

Documentation:

First-, Second-, and Third-Release Values

Philadelphia Fed's Real-Time Data Set for Macroeconomists

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1. Introduction

We document our computational methods for constructing time series of first-, second-, and third-release values for the macroeconomic variables in the Philadelphia Fed's real-time data set for macroeconomists (RTDSM). Researchers can use these series to construct revisions and, perhaps more importantly, measures of the reliability of early releases of the data. We also provide caveats on using the data.

In broad terms, we construct our series of release values in the following manner:

- We begin with the raw data in RTDSM. These data are expressed in levels. (For each variable in the data set, RTDSM records the entire time-series history as that history appeared on various *vintage dates* of the past.)
- For most variables, we transform the data into period-over-period growth rates (month-over-month or quarter-over-quarter) because revisions to growth rates are often more interesting than revisions to levels. We express growth rates in annualized percentage points. For a select few variables, we do not transform the data into growth rates.
- We isolate the appropriate growth rates that represent a government statistical agency's first, second, and third releases for every observation, forming three time series that we appropriately call

First: The time series for first-release values;

Second: The time series for second-release values;

Third: The time series for third-release values.

- Finally, we also provide a time series for the latest-revised historical values. These are the values of the observations as they appear today (in RTDSM's most recent vintage of data available when we made our computations). We call this variable:

Most_Recent: The time series observations as they appear today (as recorded in the most recent vintage of RTDSM).

2. Revisions

Some users of the data will want to compute times series for revisions. Let t index the observation date. Using the variables defined above, we can easily define many alternative measures of revisions (Rev) . Some prime examples of interest follow.

Revision From First Release to Second Release:

$$\text{Rev}_{12,t} = \text{Second}_t - \text{First}_t$$

Revision From Second Release to Third Release:

$$\text{Rev}_{23,t} = \text{Third}_t - \text{Second}_t$$

Revision From First Release to Third Release:

$$\text{Rev}_{13,t} = \text{Third}_t - \text{First}_t$$

Revision From First Release to Most Recent Release:

$$\text{Rev}_{1M,t} = \text{Most_Recent}_t - \text{First}_t$$

3. Computational Details

Step 1. Compute Growth Rates. We begin (in most cases) by transforming the raw data in RTDSM from levels to period-over-period growth rates, expressed in annualized percentage points. Let X_t denote the period- t observation for the level of variable X . The subscript t indexes either a quarterly or monthly observation date, depending on whether the variable appears in our data set with quarterly or monthly observations. The monthly and quarterly growth-rate calculations (GX) are:

Month-over-Month Growth Rate

$$GX_t = 100.0 \left[\left(\frac{X_t}{X_{t-1}} \right)^{12} - 1 \right]$$

Quarter-over-Quarter Growth Rate

$$GX_t = 100.0 \left[\left(\frac{X_t}{X_{t-1}} \right)^4 - 1 \right]$$

Figure 1 shows a slice of the Philadelphia Fed's real-time data set for the level of real GDP. The columns show the vintages. The rows show the observations for each vintage. Notice that the columns are named with a suffix (*yyMmm*) for the vintage date of data they represent. The column ROUTPUT12M7 shows the observations for real GDP that the U.S. Bureau of Economic Analysis made available to the public in the middle of July 2012.

We highlight six numbers with red boxes at the bottom of selected columns. These numbers are the level of real GDP on first, second, and third release for two observations: 2012 Q2 and 2012 Q3.

Figure 2 shows the results of converting the level of real GDP (Figure 1) into quarter-over-quarter growth rates, expressed in annualized percentage points.

Step 2. Extract the Relevant Observations From the Appropriate Vintages. We now want to extract the relevant observations from the vintages appropriate for first releases, second releases, and third releases. We use the following method: We extract the numbers from three consecutively-dated monthly vintages.

We demonstrate the method in Figure 2 for first-, second-, and third-release values of quarter-over-quarter real GDP growth. We highlight the numbers for two observations: 2012 Q2 and 2012 Q3 (Figure 2). For 2012 Q2: The first-release value is 1.537 percent, the second-release value is 1.732 percent, and the third-release value is 1.253 percent. For 2012 Q3, the values are: 2.014 percent, 2.672 percent, and 3.106 percent.

Figure 3 shows how we arrange the growth rates in Figure 2 according to the release. There is one column for first-release values (*First*), one for second-release values (*Second*), and one for third-release values (*Third*). The last column (*Most_Recent*) gives the values as they appear in the most recent vintage of RTDSM. Note that the *Most_Recent* values incorporate the cumulative effect of all prior revisions to the observations.

