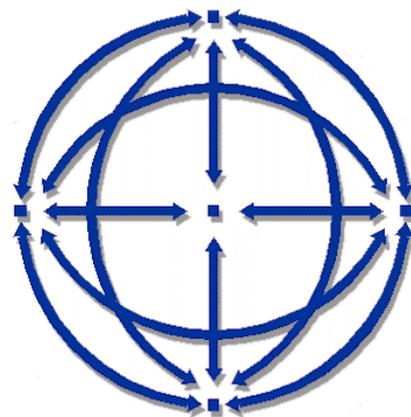


Latest Developments in the Canadian Economic Accounts

Impact of the 2012 CSNA revisions on the Quarterly Labour Productivity Accounts



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- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0^s value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- ^P preliminary
- ^r revised
- X suppressed to meet the confidentiality requirements of the *Statistics Act*
- ^E use with caution
- F too unreliable to be published
- * significantly different from reference category ($p < 0.05$)

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Impact of the 2012 CSNA (Canadian System of National Accounts) revisions on the Quarterly Labour Productivity Accounts

Summary

This report highlights the revisions to the quarterly estimates of labour productivity and associated variables in the business sector resulting from the historical revision of the national Gross Domestic Product by Income and by Expenditure Accounts (NIEA) released on October 1st, 2012.

Introduction

This report is intended to help users understand the impact that the historical revision of the NIEA (national Gross Domestic Product by Income and by Expenditure Accounts) has had on the aggregate measures of labour productivity and associated variables in the quarterly labour productivity program.

Throughout this report the abbreviation CSNA (Canadian System of National Accounts)¹² (Canadian System of National Accounts 2012) is used to refer to the revised productivity measures released on October 12th, 2012, while CSNA (Canadian System of National Accounts)⁹⁷ refers to the previous measures, whose last publication date was September 7th, 2012.

The analytical framework used for labour productivity includes four basic variables: output, employment, hours worked and compensation. The derived variables are gross domestic product (GDP) per hour worked (labour productivity), hours worked per job, hourly compensation and unit labour cost.

The CSNA (Canadian System of National Accounts)¹² revisions led to changes in all the variables used to measure productivity and its underlying variables. The key changes for each basic variable are summarized in the sections below. Following that is a description of the impact that the changes have had on the derived variables such as labour productivity. The report concludes with a brief examination of the impact that the revisions have had on growth differences between Canada and the United States.

In addition, the indexes of labour productivity and the related variables have been converted from reference year 2002 to reference year 2007. This change affects the data for the period from the first quarter of 1981 to the present. Adoption of the new 2007 reference year does not alter productivity growth rates since it only represents a scaling of the previous indices that were based on 2002.

Changes in the estimates of output

The quarterly estimates of the business-sector real GDP (gross domestic product) used in the productivity measures are derived from a Fisher chain index of the GDP (gross domestic product) at market prices. This index excludes economic activity of the government sector and the new non-profit institutions serving households sector, as well as the imputed rent of owner-occupied dwellings.

The various revisions to the estimates of real GDP (gross domestic product) by sector had very little impact on the long-term growth in output used to measure labour productivity and unit labour cost. For the entire 30 year period, the average annual growth of real GDP (gross domestic product) in the business sector was revised downward 0.1 percentage points. Essentially, this revision came from the 1981 to 1990 period, where real GDP (gross domestic product) was revised down by 0.3 percentage points.

The revision to business sector GDP (gross domestic product) for the last few years changed the profile of the recent recession, with real GDP in 2008 showing growth of 0.2% (revised from a 0.3% decline), followed by a larger decline in 2009 at 4.8% revised down from 4.5%.

Revisions to 2009 incorporate the annual benchmarks from the Canadian Input-Output Tables. Revisions to the annual growth rates of real GDP (gross domestic product) in the business sector were small in 2010 and 2011—unchanged in 2010 and revised downward 0.1 percentage points in 2011.

For comparison purposes, the indexes of previous measures have been converted from reference year 2002 to the new reference year 2007 in all the graphs.

