frac{\bar{v}_X + \bar{v}_M}{2} \right) \ln(ToT_{t/t-1}) \tag{5}$$

which is identical to the FDD based trading gain when trade is balanced. In the special case the exports equal imports, the recommendations of the SNA 1993 are equivalent. When trade is not balanced, using the average change in export and import prices leads to a trading gain that is a constrained version of the FDD based trading gain.

Similarly, use of only import or export price changes leads to further constraints. If the import price index is used to deflate net exports, then the terms of trade shift is weighted only by the share of imports in nominal GDP:

$$\ln(T_{t/t-1}) = \left(\bar{v}_M \right) \ln(ToT_{t/t-1}) \tag{6}$$

An analogous result where the terms of trade shift is weighted by the share of exports in nominal GDP is obtained when the export price index is used. Employing export or import prices for the trading gain leads to a trading gain that is a constrained version of the one from the FDD deflator.

The FDD deflated trading gain encompasses other suggestions, and allows for richer dynamics. It also matches closely with existing theory in other areas, particularly general equilibrium models (Kohli 2006). Importantly, when relative prices change, they induce changes within an economy, and only in a general equilibrium framework can the long-term effects be analyzed. The two types of relative price effects in the FDD trading gain are consistent with the dependent economy model of the balance of payments and what has become known as the Australian model (Salter 1959, Corden 1960, Swan 1960). It is also consistent with real balance of payments theory since, As Corden (1992) notes, the Australian model was used to integrate money and real balance of payments theory by Dornbusch (1974, 1980). As well, the booming sector, or Dutch disease, model of Corden and Neary (1982) and Corden (1984) incorporates terms of trade and Salter ratio effects. In each case, a relative price shift, and its impact on the real income measure outlined above, are the initial steps of a longer adjustment process.

Real income growth in Canada and the U.S.

Data sources and presentation

Data for Canadian real income measures are taken from the National Income and Expenditure Accounts found on Statistics Canada's Cansim database. The U.S. data comes from the Bureau of Economic Analysis National Income and Productivity Accounts.

For each country, the Tornquist index decomposition of real GNI is presented. The figures for Canada and the US divide real GNI growth into the contribution from real GDP, net income from abroad and the trading gain. The figure depicts the contributions using a bar graph with the sum represented by a line superimposed on the bar. For each country, the real income measures are calculated in the same manner for this paper. The U.S. B.E.A. provides a command GNP series that is similar to the real GNI series presented in this paper. For the purposes of comparison, however, the real GNI series employed in the analysis are computed by the author.

The Net Income From Abroad and the Trading Gain

Net income from aboard (NIFA), is not typically an important short-run source of real income growth. Payments to, and receipts from, foreigners typically made up less than 5 % of nominal GNI in Canada and the US from 1962 to 2007 (Table 1). On net, the share is even smaller, averaging 2.6% in Canada and just 0.7% in the US.

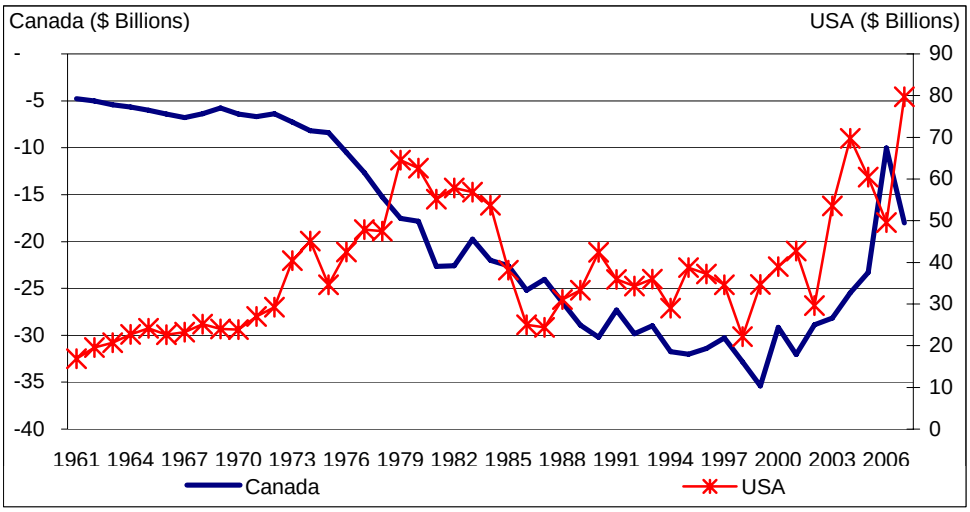
Table 1 Payment and Receipt Weights: Canada vs USA 1962 to 2007

