

OECD SHORT-TERM ECONOMIC STATISTICS WORKING PARTY  
(STESWP)

**Revising the Canadian Monthly GDP Statistics**  
**Statistics Canada**

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## **A. Output-Based Gross Domestic Product in Canada**

1. The monthly GDP by industry program has been following a very rigorous revision process for over 20 years. The production of the monthly GDP estimates includes two main revision processes, a monthly process and an annual process. A historical revision process takes place every 10 to 15 years. All the processes are linked to revision processes that affect the whole system of national accounts. Source data are also revised regularly but the timing of the revisions is quite different from the one in the Canadian System of National Accounts.

## **B. Sources of Revisions**

2. Output based GDP, also known in Canada as GDP by industry, covers the value of a myriad of goods and services produced by the Canadian economy. Its compilation therefore requires a wide range of input data, primarily derived from surveys of Canadian businesses. Given that GDP by industry is the timeliest indicator of economic growth, the input data going into the monthly calculation of GDP are often preliminary and are subject to revisions. In addition, the monthly data sources are incomplete in the sense that they do not provide all the necessary information on outputs and intermediate inputs for calculating value added. Estimates of monthly GDP are therefore based on a projector system and are assembled on a set of assumptions. This means that they will be revised when the annual benchmarks become available from the Input-Output tables. These annual benchmarks are subject to revisions themselves. Lastly, changes in national accounting conventions and concepts also have to be incorporated from time to time and accordingly, estimates of monthly GDP are revised periodically as follows.

## **C. Monthly revisions**

3. When estimates of GDP by industry are prepared for a current month, several preceding months are revised. The revisions extend back to January of the year during which the most recent annual revision was made. For example, after the annual revision in September 2006, when monthly GDP was released for the month of July, the monthly GDP continue to be revised back to January 2006 until September 2007.

4. The two main reasons for the regular monthly revisions are data updates due to revisions to the source data and revisions to the seasonal factors. Trading-day factors are normally revised only once a year.

5. Revisions to the source data generally reflect more complete response to surveys and correction of errors arising from editing or imputing. Revisions to the seasonally adjusted estimates are caused by re-estimating the seasonal parameters each month. Seasonally adjusted estimates are less reliable near the end of the time series than in the interior, therefore as time passes and a given month works its way back to the interior of a time series, its seasonally adjusted value is revised to produce a more accurate estimate. The revisions to the seasonal parameters are generally random and decrease in time. The largest monthly revision usually occurs with the addition of the month of December because with the closing of the calendar year revisions to both the source data and the seasonal factors tend to be more significant than in other months.

6. The main reason for going back to January of the year during which the most recent annual revision was made is to push back any breaks due to seasonality as far back as possible.<sup>1</sup>

7. In the quarterly income and expenditure accounts, revisions are only carried back to the first quarter of the current year while revisions to monthly survey data are normally carried back 3 months, unadjusted and seasonally adjusted series. The 3-month revision policy is mainly to allow adjusting for late response.

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<sup>1</sup> Seasonally factors are less reliable for data points near the end of time series than for those in the interior. Consequently it was decided to use a concurrent approach for adjusting for seasonality for most GDP projectors.

#### **D. Quarterly revisions**

8. With the release of the third month of the quarter, the monthly GDP estimates are reconciled with those of the quarterly income and expenditure accounts. Occasionally, both sets of data are revised back because new quarterly information becomes available or revised. This is the case when the quarterly financial survey (QFS) becomes available.

9. Unless facing large revisions, no special information is provided to users about the sources of the monthly revisions. However, a special meeting with forecasters, government officials' takes place the day after the release to explain in more detail the results released at the time of the quarter. The review includes:

- Income and expenditure accounts
- Monthly GDP by industry
- Balance of payments results

10. At the meeting, movement of time series and what caused them are reviewed at a fairly detailed level. Revisions and patterns of revisions are reviewed as well.

#### **E. Annual revisions**

11. Each year, when the annual Input-Output based estimates are released, the monthly GDP series are normally revised for several years. The main purpose of the annual revision is to incorporate the newly released Input-Output based benchmark levels and to capture the revisions to the benchmarks in the preceding year.

12. As it is not desirable to continuously update all monthly GDP values with the addition of each annual benchmark, the benchmark span is restricted to cover only the most recent five and a half years of monthly estimates. In order to avoid a small break between the historical and the newly revised segments of the GDP series, the last month immediately preceding the benchmark span is also included in the minimization process as an endpoint constraint.