Changes in the estimates of compensation

The aggregate data on labour compensation used in the Canadian productivity measures originates from the NIEA (national Gross Domestic Product by Income and by Expenditure Accounts). The labour compensation estimates play a key role in the allocation of hours worked by sector. While CSNA (Canadian System of National Accounts)¹² did not introduce any conceptual changes in employee compensation, the estimates were affected by a large number of statistical revisions. CSNA (Canadian System of National Accounts)¹² resulted in a large shift in the distribution of employee compensation from the business sector to the government sector.

In CSNA (Canadian System of National Accounts)⁹⁷, business sector estimates of employee compensation were developed by first deriving a total economy wide level of labour income obtained from T4 administrative data files. Once the total economy-wide labour income estimates were compiled, an estimate was derived for the government sector. The source of this information included federal, provincial and local government public accounts, employee compensation for hospitals as reported by the Canadian Institute for Health Information and employee compensation for residential health facilities as reported by the Residential Care Facilities Survey, as well as compensation from each level of public education. Employee compensation for the household sector was then derived by linking a list of Aboriginal general governments and non-profit institutions serving households (NPISH) to the T4 administrative data file. The government sector, NPISH (non-profit institutions serving households) and household sector estimates of employee compensation were then subtracted from the total to derive, residually, employee compensation in the business sector.

As part of the implementation of CSNA (Canadian System of National Accounts)¹², a direct approach was used to develop business sector employee compensation, using institutional unit information obtained from Statistics Canada's business register as well as other administrative sources (e.g., tax charity files for the NPISH (non-profit institutions serving households) sector).

This resulted in a substantial upward revision to employee compensation in the non-business sector and a downward revision in the business sector. Aside from the use of updated business and non-business frame information, there were also a number of statistical revisions made to total employee compensation.

Substantial revisions to the estimates for Aboriginal governments, religious institutions and the wages of private-household service workers altered the level of compensation for the entire economy. CSNA (Canadian System of National Accounts)¹² also adjusted employee compensation downward to exclude compensation paid to non-residents working in embassies and consulates within Canada's borders.

The cumulative effect of these revisions, in 2007, was to increase non-business sector compensation by close to \$6 billion and to reduce business sector compensation by about \$8 billion. In terms of growth rate, these changes had little impact over the thirty-year revision period.

Changes in the estimates of jobs and hours worked

In the productivity program, the number of hours worked is calculated by multiplying the number of jobs by the average hours worked, estimated from Labour Force Survey (LFS) data.

The number of jobs in the business sector is derived residually by subtracting all jobs in the non-business sector from the total number of jobs in the entire economy. The benchmark used for jobs in the Productivity Accounts is based largely on LFS data. Since the LFS does not cover the entire Canadian economy, it is complemented by other data, such as: the Canadian Forces, workers on First Nation reserve, military and civilian personnel posted abroad and northern workers. Conceptual adjustments were also made to the LFS data, to convert the concept of "persons employed" into number of jobs and to exclude persons who were on leave without pay from their employment. (See *Girard, Maynard and Tanguay, 2006*)

One conceptual change was made to the estimation method. The number of jobs now excludes Canadians who work for non-resident entities, for example, Canadians working in Canada for foreign entities such as consulates and embassies and people residing in Canada but working for non-residents outside the country. The revised data incorporate upward revisions to the estimate of number of jobs on First Nations reserves. Data from recent censuses and Aboriginal peoples' surveys conducted in the last decade have improved the estimate's quality. Jobs data for the private-household industry and religious institutions were also revised to reflect revisions to employee compensation.

Aboriginal general governments, which were part of the business sector in CSNA (Canadian System of National Accounts)⁹⁷, are now in the government sector.

The level of hours worked remained almost unchanged for the overall economy, while the split by sector ended up by an upward revision of the non-commercial sector at the expense of the business sector. Using 2007, the reference year, hours in the overall economy were revised up slightly (41 millions). However, it was revised down by 253 millions in businesses and revised up by 294 millions in non-commercial sector. These changes to the hours worked levels did not have any impact on the long run growth rates for the overall economy and the business sector. Only the non-commercial sector has registered slight revisions of plus or minus 0.1 percentage points over the three last decades.