4. Important Caveats

Important caveats accompany the construction of our values for first-, second-, and third-releases. One algorithm for extracting first-, second-, and third-release values from the raw data in RTDSM is to search over vintages of data for the first, second, and third times each observation appears. This algorithm has a disadvantage: When a government statistical agency delays the release of its data or changes the schedule on which the data are released over time, this algorithm yields estimates that could give a misleading impression about the date on which the release was available to the public. In some empirical studies, ambiguity or false assumptions

about the timing of the release could yield incorrect results. Thus, we do not use the first algorithm.

A second, closely related algorithm is to extract the first-, second-, and third-release observations from the vintages in which they *should* appear, given the timing (as we know it today) with which government statistical agencies release their data. We use this second algorithm in constructing first-, second-, and third-release values.

The two alternative algorithms will, in general, yield identical numbers for first-, second-, and third-release values, except as noted below.

National Income and Product Accounts: Timing of Releases.

The U.S. Bureau of Economic Analysis (BEA) has changed over time the schedule on which it released its data for GDP and related components. Early in our sample period (1965 Q3 to the present), first-releases were often delayed relative to today's schedule. In addition, BEA did not always try to revise its second-release values. These problems are more severe the more disaggregated the variable and the earlier the observation date. In our files, the consequences are as follows:

- In observations of the distant past, we code many first-release values as missing.
- In observations of the distant past, the third-release values are often the same as the second-release values.

National Income and Product Accounts: Federal Government Shutdown in 1995.

A shutdown in the federal government occurred in late 1995. This shutdown affected the operations of government statistical agencies and produced a delay in the release of such data from the national income and product accounts as GDP and related components. Accordingly, we record a missing value for the 1995 Q4 first release of real and nominal GDP and the related components.

National Income and Product Accounts: Observation for 2003 Q3.

BEA released a benchmark revision to the U.S. national income and product accounts on December 10, 2003. Prior to the release of the benchmark-revised data, BEA released its first estimate for 2003 Q3 U.S. real and nominal GDP and the components. However, the benchmark revision omitted the observation for 2003 Q3. Accordingly, the data set correctly includes the first estimate and (correctly) omits the second estimate.

National Income and Product Accounts: Federal Government Shutdown in 2013 - All Variables Except Housing Starts.

The shutdown of the federal government from October 1, 2013, to October 16, 2013, caused U.S. government statistical agencies to delay their releases of new observations for variables in the Philadelphia Fed's real-time data set. However, the delays were minimal for all variables other than housing starts. For variables whose releases were subject to these minor delays, including variables from the national accounts, we decided to postpone our collection of the data until the new observations became available. (The delay was a couple weeks.) This strategy allowed us to maintain continuity in our time series of first-, second-, and third-release values. Our strategy for housing starts appears below.

National Income and Product Accounts: Federal Government Shutdown in 2018.

The shutdown of the federal government from December 22, 2018, through January 25, 2019, caused the U.S. Bureau of Economic Analysis (BEA) to delay its releases of new observations for such variables from the national income and product accounts as GDP and related components.

GDP and Components. The primary effect of the shutdown was to change the timing and number of releases for the 2018 Q4 GDP (and components) observation. First, BEA published only two releases for the 2018 Q4 observation, rather than the usual three releases. Second, the timing of the releases was delayed.

On February 28, 2019, BEA published its first estimate for the 2018 Q4 GDP observation and the corresponding observation for GDP's components, marking a one-month delay from the previously announced release date. According to BEA, this estimate included "the usual source data incorporated into the Advance estimate (which should have been released Jan 30) and a subset of the source data that would normally have been used for the Second estimate." We have treated this February 28 release as a "First" observation, even though it was a month late and included more than the usual source data.

On March 28, 2019, BEA published a revision to the 2018 Q4 observation and called this revised value the Third estimate, even though it was only the second time BEA reported a value for the quarter. We treat this revised value as a "Third" observation and set to missing the 2018 Q4 observation that we call "Second".

Personal Income and Outlays. The federal government shutdown also caused BEA to delay publication of variables included in its report on monthly personal income and outlays. The delays for reporting personal income were less severe than the delays for reporting outlays for such outlays as monthly personal consumption expenditures. In constructing our observations for first-, second, and third-release values for these variables, we made appropriate decisions about missing values on a variable-by-variable basis.

Housing Starts: Federal Government Shutdown in 2013.

As noted above, the federal government shutdown from October 1, 2013, to October 16, 2013, caused major delays in the Census Bureau's release of new observations for housing starts: The Census Bureau postponed its release of housing starts for September 2013 and October 2013 until December 18, 2013. Moreover, the delayed first-release values of these observations in December could incorporate source information not generally available at the time of the standard release schedule. Similar comments apply to second- and third-release values. Accordingly, we have chosen to define missing values for the observations of first-, second-, and third-release values affected by the period of the 2013 federal government shutdown.

Housing Starts: Federal Government Shutdown in 2018.

