Survey of

PROFESSIONAL

FORECASTERS

Federal Reserve Bank

of Philadelphia

Documentation

Last Update: October 4, 2023

Table of Contents

1. Overview

The forecasts for the Survey of Professional Forecasters (SPF) are provided by the Federal Reserve Bank of Philadelphia. The quarterly survey, formerly conducted by the American Statistical Association (ASA) and the National Bureau of Economic Research (NBER), began in 1968:Q4 and was taken over by the Philadelphia Fed in 1990:Q2.

The data set contains all variables currently included in the survey. Some variables have been in the survey since 1968:Q4; others were added in the survey of 1981:Q3. In recent years, we added the following **variables**:

- **Long-Term Projections**. Beginning with the survey of 1992:Q1, we added long-term forecasts for 10-year annual-average real GDP growth and productivity growth (RGDP10 and PROD10). We also added 10-year annual-average forecasts for returns on S&P 500 stocks, three-month Treasury bills, and 10-year Treasury bonds (STOCK10, BILL10, and BOND10). These long-term forecasts appear in first-quarter surveys only.

- **Natural Rate of Unemployment**. In the survey of 1996:Q3, we added forecasts for the natural rate of unemployment (UBAR). This variable appears in third-quarter surveys only.

- **Nonfarm Payroll Employment**. In the survey of 2003:Q4, we added forecasts for nonfarm payroll employment (EMP).

- **Long-Term CPI Inflation**. In the survey of 2005:Q3, we added forecasts for the five-year annual-average rate of headline CPI inflation (CPI5YR). We also extended the forecast horizon one year for fourth-quarter over fourth-quarter headline CPI inflation.

- **Short-Term CPI and PCE Inflation**. In the survey of 2007:Q1, we added forecasts for core CPI inflation (CORECPI), headline PCE inflation (PCE), and core PCE inflation (COREPCE).

- **Core CPI and Core PCE Probabilities**. In the survey 2007:Q1, we added density projections for core CPI inflation (PRCCPI) and core PCE inflation (PRCPCE).

- **Unemployment and Real GDP Probabilities**. In the survey of 2009:Q2, we added density projections for the civilian unemployment rate (PRUNEMP). We also extended the annual forecast horizon two years for density projections for real GDP growth (PRGDP).

- **Baa Interest Rate**. In the survey of 2010:Q1, we added projections for the rate on Moody's Baa corporate bond yields (BAABOND).

In the surveys conducted since the Philadelphia Fed took over, the forecasters provide quarterly projections for five quarters and annual projections for the current year and the following year. Except as noted in the pages below, the format of the survey is the same as it was when we took it over. However, in recent years, we made the following changes to the **forecast horizons**:

- **Annual Horizons for Unemployment and Real GDP**. Beginning with the 2009:Q2 survey, we asked the forecasters to provide two more years of annual projections for the annual-average civilian unemployment rate (UNEMP) and annual-average real GDP (RGDP).

- **Annual Horizons for Interest Rates**. Beginning with the 2009:Q3 survey, we asked the forecasters to provide two more years of annual projections for the annual-average rates on three-month Treasury bills (TBILL) rate and 10-year Treasury bonds (TBOND).

This documentation provides information on the variables forecast and the format of the files. We begin with a listing and description of the files and the survey's timing. We then discuss the following topics:

- Section 2 discusses the organization of the files for median and mean forecasts for the levels of variables. We also document the names of the variables. Importantly, this section describes any caveats on particular survey variables.

- Section 3 discusses forecasts for growth rates. For most survey variables, we construct growth rates as the rate of growth in the mean or median forecast for the level. The exceptions are the headline and core CPI and PCE inflation rates, which enter the survey in growth-rate form.

- Section 4 discusses the files for individual forecasts. The organization of the files is similar to that for the mean and median forecasts. Important caveats exist in using the individual responses.

- Section 5 discusses a special file that we have constructed for one-year-ahead and 10-year-ahead forecasts for CPI inflation.