	Canada		USA	
	Payments to Foreigners	Receipts from Foreigners	Payments to Foreigners	Receipts from Foreigners
Max	6.8	3.3	5.0	5.5
Min	2.5	0.7	0.3	1.0
Average	4.7	2.1	1.8	2.5

Nevertheless, changes in NIFA can affect growth in real GNI over long periods of time (Figure 1). In Canada, NIFA represents a net outflow of funds because Canada pays more to foreigners that it receives. From 1961 to 1999, the amount of money remitted to foreigners tended to increase every year. After 1999, this trend reversed as payments to Canadians began rising more rapidly than Canadian payments to foreigners.

In the US, payments by foreigners to Americans are larger in all periods. While NIFA tends to rise over time, there are noticeable changes around the first and second oil shocks, the 1986 oil price collapse and the post-2002 energy price increases.

Figure 1 Net Income From Abroad: Canada vs. USA 1961 to 2007



The trading gain has more influence on real GNI than NIFA, especially in the short-run. However, the two components of the trading gain, the Salter ratio and terms of trade, do not necessarily have a similar impact. In both Canada and the US, net exports only make up a small proportion of GDP (Table 2). The share of trade in GDP is larger, particularly for Canada, which is more amenable to the small open economy assumption. At most, roughly 6 percent of changes in the Salter ratio are transmitted through to changes in real income in either country.

Table 2 Salter Ratio and Terms of Trade Weights[1]: Canada vs USA 1962 to 2007

	Canada		USA	
	Salter Ratio	Terms of Trade	Salter Ratio	Terms of Trade
Max	5.7	42.0	5.8	14.2
Min	0.0	17.9	0.0	4.6
Average	1.8	27.7	1.7	9.1

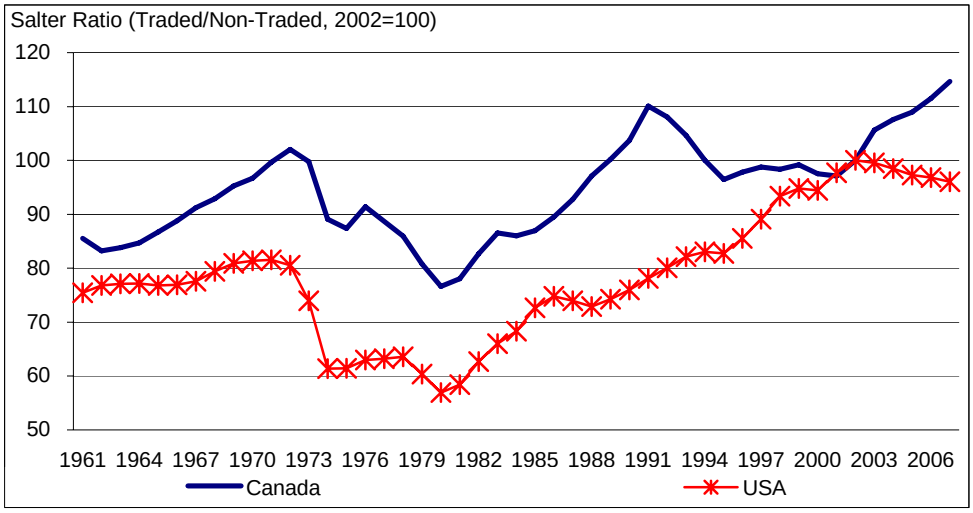
[1]Absolute values of weights

Over most of the 1961 to 2007 period, the Canadian and US Salter ratios have moved similarly (Figure 2). In both countries, the price of traded goods has tended to rise faster than domestic prices. This is not surprising given the linkages between the two economies, with each being the largest trading partner of the other for most of the period. Similarly, macro-economic events that have affected the world have influenced the two economies in an analogous manner - the first and second oil shocks in particular.