The shutdown of the federal government from December 22, 2018, through January 25, 2019, caused the U.S. Census Bureau to delay its releases of new observations for housing starts. The delays were particularly long. The observation for December 2018 housing starts was not released until February 26, 2019, marking a nearly six-week delay in the publication for the initial release (and corresponding revisions to prior releases). The initial release for January 2019 was on March 8, 2019, marking a two-week delay. We have decided to record many values around this period as missing, to avoid giving the false impression that the timing of releases immediately after the federal shutdown was the same as the normal timing.

Consumer and Producer Price Indexes: Nature of Revisions.

The U.S. Bureau of Labor Statistics (BLS) revises its headline and core consumer price indexes annually after it re-estimates new seasonal factors. There are no revisions to the seasonally adjusted CPI outside of those due to re-estimated seasonal factors. Consequently, it makes little sense to provide second-, and third-release values using our methodology: Most observations would show no revision to the first-release value. Therefore, we provide only the values on first release and the values from the most recent vintage.

With one exception, the nature of revisions to headline and core measures of the producer price index for finished goods is the same as that for the consumer price indexes. The exception is that producer price indexes may be revised three to four months after their initial release because BLS incorporates additional information from late reporters and corrections into its initial estimates. Such revisions appear in a monthly vintage that postdates the vintage from which we would extract second- and third-release values. Thus, as above, we provide only the values on first release and the values from the most recent vintage.

Consumer Price and Producer Price Indexes (and Labor Market Variables): Federal Government Shutdown in 2018.

The operations of the U.S. Bureau of Labor Statistics (BLS) were not affected by the federal government shutdown over the period December 22, 2018, through January 25, 2019. That

means such BLS variables as the consumer price index, the producer price index, the unemployment rate, employment, and hours worked were released without delay over the period of the shutdown.

Industrial Production Index and Capacity Utilization: Annual Revisions.

The staff at the Federal Reserve Board of Governors produces the well known monthly indexes of industrial production and related measures of capacity utilization. The unusual feature of the Board's staff's release schedule is that annual revisions are released on a date that falls between the dates of two monthly reports. (In contrast, many government statistical agencies release their annual revisions concurrent with their normal monthly reports.)

The effect on our data for first-, second-, and third-release values is as follows: In defining our values, we stick to the observations published in the normal monthly reports. (For example, if an annual revision occurs on a date that falls between the monthly vintage for the first-release and the monthly vintage for the second release, we take our first- and second-release values from those monthly vintages. We do not record as the second-release value the revised observation published in the annual revision.)

Industrial Production Index and Capacity Utilization: Federal Government Shutdown in 2018.

The Federal Reserve Board of Governors' releases for industrial production and capacity utilization were not affected by the federal government shutdown over the period December 22, 2018, through January 25, 2019. All data were released, as previously planned, without delay during this period.

Unit Labor Costs and Output per Hour.

These variables are revised on an atypical basis. We provide the first-release values and the second-release values but no values for the third-release which is made available to the public two months (not one month) after the second release.

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Figure 3. First-, Second-, and Third-Release Values for Q/Q Real GDP Growth (Annualized Percentage Points)

The figure shows the first-, second-, and third-release values for quarter-over-quarter real GDP growth over the period 2009 Q1 to 2012 Q4. We highlight the values in red boxes for 2012 Q2 and 2012 Q3. The column labeled "Most_Recent" shows the corresponding historical values as they were known in the middle of March 2013 when this documentation was created.

K17		fx				
	A	B	C	D	E	F
1	Real GNP/GDP (ROUTPUT)					
2	Q/Q Growth (Annual Rate, Percentage Points)					
3	First-Release, Second-Release, Third-Release, and the Most-Recent-Release Values					
4						
5	<i>Date</i>	<i>First</i>	<i>Second</i>	<i>Third</i>	<i>Most_Recent</i>	
180	2009:Q1	-6.144	-5.719	-5.493	-5.249	
181	2009:Q2	-1.017	-1.014	-0.738	-0.314	
182	2009:Q3	3.534	2.782	2.235	1.447	
183	2009:Q4	5.731	5.927	5.554	4.026	
184	2010:Q1	3.239	3.036	2.738	2.335	
185	2010:Q2	2.387	1.614	1.719	2.243	
186	2010:Q3	2.010	2.525	2.559	2.603	
187	2010:Q4	3.173	2.788	3.114	2.393	
188	2011:Q1	1.748	1.842	1.915	0.079	
189	2011:Q2	1.282	0.989	1.334	2.477	
190	2011:Q3	2.464	2.004	1.815	1.279	
191	2011:Q4	2.752	2.982	2.955	4.092	
192	2012:Q1	2.204	1.860	1.872	1.961	
193	2012:Q2	1.537	1.732	1.253	1.253	
194	2012:Q3	2.014	2.672	3.106	3.106	
195	2012:Q4	-0.144	0.126	.	0.126	
196						
197						