Changes in the estimates of labour productivity and related variables

The combined result of the revisions to GDP (gross domestic product) and hours worked was an average 0.1 percentage point decrease in the annual growth rate of labour productivity in the business sector over the three decades between 1981 and 2011. The largest upward revision in labour productivity growth occurred in 1993 (+0.7) while the largest downward revision occurred in 1997 (-0.8).

Table 2 shows the effect of the revisions to the estimates of labour productivity, real GDP (gross domestic product), hours worked, average hours, hourly compensation and unit labour cost. The first part of the table shows the growth rates for the previously published estimates (CSNA (Canadian System of National Accounts)⁹⁷); the second part shows the new estimates (CSNA (Canadian System of National Accounts)¹²); and the last section shows the differences between the revised estimates and the previous estimates. It shows

the revisions' impact on the labour productivity performance of Canada for various sub-periods in the CSNA (Canadian System of National Accounts)'s historical revision period (1981 to 2011). The recent period (2000 to 2011) includes the years since the last productivity growth peak in 2000.

The first two decades (1981 to 2000) essentially encompass two economic cycles.

In general, growth in labour productivity was revised downward, with the downward revision limited to the first decade. From 1981 to 1990 average annual growth in labour productivity was revised down by 0.3 percentage points from 1.3 to 1.0. However, revisions to the growth in productivity over the next two decades (1990 to 2000 and 2000 to 2011) were unchanged from the figures previously estimated.

Comparing Canadian and U.S. (United States) labour productivity

The revised data show a 0.1 percentage point, widening in the gap between the growth in U.S. labour productivity and Canadian labour productivity. On an average annual basis, labour productivity growth is now 0.8 percentage points higher for U.S. businesses than for Canadian businesses. With CSNA (Canadian System of National Accounts)⁹⁷ the gap was 0.7 percentage points. For the entire period, there is a slight increase in the Canada-U.S. gap, reflecting the downward revision of business GDP in Canada.

When each of the last three decades is examined separately, it is noted that the revisions widened the productivity growth gap mainly in the first decade (1981 to 1990). The difference in productivity growth between the two countries rose from 0.4 to 0.7 percentage points between 1981 and 1990. It remains basically the same during the last two decades.

Conclusion

The NIEA (national Gross Domestic Product by Income and by Expenditure Accounts) 1981 to 2011 revisions had a downward impact on the quarterly data for labour productivity and associated variables in the business sector.

The revisions reduced productivity growth slightly in the first decade (1981 to 1990), and remained unchanged over the next two decades (1990 to 2011). For a more detailed analysis of the significance and causes of this gap, see Statistics Canada (2007) and Baldwin and Gu (2009). The revisions also widened the gap between Canada and the United States in labour productivity growth by 0.1 percentage points per year over the entire period (1981 to 2011).

The historical revisions were not applied to the estimates released today for productivity by industry in the business sector. The revisions at the industry level will be applied in February 2013, when historically revised estimates of GDP (gross domestic product) by industry are released.

Appendix I — References

Baldwin, John R., and Wulong Gu. 2009. Productivity Performance in Canada, 1961 to 2008: An Update on Long-term Trends. The Canadian Productivity Review. Catalogue no. (number) 15-206-XIE2009025. Ottawa: Statistics Canada.

Girard, Andrée, Jean-Pierre Maynard and Marc Tanguay. 2006. Producing Hours Worked for the SNA (System of National Accounts) in order to Measure Productivity: the Canadian Experience. The Canadian Productivity Review. Catalogue no. (number) 15-206-XIE2006004. Ottawa: Statistics Canada.

Statistics Canada. 2007. Long-term Productivity Growth in Canada and the United States, 1961 to 2006. The Canadian Productivity Review. Catalogue no. (number) 15-206-XIE2007013. Ottawa: Statistics Canada.