13. In addition to the previously described sources of revisions, the annual revisions also include the effects of:

- incorporating the latest annual benchmark levels;
- incorporating revisions to monthly source data that extend further back in time than would be picked up in the regular monthly revision cycle;
- updating the trading day adjustment when present;
- selecting new parameters for the seasonal adjustment;
- changing methods of estimating monthly GDP for specific industries.

14. Occasionally revisions involving rebasing, the implementation of a new industrial classification and the like are also made. If possible these are timed to coincide with the annual revision cycle.

15. In order to ensure that users are advised on the scope of the revisions, each publication carries a note immediately following the table of contents, which specifies the reasons for the revision, and the revision span for the newly released data. Periodically, specific detailed information about revisions is provided to users. Occasionally the following types of measures are provided:

- Bias: average difference between preliminary and final version i.e. after last benchmarking
- Dispersion: average absolute difference between the bias adjusted preliminary and the final data
- Concordance of movement: percentage of time that movements in the preliminary data are in the same direction as those of the final data.

Quantitative information about revisions is more of the following type:

- Revisions to annual levels, in dollar terms and percentages
- Revisions to quarterly and annual growth rates
- Mean and standard deviation of revision to quarterly and monthly growth rates.

16. The most common type of information that is provided to users is qualitative. The focus is mainly to revisions to source data or the use of new annual information such as administrative data. Annual revisions are normally explained in the context of the production accounts and the income and expenditure accounts. In some cases, revisions which are the results of researching/studying an issue, information about the issue is also provided.

#### F. Summary of an annual revision cycle

Current Year - 5	Monthly movement only is revised to ensure a smooth link between December of that year and January of the following year
Current Year - 4	Incorporation of the final set of IO benchmarks
Current Year - 3	Incorporation of the preliminary set of IO benchmarks
Most current two years	Level of GDP is adjusted to reflect the incorporation of the benchmarks and any new or revised information

#### G. The computer system

17. The following briefly summarizes the main aspects of the computer system that is used to compute output based monthly GDP in Canada. This system was specifically designed for the management of time series to create an environment which is capable of providing the necessary tools for the step by step tracking and analysis of the size, timing and the many sources of revisions.

18. The computer application is a menu driven facility which allows multiple users to simultaneously input, manipulate and output data.

19. The data are structured and stored in this database in the form of time series. A time series is a set of data points where each data value is an observation of a given phenomena (some measure or result of economic production), repeated over regular time intervals.

20. A separate time series exists for each type of data (actual, estimate) and level of adjustment (raw, seasonally adjusted, reconciled with annual benchmarks and quarterly constant price expenditure based GDP), etc. When it is necessary to apply an adjustment to the source data, the correction is stored in an 'estimate' series and is added to the original value. Other adjustments, such as trading day, Easter and seasonal adjustment, or the correction factors resulting from reconciliation processes with the input-output based annual benchmarks and the quarterly constant price expenditure based GDP, are also stored in separate time series. This type of manipulation of time series ensures that values provided by the data sources remain intact and the estimated and reconciled data values can be revisited (changed and often removed) once corrections are received from the data supplier or the benchmark series are revised within a new release of the input-output tables.

21. Time series can also have four versions (published, current, revised and historical) of data relating to each point in time. The published data version holds the most recently published values. The current data version is the designated working environment for the ongoing production of monthly GDP. The revised data version is the designated working environment for the annual revision and the historical data version is used for introducing historical revisions. This last version is often used to test new methodologies.

22. Time series may have gaps, in other words, not all data points are present. When manipulating the data under such circumstances, subordinate data versions contribute missing data values according to an established order of precedence.

23. The data are either observed and received from external sources or are calculated from other series stored in the database. The computation uses methodologies which are defined by users. A methodology is a set of algebraic formulae. A formula can be applied to a range of time series covering sets of industries, geographic regions, subjects and commodities. Each methodology, and each formula in the methodology, has a time span in which it is active. It is possible to apply separate methodologies to different versions of the data. It is also possible to use more than one version of a methodology for non overlapping time periods covering the lifetime of a time series. Detailed information relating to relevant methodologies is also attached to the identification of each time series.

## **H. Clients**

24. In February 2004, a survey was conducted to assess client satisfaction vis-à-vis the monthly GDP estimates. Among the respondents, 77% of users indicated not having experienced problems with the revision policy. As well, 77% found the magnitude of the revision to be acceptable. However, 33% expressed concerns about the estimates of particular industries.