Differences do arise, however. The two notable deviations occur during the 1991 recessions in Canada and the US. In Canada, domestic prices fall 3% during the 1991 recession leading to an increase in the Salter ratio. In the US, domestic prices are unchanged in 1991, leading to a small increase in its Salter ration, but not by an amount overly different from preceding and following years. And, post-2002, the countries respective Salter ratios diverge, with the US ratio continuing to climb and the Canadian ratio falling.

The post-2002 divergence stems primarily from differences in the behaviour of import prices. In Canada, import prices have fallen by an average of 2.7% per year from 2002 to 2007. In the US, import prices have increased by an average of 4.3%. The most likely source of this difference is the average appreciation of the $CDN/$US exchange rate of 7.9% per year.

Figure 2 Salter Ratio: Canada vs. USA 1961 to 2007



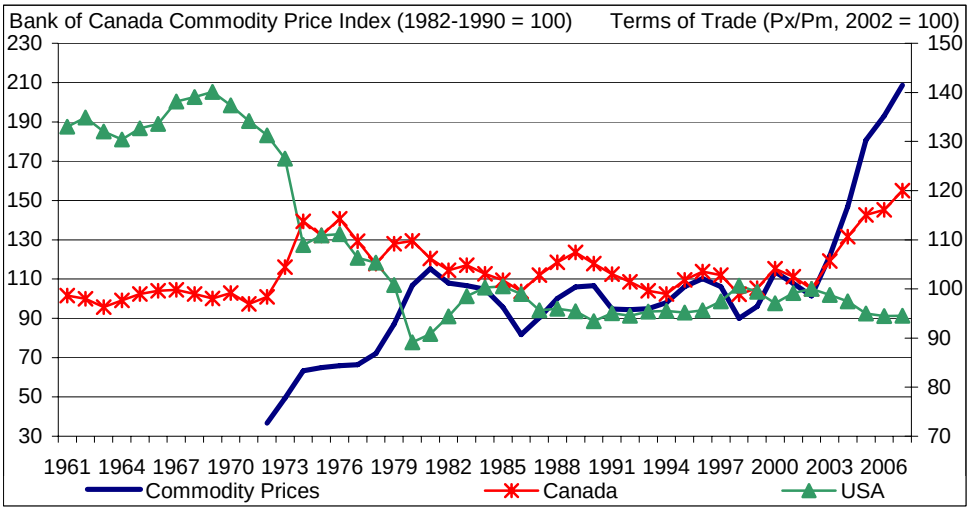
Source: Author's calculations

Changes in the terms of trade are more important sources of short-run changes in real GNI. The terms of trade represent the opportunity cost of imports in terms of exports. When the price of exports rises, or the price of import falls, Canada is able to purchase more imports with the same volume of exports and consumption can potentially increase. This process produces gains in the purchasing power of income—gains that are just as real as those produced by productivity growth since Canada can consume more goods and services from its resource base after a terms-of-trade increase (Diewert and Morrison 1986).

In Canada, up to 42% of terms of trade changes are manifested in real income. The US does not depend as heavily on trade activity for GDP, and, as a result, the terms of trade have less of an influence than for Canada. Nonetheless, up to 14% of terms of trade changes impact short-run real GNI growth in the US.