Chart 1

Impact of revisions to the index of real gross domestic product in the business sector by quarter (before and after revision)

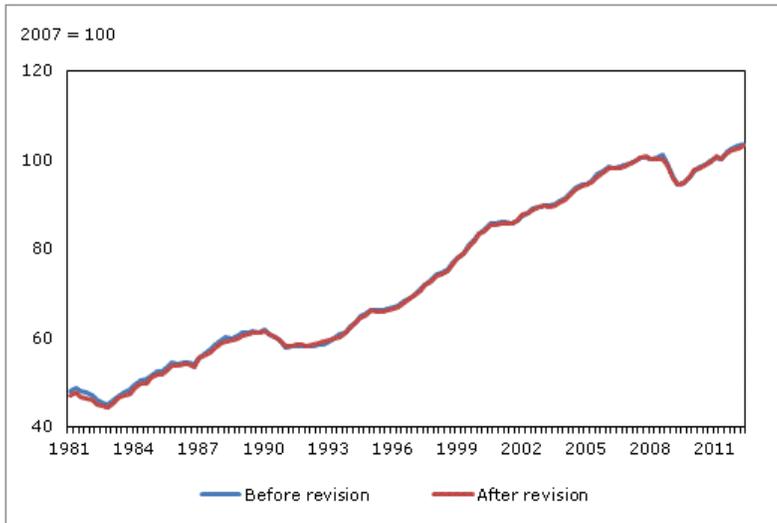




Chart 2 Total compensation before and after revision

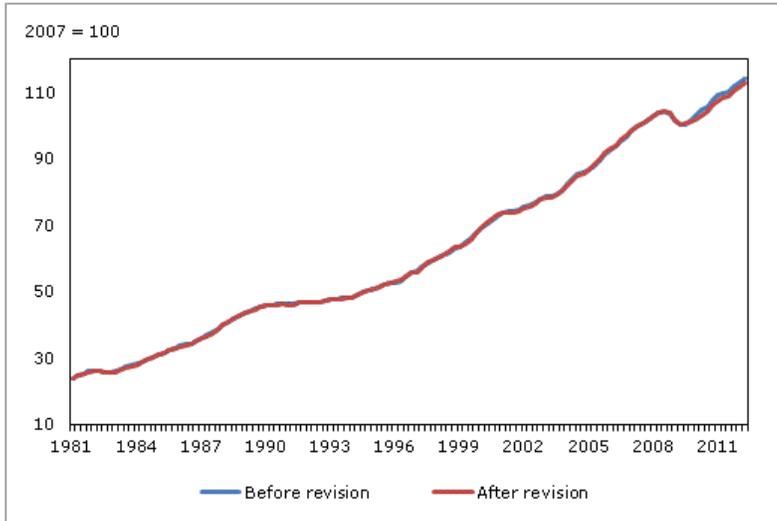




Chart 3

Quarterly estimates of hours worked before and after revision

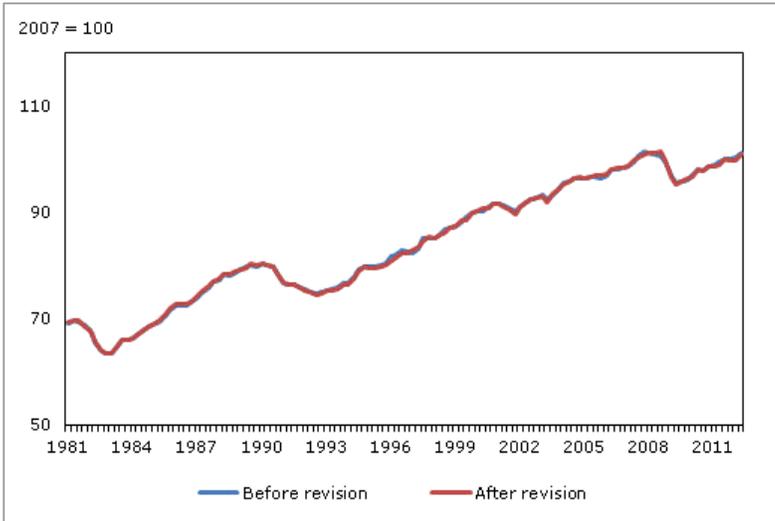




Chart 4 Labour productivity before and after revision – Business sector

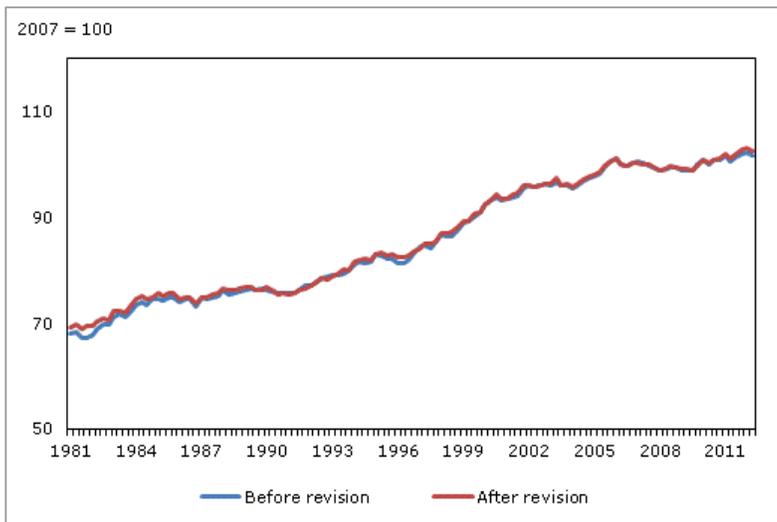




Table 1

Impact of the revisions made to real GDP (Gross domestic product) in the overall economy, business sector and non-business sector

	Business sector		Non-business sector		Total economy	
	Before revision	After revision	Before revision	After revision	Before revision	After revision
	percent					
1981 to 2011	2.6	2.5	2.2	2.3	2.5	2.4
1981 to 1990	2.9	2.6	2.4	2.5	2.7	2.6
1990 to 2000	3.4	3.4	1.4	1.4	2.9	2.9
2000 to 2011	1.6	1.6	2.9	2.9	1.9	2.0



Table 2
Average annual growth of labour productivity and associated variables – Business sector (before and after revision)

	Real gross domestic product	Number of jobs	Average hours worked	Hours worked	Total compensation	Hourly compensation	Unit labour cost	Labour productivity
