

Fiscal Series from the FOMC Greenbooks

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This document describes the construction of our Greenbook fiscal variable dataset.

I. Sources and Sample

The Greenbook is summary of economic conditions, trends and forecasts prepared for every meeting of the FOMC. Our primary data sources are page scans of each Greenbook made available by the Board of Governors of the Federal Reserve System¹ and by the Real Time Data Research Center at the Federal Reserve Bank of Philadelphia.² These two sources provide independently-made page scans from different physical copies of the vintage historical materials; this allowed us to independently confirm figures which, on a few very rare occasions, were difficult to distinguish or missing in one of the two sources.³

The first data vintage collected was for July 1966 and the last was December 2006, covering 387 meetings of the FOMC over 40 years. This represented the full set of source materials available when we started. However, the earliest versions either lack fiscal variables or contain only very short time series (typically five quarters, most of which are historical estimates.) Most of our fiscal variables (Surplus, Revenues and Expenditures) first appeared in the August 1967 Greenbook while the first appearance of the HEB variable was in April 1970. FOMC meeting dates are slightly irregular, but for most of the period there were exactly two meetings per quarter. Meetings in the early part of the sample were more frequent (12 or more per year, but not necessarily one per month.) The release dates of key statistics also vary somewhat over the years. To standardize the forecast horizons we examine, we restrict our analysis to the vintages from the first and the last FOMC meeting of each quarter. A complete list of data vintage dates is provided below and are summarized in the following Table.

The number of observations and the forecast horizons included in each series varied considerably over time. Our figures were principally compiled from the *Federal Sector Accounts* and *Main Economic Indicators* Tables (whose contents varied somewhat over the years.) When series were shown in both tables, we collected data from both to maximize the span of observations available. In some

¹www.federalreserve.gov/monetarypolicy/fomc/

²www.philadelphiafed.org/research-and-data/real-time-center/greenbook-data/

³Note that the Greenbook estimates published in the ALFRED database at the Federal Reserve Bank of St. Louis only contains figures from the main volumes of the Greenbook. This is compiled a few days prior to the meeting of FOMC; late-breaking developments (such as statistical releases or revisions) are collected and circulated in the form of a supplement to the Greenbook. Our data reflect the estimates presented to the FOMC; these incorporate any additions or revisions contained in supplements to the Greenbook.

TABLE 1—AVAILABLE DATA VINTAGES (FOMC MEETING DATES)

Series	First Vintage	Last Vintage
Surplus	August 1967	December 2006
Receipts	August 1967	December 2006
Expenditures	August 1967	December 2006
Unemployment	July 1966	December 2006
GDP (nominal)	July 1966	December 2006
GDP (real)	July 1966	December 2006
HEB	April 1970	December 2006
HEB (6%)	November 1980	December 2006

of the earliest vintages, series might not contain more than 5 Q of historical estimates and forecasts, whereas later vintages could contain up to 20Q. Greenbooks often had slightly more quarters of historical estimates than of forecasts, as can be seen in Table 2, which gives one example of the number of available forecasts for each forecast horizon.

TABLE 2—NUMBER OF OBSERVATIONS BY FORECAST HORIZON: GOVT. RECEIPTS (OUTCOME = FIRST REPORTED VALUE)

Forecast Horizon	First Meeting	Last Meeting	Forecast Horizon	First Meeting	Last Meeting
-12	0	0	12	0	0
-11	2	0	11	0	0
-10	3	2	10	0	0
-9	3	3	9	1	6
-8	3	3	8	9	17
-7	3	3	7	18	26
-6	16	3	6	39	52
-5	40	19	5	65	74
-4	73	49	4	88	101
-3	120	92	3	117	128
-2	152	143	2	135	137
-1	158	157	1	146	150
0	158	158			

II. Validation

The data were validated in a number of ways.

- 1.) A professional data-entry firm was employed for initial key-input of the data with a contracted accuracy rate $\geq 99.95\%$.

2.) Several of their series were then checked against independent sources. This verified the claimed accuracy rate.

2a) Unemployment rates, as well as nominal and real levels of GNP and GDP were checked against estimates published in ALFRED by the FRB St. Louis. We found 10 cases where the figures in ALFRED did not correspond to the page scans, and one case where we had missed an entry.⁴ We also found a number of cases where the FOMC and the FRB Philadelphia page scans disagreed. In those cases, the FRB Philadelphia page scans were dated slightly after the original Greenbook estimates, indicating that figures were revised just prior to the FOMC meeting. We used the latter.

2b) HEB estimates were checked against estimates entered independently.⁵ Of approximately 3,000 data points, we found and corrected 10 discrepancies (0.3%); three were due to incorrect or missing meeting dates, five were due to keying errors in the independent estimates, and the remainder due to illegible page scans.

3.) There were a small number of cases in which figures shown in the *Federal Sector Accounts* Table were not precisely the same as those shown in *Main Economic Indicators* Table of the same Greenbook. One possibility is that the two tables may have been prepared by different groups; older Greenbooks were compiled by hand and slight discrepancies may have arisen in preparation.