- Section 6 discusses the survey's density projections.

- Section 7 discusses an alternative way of presenting the data by the variable forecast.

- Section 8 discusses the files containing the projections for the natural rate of unemployment (NAIRU). This variable enters the survey only in the third quarter.

- Section 9 discusses the data files and our computations for cross-sectional forecast dispersion.

- Section 10 discusses implied forecasts for 21 variables that do not directly enter the survey. This includes projections for interest-rate term spreads, real interest rates, and forward inflation rates.

- Section 11 lists the changes made to this document.

Table 1 provides a list of the files and a description of their contents.

Table 1. Overview — Files and Contents

Name of File	Brief Description of Contents
MedianLevel.xlsx	An Excel workbook with multiple worksheets. Each worksheet holds the time series of *median* forecasts for the level of a different variable. The first two columns list the year and quarter in which the survey was conducted. The remaining columns give the *median* forecasts for all quarterly and annual horizons, as described below.
MeanLevel.xlsx	An Excel workbook with multiple worksheets. Each worksheet holds the time series of *mean* forecasts for the level of a different variable. The first two columns list the year and quarter in which the survey was conducted. The remaining columns give the *mean* forecasts for all quarterly and annual horizons, as described below.
MedianGrowth.xlsx	An Excel workbook with multiple worksheets. Each worksheet holds the time series of *median* forecasts for growth of a different variable (annualized percentage points). These are the growth rates of the levels provided in MedianLevel.xlsx. The first two columns list the year and quarter in which the survey was conducted. The remaining columns give the forecasts for all quarterly horizons.
MeanGrowth.xlsx	An Excel workbook with multiple worksheets. Each worksheet holds the time series of *mean* forecasts for growth of a different variable (annualized percentage points). These are the growth rates of the levels provided in MeanLevel.xlsx. The first two columns list the year and quarter in which the survey was conducted. The remaining columns give the forecasts for all quarterly horizons.
Prob.xlsx	An Excel workbook with six worksheets. Each worksheet gives the time series of *mean* probability forecasts for a different probability variable in the survey, as described below. The first two columns give the year and quarter in which the survey was conducted.
Dispersion_1.xlsx	An Excel workbook with multiple worksheets. Each worksheet holds the time series of forecast *dispersion* for the level of a different variable. The *dispersion* measure is defined as the difference between the 75th percentile and the 25th percentile of the projections in levels. The first column lists the year and quarter in which the survey was conducted. The remaining columns give the 25th percentile, the 75th percentile, and the forecast *dispersion* for all quarterly horizons. We provide this measure of dispersion only for the variables for which it makes the most sense.

Name of File	Brief Description of Contents
Dispersion_2.xlsx	An Excel workbook with multiple worksheets. Each worksheet holds the time series of forecast *dispersion* for the Q/Q growth (annualized percentage points) of a different variable. The *dispersion* measure is defined as the difference between the 75th percentile and the 25th percentile of the projections for Q/Q growth, expressed in annualized percentage points. The first column lists the year and quarter in which the survey was conducted. The remaining columns give the 25th percentile, the 75th percentile, and the forecast *dispersion* for all quarterly horizons. We provide this measure of dispersion only for the variables for which it makes the most sense.
Dispersion_3.xlsx	An Excel workbook with multiple worksheets. Each worksheet holds the time series of forecast *dispersion* for the log difference of the levels of a different variable. The *dispersion* measure is defined as the percent difference (in percentage points) between the 75th percentile and the 25th percentile of the projections in levels. The first column lists the year and quarter in which the survey was conducted. The remaining columns give the 25th percentile, the 75th percentile, and the forecast *dispersion* for all quarterly horizons. We provide this measure of dispersion only for the variables for which it makes the most sense.
SPFmicrodata.xlsx	An Excel workbook with multiple worksheets. Each worksheet holds the time series of individual forecasts of a different variable. The first three columns give the year and quarter of the survey and the forecaster's identification number (ID). The remaining columns give the forecasts for all horizons in the survey, organized in the same manner as the mean and median forecast files for levels (MedianLevel.xlsx and MeanLevel.xlsx).
Inflation.xlsx	An Excel workbook with one worksheet containing three series for expectations of inflation. The first two are one-year-ahead expectations of inflation (measured by the GNP/GDP price index and, alternatively, the CPI). The third series is the expectation for annual-average inflation over the next 10 years. The one-year-ahead expectations are annual averages, in annualized percentage points, over the four quarters, beginning with the quarter after the quarter in which the survey was conducted. (The year and quarter in which the survey was conducted are listed in the first two columns.) All forecasts are based on the median response.