	percent							
Revised annual average measures								
1981 to 2011	2.5	1.4	-0.2	1.2	5.0	3.7	2.4	1.3
1981 to 1990	2.6	1.6	-0.1	1.6	7.1	5.4	4.4	1.0
1990 to 2000	3.4	1.4	-0.1	1.3	4.3	3.0	0.9	2.1
2000 to 2011	1.6	1.3	-0.4	0.8	4.0	3.1	2.3	0.8
Previous annual average measures								
1981 to 2011	2.6	1.4	-0.2	1.2	5.1	3.8	2.4	1.4
1981 to 1990	2.9	1.6	-0.1	1.6	7.1	5.4	4.1	1.3
1990 to 2000	3.4	1.4	-0.1	1.3	4.4	3.1	1.0	2.1
2000 to 2011	1.6	1.3	-0.4	0.9	4.1	3.2	2.4	0.8
	percentage points							
Difference (revised minus previous)								
1981 to 2011	-0.1	0.0	0.0	0.0	-0.1	-0.1	0.0	-0.1
1981 to 1990	-0.3	0.0	0.0	0.0	0.0	0.0	0.3	-0.3
1990 to 2000	0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0
2000 to 2011	0.0	0.0	0.0	-0.1	-0.1	-0.1	-0.1	0.0



Table 3

Average annual growth of labour productivity in the business sector before and after revision, Canada and the United States

	Canada		United States
	Before revision	After revision	
	percent		
1981 to 2011	1.4	1.3	2.1
1981 to 2000	1.7	1.6	2.0
1981 to 1990	1.3	1.0	1.7
1990 to 2000	2.1	2.1	2.2
2000 to 2011	0.8	0.8	2.3
2009	0.0	-0.1	3.1
2010	1.5	1.6	3.0
2011	0.8	1.1	0.4

Source: Bureau of Labor Statistics. 2012. "Productivity and Costs, Second quarter 2012." NEWS, September 5 (U.S. data)