25. When asked if they would prefer more timely GDP<sup>2</sup> measures, even if that meant larger revisions, and what amplitude of revision to overall growth rate would be acceptable, respondents generally agree that revisions should be minimized. A 0.0 to 0.3% was considered as being a “good trade-off” with a net preference for a  $\pm 0.2\%$  revision on average. In terms of timeliness, respondents tend to appreciate the current situation as opposed to more timely estimates but subject to greater revisions.

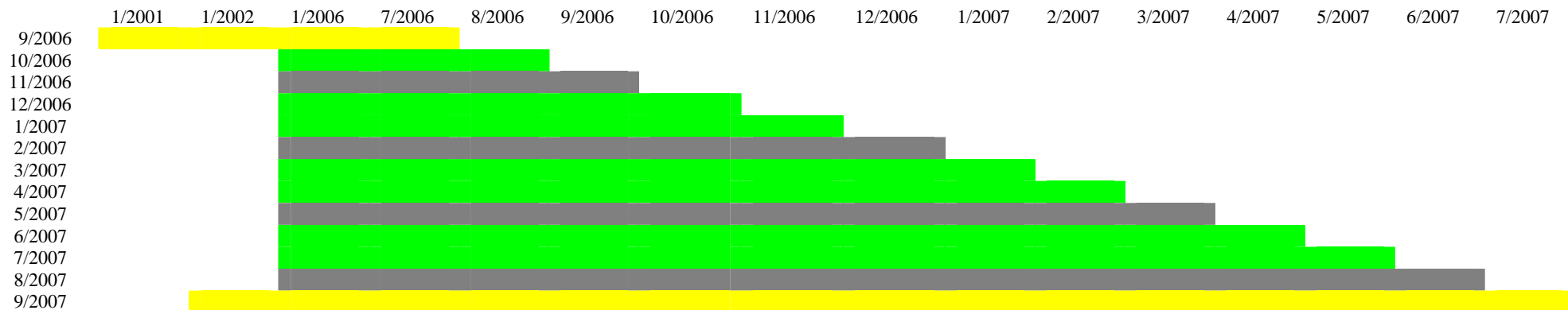
26. When asked whether adequate information were provided when GDP estimates were affected by unexpected events such as SARS, mad cow disease or strikes, users of monthly GDP were largely satisfied. From direct dealings with users, analysts in charge of producing monthly GDP estimates learned that the story matters and revisions should not change the story.

27. Even though revisions add to the workload of users, there is a need for accurate GDP data, so updates are critical and warranted for both modeling and forecasting. However, Statistics Canada should be quick at incorporating the most important revisions.

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<sup>2</sup> Monthly GDP by industry estimates are released 60 days after the reference month.

**Annex A - OUTPUT BASED MONTHLY GDP IN CANADA IN 1997 PRICES – REASONS FOR REVISIONS  
AND TIME PERIODS AFFECTED DURING A ONE YEAR CYCLE**



**Monthly revisions**

Updating: Source data (late response, additions to administrative database corrections)  
Seasonal adjustment (calculating concurrent seasonal factors)

**Quarterly revisions**

Updating: Source data (late response, additions to administrative database corrections)  
Seasonal adjustment (calculating concurrent seasonal factors)  
Reconciling: Achieving consistency with quarterly constant prices expenditure-based GDP  
Benchmarking monthly source data to quarterly source data

**Annual Revisions:**

Updating: Source data (benchmarking monthly source data to annual source data, revisions to source data that fall outside the span of regular monthly revisions)  
Weights (for calculation of price or volume indexes)  
Trading day adjustment (recalculating daily weights)  
Seasonal adjustment (selecting new parameters for the seasonal adjustment, retesting the estimates for the presence of Easter effect)  
Methodology (changing the projector for measuring monthly GDP for specific industries, adjusting for consistent bias in methodology)  
Changing the base year for the Laspeyres estimates, occasionally changing the reference year for the Fisher estimates  
Reconciling: Achieving consistency with quarterly constant prices expenditure-based GDP  
Adjusting monthly estimates to annual benchmarks from Input-Output tables and to annual control totals from administrative sources  
Note: Occasionally, annual revisions coincide with historical revisions

**Historical revisions**

Updating: Industrial classification system (such as implementing the North American Industry Classification System NAICS)  
SNA concepts (such as implementing the SNA 1993)  
Reclassification of establishments to industries  
Corrections on the central frame  
Note: The extent of the revision span is determined depending on the type of changes being introduced and also based on operational considerations

## **ANNEX: B-1**

### **Output-Based Gross Domestic Product in Canada**

#### **Revision Analysis - An Example of some explanations provided to users**

The following is a description of the impact and the frequency of the revisions through a specific example. The review follows the time path of the revisions to output-based GDP in Canada, as published between 1997 and 2001. During this four and a half year period estimates of GDP were published at 1992 constant prices, but the revision pattern affecting these estimates can be taken as typical for any base year segment of the GDP series.