Overview: Timing of the Survey. The Philadelphia Fed's first survey was the one for 1990:Q2. However, this survey was not conducted in real time because we had not yet taken over full responsibility from the ASA/NBER. For this survey, the forecasters were asked to provide dated forecasts from May 1990.

The first survey we conducted in real time was the one for 1990:Q3. With a few minor exceptions noted below, we have maintained a consistent timing in conducting the surveys since the 1990:Q3 survey. We now discuss several topics related to the survey's timing. The topics are:

- Information sets and deadlines;
- Survey release dates; and
- Timing of surveys prior to the 1990:Q2 survey.

Information Sets and Deadlines. The survey's timing is geared to the release of the Bureau of Economic Analysis's (BEA) *advance report* of the national income and product accounts (NIPA). This report is released at the end of the first month of each quarter. It contains the first estimate of GDP (and components) for the previous quarter. We send our survey questionnaires after this report is released to the public. The survey's questionnaires report recent historical values of the data from the BEA's advance report and the most recent reports of other government statistical agencies. Thus, in submitting their projections, our panelists' information sets include the data reported in the advance report.

For the surveys, we conducted after the 1990:Q2 survey, we have set the deadlines for responses at late in the second to third week of the middle month of each quarter. A complete list of the dates of deadlines for surveys from 1990:Q2 to the present is available on the Philadelphia Fed's website at https://www.philadelphiafed.org/-/media/frbp/assets/surveys-and-data/survey-of-professional-forecasters/spf-release-dates.txt.

For some variables, notably those contained in the Bureau of Labor Statistics's (BLS) monthly Employment Situation Summary, there could be a revision to the data (and an additional monthly observation) compared with the data we reported on the survey questionnaire. This happens when there is a new release of the data after we send the survey questionnaire but before the deadline for returning it. The Employment Situation Summary is a prime example, because the BLS has almost always released this report on the first Friday of each month, after we send the questionnaire and before the deadline. Thus, the information sets of the panelists include the data reported in the Employment Situation Summary that the BLS releases to the public in the middle month of each quarter.

A minor change in the timing of the dates of the deadlines occurred beginning with the survey of 2005:Q1. Beginning with this survey, we tightened our production schedule. The dates of the deadlines for responses were moved up a few days (in most surveys), to the second week of the middle month. (The dates for release to the public were also moved up a few days.)

Survey Release Dates. From 1990:Q3 to 2004:Q4, we released the results of the survey to the public in the fourth week of the middle month of the quarter. Exceptions are noted on the

Philadelphia Fed's website for the survey. Beginning with the survey of 2005:Q1, we advanced the dates of release a few days, to late in the second week of the middle month of the quarter. We always release the results before the BEA's second report for the national income and product accounts.[1]

Timing of Surveys Prior to the 1990:Q2 Survey*.* We do not know with certainty the timing of the surveys conducted by the ASA/NBER. We think that, in broad terms, the timing was similar to that adopted by the Philadelphia Fed. In other words, we think that the questionnaires were sent to panelists after the first (advance) report of the national income and product accounts and that the results were released to the public before the second report. However, because we are uncertain about the ASA/NBER's timing, our reference dates do not cover surveys prior to that of 1990:Q2.

---

[1] Beginning with the benchmark revision of July 2009, the BEA changed its vintage terminology: Instead of the terminology "Advance," "Preliminary," and "Final," the BEA uses "Advance," "Second," and "Third." The timing of these releases remains the same.