In both Canada and the US, terms of trade shifts are closely associated with changes in commodity prices (Figure 3). Canada is a net exporter of commodities while the US is a net importer, and this is reflected in their respective terms of trade responses to commodity price movements. Canada's terms of trade improve when commodity prices rise, and deteriorate when commodity prices fall. The opposite happens in the US.

Figure 3 Terms of Trade and Commodity Prices: Canada vs. USA 1961 to 2007



Source: Cansim table 380-0030

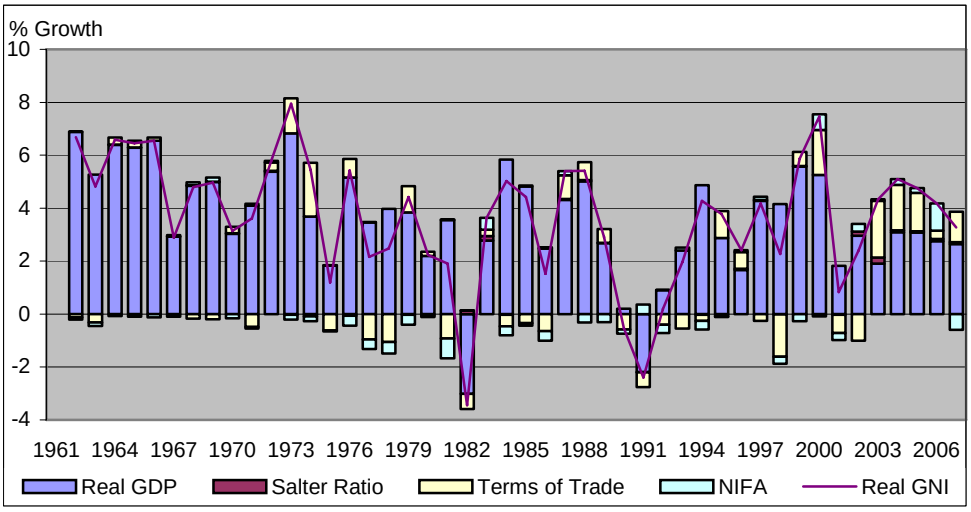
During the first and second oil shocks, there is a large terms of trade deterioration in the US, and while Canada does see an improvement, it is not nearly as large. In Canada, federal policies were put in place in response to the 1973 oil shock that segregated Canada from world oil markets. As a result, the impact of rising energy prices had a smaller impact because the commodity price changes that would have driven the terms of trade were removed. In more recent years the Canadian energy market has been integrated into the larger North American market. During the post-2002 commodity price increases Canada's terms of trade have, therefore, adjusted to these increases.

Real GNI Growth by Source

From 1961 to 2007, real GDP growth is the largest contributor to real GNI. Expanding the concept of real income continues to show that changes in inputs and productivity are the most important source of rising real incomes in the long-run. However, in the short-run, changes in price structures can be very influential. And, over long periods of time, changes in NIFA can erode gains from production.

In Canada, prices make important contributions to real income in 1973/1974, during the late 1990s and after 2002 (Figure 4). The majority of relative price related gains come from the terms of trade. The low weight on the Salter ratio prevents it from having a noticeable impact. From 1962 to 1999, NIFA tends to detract from real income growth each year, with a larger than usual effect in 1982. Post-1999, NIFA begins contributing to real income growth in Canada, with a large contribution in 2006 due to the return to Canada of softwood lumber duties that had been levied by the US during a trade dispute.