The first 1992 based estimates of GDP covering the January 1992 to October 1997 time span were released in December 1997. In the months and years that followed, these estimates were continually revised with the addition of each new reference month. The series of monthly and annual revisions continued until July 2001 when in the context of a historical revision of the Canadian System of National Accounts, 1997 replaced 1992 as the new base year and the original growth rates of the 1992 based series between January 1992 and December 1996 became final.

In order to give a somewhat closer view, the following is a brief study of the size and the importance of the revisions that affected the GDP by industry growth rates between January 1992 and June 2001. During this nine and a half year (or 114 month) period the economy enjoyed a long period of rise, expanding in each year at an average rate of 3 percent. As a result, the level of total GDP in June 2001 stood approximately 30 percent higher than in January 1992. This steady increase was the cumulative effect of a total of 86 monthly increases, with the vast majority of the month-to-month growth rates falling in the 0.1 to 0.5 percent range. The upward trend was interrupted by only 21 scattered instances of declines and 7 months of no growth.

A comparison between the preliminary and final monthly growth rates reveals that the largest differences were 0.5 and -0.4 percent, but in 90 percent of the time the aggregate revision affecting any particular month fell in the narrower, -0.2 to 0.2 range. In 80 out of 114 months the estimates were either not revised at all or the revisions were positive. Figure 1 illustrates the size and the direction of the total monthly revisions. Total revision is the difference between the published preliminary and final growth rates.

As can be seen in Figure 2, the size of the annual revisions fell in the -0.2 and 0.8 percent range. The two largest revisions (0.6 and 0.8 percent) occurred in 1994 and 1995; each caused by the incorporation of the IO based benchmark levels. Revisions in the other years fell between -0.2 and 0.3 percent.