Table 1A summarizes the timing of the Survey of Professional Forecasters in the surveys beginning with 1990:Q3.

Table 1A. Timing of the Survey of Professional Forecasters
1990:Q3 to Present

Survey Name	Questionnaires Sent to Panelists	Last Quarter of History in the Panelists' Information Sets	Date of Deadline for Submissions[2]	Results Released to the Public
First Quarter	End of January (after NIPA advance report)	Q4	Middle of February (second to third week)	Middle to Late February (before NIPA second report)
Second Quarter	End of April (after NIPA advance report)	Q1	Middle of May (second to third week)	Middle to Late May (before NIPA second report)
Third Quarter	End of July (after NIPA advance report)	Q2	Middle of August (second to third week)	Middle to Late August (before NIPA second report)
Fourth Quarter	End of October (after NIPA advance report)	Q3	Middle of November (second to third week)	Middle to Late November (before NIPA second report)

---

[2] A minor break in the timing of the dates of the deadlines and news releases begins with the survey of 2005:Q1. For details, see the text above and the file located on the Philadelphia Fed's website at: https://www.philadelphiafed.org/-/media/frbp/assets/surveys-and-data/survey-of-professional-forecasters/spf-release-dates.txt.

2. Median and Mean Forecasts for Levels

In each survey, the forecasters provide their projections for the next five quarters and for the current and following years.[3] The files *MedianLevel.xlsx* and *MeanLevel.xlsx* contain the median and mean survey responses. Both files are organized in the same manner. Each is an Excel workbook containing multiple worksheets, with each worksheet containing the forecasts for a particular variable. You move among the worksheets by choosing the appropriate tab at the bottom. These tabs refer to the variable being forecast. We use "#N/A" to denote a missing value. **Table 2** defines the variables forecast (worksheet tabs) and provides a brief description of each.

In July 2012, we added forecasts for some variables that do not appear directly in the survey. We construct these "implied forecasts" as linear combinations of the forecasts for variables in the survey. Examples are forecasts for real interest rates, the spread between various interest rates, and five-year forward, five-year annual-average inflation rates. **Table 2A** lists the variables for which we compute "implied forecasts."

---

[3] See the discussion below for exceptions for the annual forecasts in the surveys of 1985:Q1, 1986:Q1, and 1990:Q1. Beginning with the 2007:Q1 survey, we asked the forecasters to provide the annual forecasts for the current and the next two years for CPI inflation rate, core CPI inflation rate, PCE inflation rate, and core PCE inflation rate. Beginning with the 2010:Q1 survey, we asked the forecasters to provide two more years of annual forecasts for the civilian unemployment rate, three-month Treasury bill rate, 10-year Treasury bond rate, and real GDP.

Table 2. Variables Forecast in the Survey

Variable Name and Worksheet Tab	Description
NGDP	Forecasts for the quarterly and annual level of nominal GDP. Seasonally adjusted, annual rate, billions $. Prior to 1992, these are forecasts for nominal GNP. Annual forecasts are for the annual average of the quarterly levels. **First survey to include this variable:** 1968:Q4.
PGDP	Forecasts for the quarterly and annual level of the chain-weighted GDP price index. Seasonally adjusted, index, base year varies. 1992–1995, GDP implicit deflator. Prior to 1992, GNP implicit deflator. Annual forecasts are for the annual average of the quarterly levels. **First survey to include this variable:** 1968:Q4.
CPROF	Forecasts for the quarterly and annual level of nominal corporate profits after tax *excluding* IVA and CCAdj. Seasonally adjusted, annual rate, billions $. Beginning with the survey of 2006:Q1, this variable *includes* IVA and CCAdj. Annual forecasts are for the annual average of the quarterly levels. **First survey to include this variable:** 1968:Q4.
UNEMP	Forecasts for the quarterly average and annual-average unemployment rate. Seasonally adjusted, percentage points. Quarterly forecasts are for the quarterly average of the underlying monthly levels. Annual forecasts are for the annual average of the underlying monthly levels. **First survey to include this variable:** 1968:Q4.
EMP	Forecasts for the quarterly average and annual-average level of nonfarm payroll employment. Seasonally adjusted, thousands of jobs. Quarterly forecasts are for the quarterly average of the underlying monthly levels. Annual forecasts are for the annual average of the underlying monthly levels. **First survey to include this variable:** 2003:Q4.
INDPROD	Forecasts for the quarterly average and annual-average level of the index of industrial production. Seasonally adjusted, index, base year varies. Quarterly forecasts are for the quarterly average of the underlying monthly levels. Annual forecasts are for the annual average of the underlying monthly levels. **First survey to include this variable:** 1968:Q4.