4.) We verified that the Surplus/Deficit data were consistent with the data for Receipts and Expenditures.⁶

III. Forecasts

We recorded all Greenbook estimates for our selected series. This included estimates for future periods (forecasts), current periods (nowcasts) and historical periods (backcasts.) In this appendix, we collectively refer to all of these as *forecasts* although some prefer the term “projection” to emphasize the conditional nature of these estimates. Forecast horizons varied widely from meeting to meeting. At times, the convention was that the forecast horizon was fixed to the end of a given calendar year, then rolled forward once a year. This meant that the length of the forecast horizon varied somewhat through the year. There was also a general tendency for forecast and backcast horizons to increase across the decades, although there were some occasions when the horizons were decreased (perhaps because the longest horizons were not felt to be useful.) When series were listed in more than one table, different tables might include different forecast horizons. As the content of the tables evolved over time, the available forecast horizons might therefore vary from series to series.

⁴We communicated our findings to the FRB St. Louis, who verified our figures and corrected the entries in ALFRED. Note that with slightly more than 5000 data points checked, this implies a pre-correction error rate for Greenbook series in ALFRED of < 0.2% and < 0.02% for our data entry.

⁵The authors would like to thank Wendy Chan of the Bank of Canada for her research assistance.

⁶Figures in the Greenbook for May 1999 incorrectly reversed the sign on the Deficit. We corrected the sign.

IV. Outcomes

Forecast evaluation requires a measure of observed outcomes. One of the series we collect (HEB) has no officially published value; it is only calculated by Board staff. While the other series correspond to official statistics, values published for the latter are revised over time. These revisions may reflect the incorporation of new information as preliminary published estimates are refined in the quarters immediately following their initial publication. It may also reflect conceptual changes in the definition of the series, such as the change from GNP to GDP or from a fiscal surplus to a fiscal current account surplus. We refer to the latter as “benchmark” revisions. Each of our series were affected, to greater or lesser degree, by benchmark changes. This complicates the measurement of forecast outcomes. We therefore use a variety of different “outcome” concepts to provide alternative characterizations of forecast performance. They are

First Release: This is the initial quarterly estimate published by the responsible official statistical agency (BEA or BLS.)

One Year: This is the official quarterly estimate that was available precisely one year after the publication of the First Release. For example, if the First Release was published on 23 September 1998 and revisions were published on 26 August 1999 and 29 September 1999, the August 1999 estimate would be the One Year estimate. This typically incorporates the annual revision common to most official series.

Last Greenbook: This is the last value recorded in the Greenbook, typically one or more years after the quarter to which it refers. This is primarily important as a measure for HEB, which has no counterpart in official statistics.

Pre-Benchmark: This is the last official estimate reported prior to a benchmark revision of the series. This is intended to capture the most precise available estimate of the same concept that the staff were forecasting and has previously been used in the literature as a measure of data revision.⁷ We discuss the identification and importance of benchmark revisions below.

Final: This is a “contemporary” estimate, which in our case was the official estimate as of December 27, 2012.

V. Benchmark Revisions

We use the extent of revision to define those which we treat as *benchmark* revisions. We treat as benchmark revisions those which affect the entire published history of a time series. For example, US Quarterly National Accounts are available starting from 1946Q1. Revisions which do not affect the published estimates for the 1940s are therefore not considered benchmark revisions. Changes in seasonal adjustment factors, although they may occur many years after the fact, are not counted as benchmark revisions. Changes in base years (for real values), or

⁷For example, see Aruoba (2008).

the change from fixed-weight to chain-weighted values, or the change from GNP to GDP, are all examples of benchmark changes. This definition of benchmark revision has at least two important advantages.

1.) It is a simple, transparent and objective way to determine which revisions are to be treated as benchmark revisions.

2.) It implicitly relies on the judgement of the statistical agency to determine which methodological or conceptual changes are important enough to be considered benchmark changes. In effect, if the statistical agency judges that historical estimates are sufficiently comparable to current estimates that no revision to the former is required, no benchmark revision has occurred.

This definition also has at least one important drawback: since no official series is published for HEB, no long time series are available to identify benchmark changes. As we describe below, we therefore treat HEB estimates somewhat differently.

The economic importance of benchmark revisions varied vastly across our series, as we describe below in greater detail. At one extreme, benchmark revisions in the unemployment rate were rare and trivial. In contrast, the redefinition of the government accounts had an important impact on our fiscal variables. We discuss the economic importance of benchmark revisions in the next section. Table 3 shows the dates at which benchmark revisions were first published for each series.