**ANNEX: B-2**

Figure 1

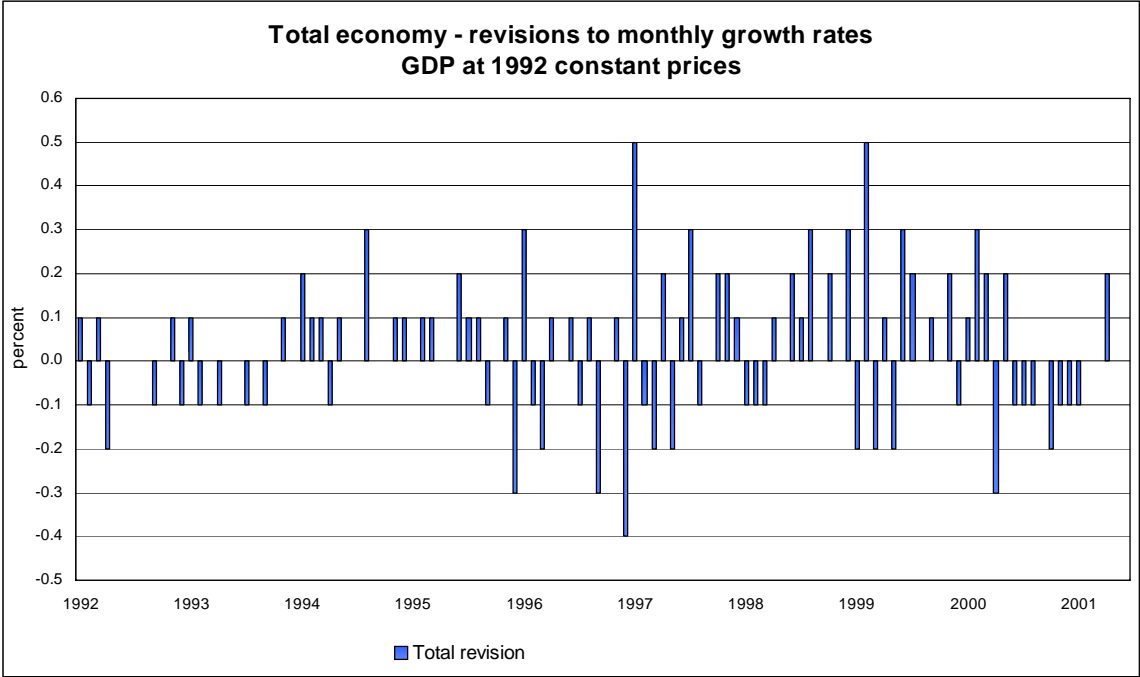
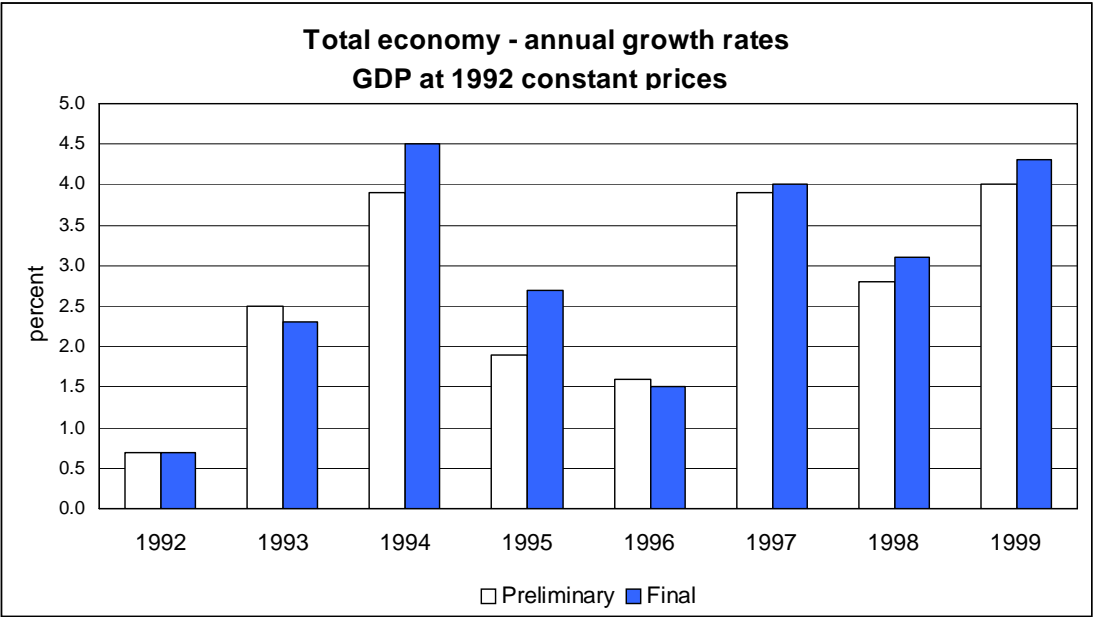


Figure 2



## ANNEX C

### Revision objectives

The major objectives are:

- That all significant revisions are incorporated
- That the historical segment of the series is kept unchanged
- That there will be no significant break between the unrevised and revised segments of the series

### Revision span for monthly revisions

When estimates of GDP by industry are prepared for a current month, several preceding months are revised. The revisions extend back to January of the year during which the most recent annual revision was made.

Type of revision	Reasons for revising back to January
Revised source data	By the time the annual revision takes place in September; the revision policy of most data suppliers restricts corrections to the current year only.
Seasonal factors	Endpoint seasonal adjustment creates revisions. These revisions are generally random and decrease in time. The largest revision occurs with the addition of the month of December when the seasonal factor for the entire year is revised. In most cases revisions prior to January are insignificant.

### Revision span for annual revisions

Each year, in the context of the annual revision, the monthly GDP values are revised in the most recent five and a half years.

Type of revision	Reasons for revising five and half years
Source data	Benchmarking of monthly source data to annual source data affects the last two or three complete years.
Weights	Weights that are used in the computation of volume and price indexes are obtained from a new preliminary and a revised Input-Output table. The new preliminary Input-Output tables become available with a two and a half year lag.
Benchmark adjustment	Each year, with the addition of a new benchmark level, the monthly GDP series is benchmark adjusted again. As a consequence, the adjusting ratios, also called benchmark factors, undergo revisions. The revisions affect the entire benchmarking period, including the historical years when neither the annual levels nor the unadjusted monthly estimates were revised. These revisions in the more distant years tend to be not significant and can safely be ignored. As it is not desirable to continuously update all monthly GDP values with the addition of each annual benchmark, the benchmark span is restricted to cover only the most recent five and a half years of monthly estimates. In order to avoid a small break between the historical and the newly revised segments of the GDP series, the last month immediately preceding the benchmark span is also included in the minimization process as an endpoint constraint.