HOUSING	Forecasts for the quarterly average and annual-average level of housing starts. Seasonally adjusted, annual rate, millions. Quarterly forecasts are for the quarterly average of the underlying monthly levels. Annual forecasts are for the annual average of the underlying monthly levels. **First survey to include this variable:** 1968:Q4.
TBILL	Forecasts for the quarterly average and annual-average three-month Treasury bill rate. Percentage points. Quarterly forecasts are for the quarterly average of the underlying daily levels. Annual forecasts are for the annual average of the underlying daily levels. **First survey to include this variable:** 1981:Q3.
BOND	Forecasts for the quarterly average and annual-average level of Moody's Aaa corporate bond yield. Percentage points. Prior to 1990:Q4, this is the new, high-grade corporate bond yield (*Business Conditions Digest* variable 116). Quarterly forecasts are for the quarterly average of the underlying daily levels. Annual forecasts are for the annual average of the underlying daily levels. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public. **First survey to include this variable:** 1981:Q3.
BAABOND	Forecasts for the quarterly average and annual-average level of Moody's Baa corporate bond yield. Percentage points. Quarterly forecasts are for the quarterly average of the underlying daily levels. Annual forecasts are for the annual average of the underlying daily levels. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public. **First survey to include this variable:** 2010:Q1.
TBOND	Forecasts for the quarterly average and annual-average 10-year Treasury bond rate. Percentage points. Quarterly forecasts are for the quarterly average of the underlying daily levels. Annual forecasts are for the annual average of the underlying daily levels. **First survey to include this variable:** 1992:Q1.
RGDP	Forecasts for the quarterly and annual level of chain-weighted real GDP. Seasonally adjusted, annual rate, base year varies. 1992–1995, fixed-weighted real GDP. Prior to 1992, fixed-weighted real GNP. Annual forecasts are for the annual average of the quarterly levels. Prior to 1981:Q3, RGDP is computed by using the formula NGDP / PGDP * 100. **First survey to include this variable:** 1968:Q4.

RCONSUM	Forecasts for the quarterly and annual level of chain-weighted real personal consumption expenditures. Seasonally adjusted, annual rate, base year varies. Annual forecasts are for the annual average of the quarterly levels. Prior to 1996, fixed-weighted real personal consumption expenditures. **First survey to include this variable:** 1981:Q3.
RNRESIN	Forecasts for the quarterly and annual level of chain-weighted real nonresidential fixed investment. Also known as business fixed investment. Seasonally adjusted, annual rate, base year varies. Annual forecasts are for the annual average of the quarterly levels. Prior to 1996, fixed-weighted real nonresidential fixed investment. **First survey to include this variable:** 1981:Q3.
RRESINV	Forecasts for the quarterly and annual level of chain-weighted real residential fixed investment. Seasonally adjusted, annual rate, base year varies. Annual forecasts are for the annual average of the quarterly levels. Prior to 1996, fixed-weighted real residential fixed investment. **First survey to include this variable:** 1981:Q3.
RFEDGOV	Forecasts for the quarterly and annual level of chain-weighted real federal government consumption and gross investment. Seasonally adjusted, annual rate, base year varies. Annual forecasts are for the annual average of the quarterly levels. Prior to 1996, fixed-weighted real federal government purchases of goods and services. **First survey to include this variable:** 1981:Q3.
RSLGOV	Forecasts for the quarterly and annual level of chain-weighted real state and local government consumption and gross investment. Seasonally adjusted, annual rate, base year varies. Annual forecasts are for the annual average of the quarterly levels. Prior to 1996, fixed-weighted real state and local government purchases of goods and services. **First survey to include this variable:** 1981:Q3.
RCBI	Forecasts for the quarterly and annual level of chain-weighted real change in private inventories. Seasonally adjusted, annual rate, base year varies. Annual forecasts are for the annual average of the quarterly levels. Prior to 1996, fixed-weighted real change in inventories. **First survey to include this variable:** 1981:Q3.
REXPORT	Forecasts for the quarterly and annual level of chain-weighted real net exports. Seasonally adjusted, annual rate, base year varies. Annual forecasts are for the annual average of the quarterly levels. Prior to 1996, fixed-weighted real net exports. **First survey to include this variable:** 1981:Q3.