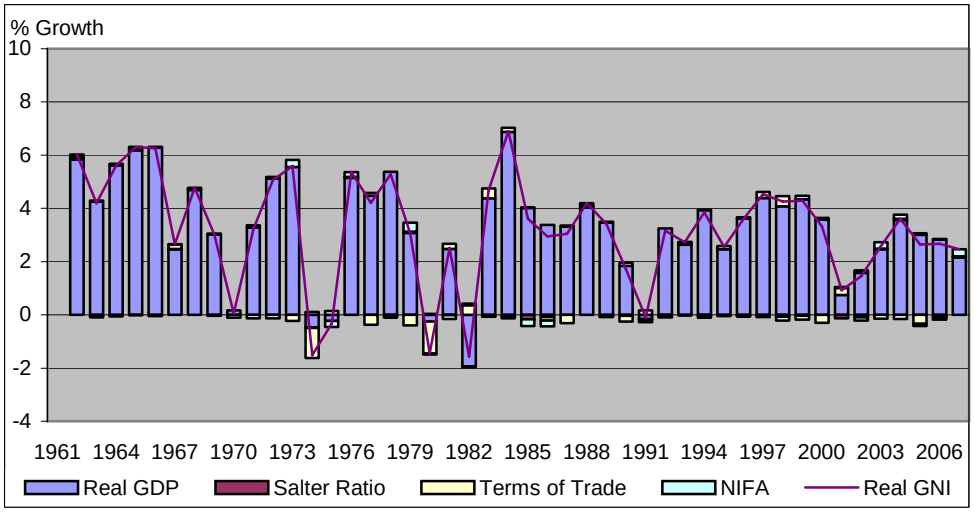
Figure 4 Canadian Real GNI Growth by Source



Source: Author's calculations

In the US, relative price effects and NIFA have less influence (Figure 5). The US is less dependent on trade activity for production, which leads to a smaller effect from terms of trade and Salter ratio changes. The two exceptions are the 1973 and 1979 oil shocks. In each case, the rising price of energy led to a significant decline in the terms of trade for the US. In 1973/1974, the terms of trade declined 14%, which held back real GNI growth by 1.1% in 1974, more than twice as much as the 0.5% decline in real GDP. In 1979/1980, the second oil shock led to a 12% decline in the terms of trade that lowered real GNI growth by 1.2% in 1980. Real GDP contribution to real GNI growth in 1980 was about a quarter as large as the terms of trade effect, or -0.3%.

Figure 5 U.S. real GNI growth



Source: Author's calculations

In both Canada and the US, real GNI growth is more variable than real GDP growth (Table 3). Over the 1962 to 2007 period, the standard deviation of real GNI growth in

Canada is 14% higher than the standard deviation of real GDP growth. In the US, real GNI's standard deviation is 5% higher. In both countries, real income adjusts more, and faster, than real GDP.

Table 3 Standard Deviations of Real GDP and Real GNI: Canada and USA 1962 to 2007

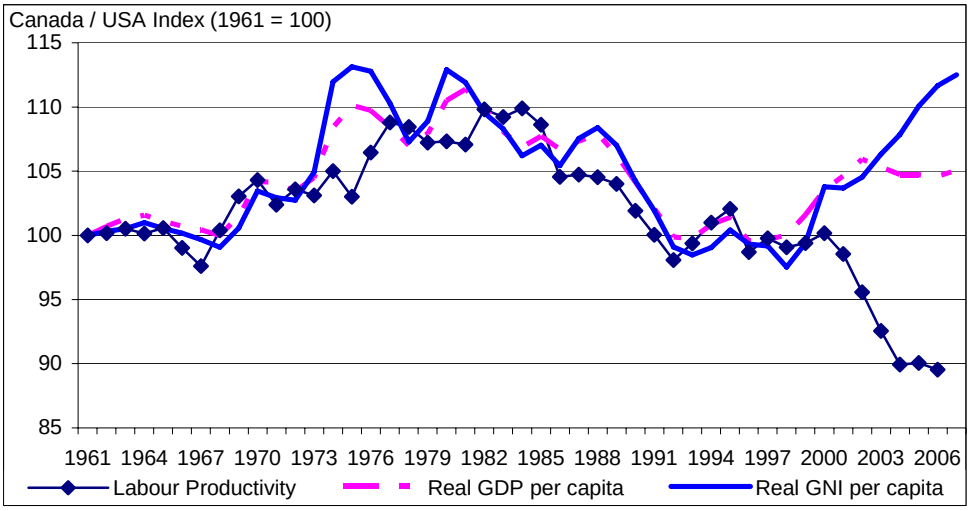
	Real GDP	Real GNI	Ratio: Real GNI/Real GDP
Canada	2.08	2.38	1.14
USA	1.96	2.06	1.05

Per capita growth in Canada and the U.S.