TABLE 3—PRE-BENCHMARK-REVISION DATES FOR QUARTERLY NATIONAL ACCOUNTS

Last Quarter	Last ALFRED Vintage	Last FOMC Date
1975:3	Dec. 19, 1975	Dec. 10, 1975
1980:3	Nov. 19, 1980	Dec. 12, 1980
1985:3	Nov. 20, 1985	Dec. 11, 1985
1991:2	Aug. 28, 1991	Oct. 30, 1991
1995:2	Oct. 27, 1995	Dec. 14, 1995
1999:2	Sep. 30, 1999	Sep. 29, 1999
2003:3	Nov. 25, 2003	Dec. 03, 2003

Note: This table gives the dates of publication for the last estimates prior to benchmark revisions of the National Accounts. The first column gives the last time period to which those estimates correspond. The second column gives the date at which those estimates were published. The last column gives the date of the last FOMC meeting prior to the publication of the benchmark revision. These dates apply to figures from the Quarterly National Accounts as based on original data vintages from ALFRED and the FRB Philadelphia Real-Time Data Set for Macroeconomists. The 1995 benchmark revision of Expenditures occurred slightly after the revision of the other series; its last pre-benchmark-revision quarter was 1995:3 which was published on 27 October 1995. The last FOMC meeting using this estimate was that of December 1995.

Values forecast prior to benchmark revision are not comparable to outcomes measured after a benchmark revision. For that reason, whenever a forecast or nowcast is made for an outcome that will only be observed after a benchmark revision has occurred, we drop those forecast errors from our data set. For example, the Greenbook for the FOMC meeting in October 1975 contained nowcasts and

forecasts for the period 1975Q4-1976Q4. Estimates for most of these outcomes were only published after the benchmark revision which was first released on 20 January 1976. Therefore, for the series affected by those benchmark changes, those forecast errors were replaced by a missing value code.

VI. Variables

GNP & GDP⁸ The BEA published estimates of GNP until December 1991, after which it switched to GDP as its main measure of economic activity. The Greenbooks followed suit, focusing on GNP until that date and GDP thereafter. Our primary use of these series is to express various fiscal series as a fraction of the overall size of the US economy, for which we need an estimate of the level of the series. After August 2005, Greenbooks no longer list GDP in levels, giving only growth rate forecasts. For the last 11 FOMC meetings we recorded, we therefore calculated an implied level GDP forecast from the growth rate forecasts by applying the compound growth rate to the second-to-last (and therefore already revised) officially published estimate. For example, the growth rate estimates from the September 2005 Greenbook are applied to the August 31, 2005 vintage BEA estimate of GDP. The last estimate in that vintage is for 2005Q2; we therefore use the 2005Q1 estimate of 12198.8 as our base.

Receipts, Expenditures and Surplus/Deficit⁹

HEB: The *High-Employment Budget Surplus/Deficit* (HEB) is the Greenbook’s estimate of a cyclically-adjusted or “structural” budget deficit. This is the Board staff’s counterfactual estimate of what the surplus (or deficit) would be if the unemployment rate were at a constant reference level over the forecast horizon. The budget deficit concept used in HEB always corresponds to that used in the Surplus/Deficit measure; prior to 1996 this was the overall Surplus or Deficit, and this was replaced by the Government Current and Capital Account Surplus/Deficit thereafter.

The reference level of unemployment used to calculate HEB is not always explicitly mentioned, but drifted upwards from near 4.0% in the earliest part of our sample before major changes were introduced in 1980. From November 1980 until March 1983, two alternative HEB estimates were presented, based on a 6.1% and a 5.1% reference level of unemployment. From May 1983 until August 1983 these were replaced by rates of 6.0% and 5.0%. Thereafter, the reference level was constant at 6.0%. We assume that these changes reflected uncertainty and disagreement within the Board about the natural rate of unemployment. The Table design during the “dual-rate” period gave greater prominence to the 6.1% (and then the 6.0%) reference level.

⁸Our outcome measures for these series were taken from ALFRED series *GNP* and *GDP*.

⁹Outcomes for the Surplus/Deficit were measured by ALFRED series *FGDEF: Net Federal Government Saving*. Outcomes for Receipts were taken from *FGRECPT: Federal Government Current Receipts*, and for Expenditures from *FGEXPND: Federal Government: Current Expenditures*.

We found that the revision of the reference level of unemployment appeared to have a qualitatively important effect on the HEB estimates. We therefore consider two different sets of HEB estimates; the full series as well as the subset (HEB6) which only considers those estimates based on a 6.0% or 6.1% reference level. We make no attempt to adjust the HEB6 series for the change from 6.1% to 6.0%. We also calculate the difference between the HEB (and HEB6) estimates and the overall Surplus/Deficit estimates as the Board Staff's implied estimate of the cyclical Surplus/Deficit.

Unemployment:¹⁰

Greenbooks only report the unemployment rate to one decimal place. Starting with the official estimate published on 9 Feb 1967, the labor force was redefined to count only those age 16 and over instead of 14 and over. This never caused revisions of more than 0.1% in absolute value in our data set. There were no benchmark revisions to unemployment after that date. We therefore chose to ignore benchmark revisions in the unemployment rate and do not use a “Pre-Benchmark” measure of outcomes.

REFERENCES

Aruoba, S. Boragan. 2008. “Data Revisions Are Not Well Behaved.” *Journal of Money, Credit, and Banking*, 40: 319–340.

¹⁰Outcomes for this series were measured by ALFRED series *UNRATE: the Civilian Unemployment Rate*.