CPI5YR	Forecasts for the annual-average rate of headline CPI inflation over the next five years. Seasonally adjusted, annualized percentage points. The "next five years" includes the year in which we conducted the survey and the following four years. Conceptually, the calculation of inflation is one that runs from the fourth quarter of the year before the survey year to the fourth quarter of the year that is five years beyond the survey year, representing a total of 20 quarters or five years. The fourth-quarter level is the quarterly average of the underlying monthly levels. **First survey to include this variable:** 2005:Q3.
PCE5YR	Forecasts for the annual-average rate of headline PCE inflation over the next five years. Seasonally adjusted, annualized percentage points. The "next five years" includes the year in which we conducted the survey and the following four years. Conceptually, the calculation of inflation is one that runs from the fourth quarter of the year before the survey year to the fourth quarter of the year that is five years beyond the survey year, representing a total of 20 quarters or five years. The fourth-quarter level is the quarterly average of the underlying monthly levels. **First survey to include this variable:** 2007:Q1.
CPI10	Forecasts for the annual-average rate of headline CPI inflation over the next 10 years. Seasonally adjusted, annualized percentage points. The "next 10 years" includes the year in which we conducted the survey and the following nine years. Conceptually, the calculation of inflation is one that runs from the fourth quarter of the year before the survey year to the fourth quarter of the year that is ten years beyond the survey year, representing a total of 40 quarters or 10 years. The fourth-quarter level is the quarterly average of the underlying monthly levels. **First survey to include this variable:** 1991:Q4.
PCE10	Forecasts for the annual-average rate of headline PCE inflation over the next 10 years. Seasonally adjusted, annualized percentage points. The "next 10 years" includes the year in which we conducted the survey and the following nine years. Conceptually, the calculation of inflation is one that runs from the fourth quarter of the year before the survey year to the fourth quarter of the year that is ten years beyond the survey year, representing a total of 40 quarters or 10 years. The fourth-quarter level is the quarterly average of the underlying monthly levels. **First survey to include this variable:** 2007:Q1.