Changes in GDP per capita over time are often taken as a measure of the increasing living standards within an economy. Cross-country comparisons can be made by indexing the ratio of per capita GDPs to a start date, and examining changes in the ratio over time. However, only in the event that both economies are closed will the real GDP per capita measures adequately reflect relative changes in living standards in all situations.

Similarly, comparisons made using relative productivity growth, while capturing long-run changes in relative performance, can be a less than ideal relative performance measure in the short-run when large relative price shifts occur.

Figure 5 Canada-US relative performance using different measures



Source: Author's calculations

For most of the 1961 to 2007 period examining labour productivity, real GDP per capita and real GNI per capita lead to the same conclusions about relative Canada/US performance (Figure 5). From 1961 to the early 1980s, the Canadian economy performed better than the US economy. Canada's labour productivity, GDP per capita and GNI per capita all rose relative to the US. From the early 1980s until the late 1990s, Canada underperformed relative to the US, and its relative gains were undone. By the late 1990s, the Canada's economy relative to the US had returned to the level of the early 1960s.

During the relative assent and decent of the Canadian economy, relative real GNI per capita displays a larger change than real GDP per capita or labour productivity. From 1961 to the early 1980s, rising energy prices had a more detrimental effect on the US. In Canada, the oil shocks initially led to terms of trade improvements while in the US deteriorations occurred. Following 1986, energy prices declined relative to other prices and, by the early 1990s commodity prices in general were declining relative to other prices. Canada's terms of trade went through prolonged periods where they tended to decline, leading to a larger drop in relative real GNI per capita.

After 2002, however, the performance of Canada relative the US depends greatly on the measure used. Canada's labour productivity did not keep pace with US labour productivity, reaching its lowest relative level in 2006 (Baldwin and Gu 2007). Canada's relative GDP per capita did fare as poorly, rising until 2002 and flattening off there after. Once the terms of trade and NIFA are accounted for, however, Canada outperforms the US. The rising commodity prices after 2002 lead to a divergence in performance measures not previously seen.

Conclusion

The performance of the Canadian economy relative to its U.S. counterpart is typically evaluated using summary statistics like Gross Domestic Product (GDP) or productivity (GDP per hour worked) to analyze differences in performance. Both of these measures capture in succinct form the myriad of events that affect the domestic income that the economy is producing by transforming labour and capital into output. As such, they provide a useful summary of what is happening to the income that is being produced by the domestic economy.

However, data from country's National Accounts can also be used to evaluate other concepts of income—concepts that take into account changes in the potential purchasing power of income that occurs from relative price shifts, the income that is being transmitted or received from abroad because of international capital investment. Normally these measures receive less attention than GDP based measures. And for many purposes, this may be adequate—because the measures are often similar. But ignoring differences in these measures hides important trends and will sometimes miss important changes in direction.

This paper demonstrates just how important divergences between these measures have been over the last 45 years—and how they can modify our interpretation of events.

In the period before 2000, all of the measures indicate a long-term gain followed by decline in the relative performance of the Canadian economy. All that has changed with the commodity boom experienced after 2002. Canada had a strong terms-of-trade improvement from 2002 to 2007, while the opposite occurred in the U.S. Prices paid for Canada's exports increased dramatically relative to the prices of its imports. Canadian receipts of income from abroad increased dramatically relative to payments abroad and NIFA rose quickly.

The concatenation of these events led to a dramatic increase in real income growth in Canada relative to its GDP growth. And this also has affected Canada/U.S. comparisons. Post-2002, the Canadian economy benefited from price movements to a previously unforeseen extent. The divergence between the relative measures after 2002 illustrates the importance of looking at more than just production when assessing economic performance.

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