RGDP10	Forecasts for the annual-average rate of growth in chain-weighted real GDP over the next 10 years. Annualized percentage points. First-quarter surveys only. The 10-year horizon covers the year in which we conducted the survey through the year that is 10 years after the survey year, a total of 40 quarters or 10 years. Prior to 1996, fixed-weighted real GDP. **First survey to include this variable:** 1992:Q1.
PROD10	Forecasts for the annual-average rate of growth in productivity (output/per hour) over the next 10 years. Annualized percentage points. First-quarter surveys only. The 10-year horizon covers the year in which we conducted the survey through the year that is 10 years after the survey year, a total of 40 quarters or 10 years. **First survey to include this variable:** 1992:Q1.
STOCK10	Forecasts for the annual-average rate of return to equities (S&P 500) over the next 10 years. Percentage points. First-quarter surveys only. The 10-year horizon covers the year in which we conducted the survey through the year that is 10 years after the survey year, a total of 40 quarters or 10 years. **First survey to include this variable:** 1992:Q1
BOND10	Forecasts for 10-year annual-average yield on 10-year constant maturity Treasury bonds. Percentage points. First-quarter surveys only. The phrasing of the question for this variable changed in the survey of 2014:Q1. This change may or may not cause a structural break in the time series of responses. For additional details, see the section below on caveats. **First survey to include this variable:** 1992:Q1.
BILL10	Forecasts for the annual-average rate of return to three-month Treasury bills over the next 10 years. Percentage points. First-quarter surveys only. The 10-year horizon covers the year in which we conducted the survey through the year that is 10 years after the survey year, a total of 40 quarters or 10 years. **First survey to include this variable:** 1992:Q1.
CPI	Forecasts for the headline CPI *inflation rate*. Seasonally adjusted, annual rate, percentage points. Quarterly forecasts are annualized quarter-over-quarter percent changes of the quarterly average price index level. Annual forecasts are fourth-quarter over fourth-quarter percent changes. The quarterly price index level is the quarterly average of the underlying monthly price index levels. **First survey to include this variable:** 1981:Q3.

CORECPI	Forecasts for the core CPI *inflation rate*. Seasonally adjusted, annual rate, percentage points. Quarterly forecasts are annualized quarter-over-quarter percent changes of the quarterly average price index level. Annual forecasts are fourth-quarter over fourth-quarter percent changes. The quarterly price index level is the quarterly average of the underlying monthly price index levels. **First survey to include this variable:** 2007:Q1.
PCE	Forecasts for the headline chain-weighted PCE *inflation rate*. Seasonally adjusted, annual rate, percentage points. Quarterly forecasts are annualized quarter-over-quarter percent changes of the quarterly average price index level. Annual forecasts are fourth-quarter over fourth-quarter percent changes. The quarterly price index level is the quarterly average of the underlying monthly price index levels. **First survey to include this variable:** 2007:Q1.
COREPCE	Forecasts for the core chain-weighted PCE *inflation rate*. Seasonally adjusted, annual rate, percentage points. Quarterly forecasts are annualized quarter-over-quarter percent changes of the quarterly average price index level. Annual forecasts are fourth-quarter over fourth-quarter percent changes. The quarterly price index level is the quarterly average of the underlying monthly price index levels. **First survey to include this variable:** 2007:Q1.
RECESS1 to RECESS5 and Anxious Index	Probability of quarter-over-quarter chain-weighted real GDP growth less than zero for the current quarter (RECESS1) and the following four quarters (RECESS2 to RECESS5). Percentage points. The "current quarter" is the quarter in which we conducted the survey. Over 1992–1995, the output concept is fixed-weighted real GDP. Prior to 1992, the output concept is fixed-weighted real GNP. Note: RECESS2 is known as the "Anxious Index." **First survey to include this variable:** 1968:Q4.
PRGDP	Density projections for annual chain-weighted real GDP growth falling into various ranges. Percentage points. Annual real GDP growth is the year-over-year growth of the annual-average level of chain-weighted real GDP. The annual- average level of chain-weighted real GDP is the average of the level of quarterly chain-weighted real GDP over the four quarters of the year. From 1992–1995, the output concept is fixed-weighted real GDP. Prior to 1992, the output concept is fixed-weighted real GNP. See the section on "Mean Probability Forecasts" for additional details. **First survey to include this variable:** 1968:Q4.

PRPGDP	Density projections for annual chain-weighted GDP price inflation falling into various ranges. Percentage points. Annual chain-weighted GDP price inflation is the year-over-year growth of the annual-average level of the chain-weighted GDP price index. The annual-average level of the chain-weighted GDP price index is the average of the quarterly chain-weighted GDP price index over the four quarters of the year. From 1992–1995, the price index is the GDP implicit deflator. Prior to 1992, the price index is the GNP implicit deflator. See the section on "Mean Probability Forecasts" for additional details. **First survey to include this variable:** 1968:Q4.
PRCCPI	Density projections for annual core CPI inflation falling into various ranges. Percentage points. Annual core CPI inflation is the fourth-quarter over fourth-quarter growth of the fourth-quarter average of the core CPI price index level. The fourth-quarter average CPI price index level is the average of the underlying monthly price index levels. See the section on "Mean Probability Forecasts" for additional details. **First survey to include this variable:** 2007:Q1.
PRCPCE	Density projections for annual chain-weighted core PCE inflation falling into various ranges. Percentage points. Annual chain-weighted core PCE inflation is the fourth-quarter over fourth-quarter growth of the fourth-quarter average of the chain-weighted core PCE price index level. The fourth-quarter average chain-weighted PCE price index level is the average of the underlying monthly chain-weighted price index levels. See the section on "Mean Probability Forecasts" for additional details. **First survey to include this variable:** 2007:Q1.
PRUNEMP	Density projections for the annual-average unemployment rate falling into various ranges. Percentage points. The annual-average unemployment rate is the average of the 12 monthly unemployment rates of the year. See the section on "Mean Probability Forecasts" for additional details. **First survey to include this variable:** 2009:Q2.
UBAR	Natural rate of unemployment. Percentage points. Third-quarter surveys only. Files for the mean statistics, median statistics, dispersion statistics, and individual responses are for those panelists who provide an estimate and say that they use the natural rate of unemployment in forming their projections. **First survey to include this variable:** 1996:Q3.

Table 2A. Variables for Which We Compute Implied Forecasts

These variables do not appear directly in the survey. Rather, we compute the implied forecasts using linear combinations of the projections for variables in the survey. The section entitled "Implied Forecasts" provides extensive documentation on our methods.

Variable Name and Worksheet Tab	Description
SPR_TBOND_TBILL	(Implied) Forecasts for the spread between the nominal rate on 10-year Treasury bonds and the nominal rate on three-month Treasury bills. Annualized percentage points. **First survey to include this variable:** 1992:Q1.
SPR_BAA_AAA	(Implied) Forecasts for the spread between the nominal rate on Moody's Baa bonds and the nominal rate on Moody's Aaa bonds. Annualized percentage points. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public. **First survey to include this variable:** 2010:Q1.
SPR_BAA_TBOND	(Implied) Forecasts for the spread between the nominal rate on Moody's Baa bonds and the nominal rate on 10-year Treasury bonds. Annualized percentage points. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public. **First survey to include this variable:** 2010:Q1.
SPR_AAA_TBOND	(Implied) Forecasts for the spread between the nominal rate on Moody's Aaa bonds and the nominal rate on 10-year Treasury bonds. Annualized percentage points. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public. **First survey to include this variable:** 1992:Q1.
RR1_TBILL_PGDP RR2_TBILL_PGDP RR3_TBILL_PGDP	(Implied) Forecasts for the real rate on three-month Treasury bills using forecasts for GNP/GDP inflation. Annualized percentage points. See the section on "Implied Forecasts" for additional information. **First survey to include this variable:** 1981:Q3.

Variable Name and Worksheet Tab	Description
RR1_TBILL_CPI **RR2_TBILL_CPI** **RR3_TBILL_CPI**	(Implied) Forecasts for the real rate on three-month Treasury bills using forecasts for headline CPI inflation. Annualized percentage points. See the section on "Implied Forecasts" for additional information. **First survey to include this variable:** 1981:Q3.
RR1_TBILL_CCPI **RR2_TBILL_CCPI** **RR3_TBILL_CCPI**	(Implied) Forecasts for the real rate on three-month Treasury bills using forecasts for core CPI inflation. Annualized percentage points. See the section on "Implied Forecasts" for additional information. **First survey to include this variable:** 2007:Q1.
RR1_TBILL_PCE **RR2_TBILL_PCE** **RR3_TBILL_PCE**	(Implied) Forecasts for the real rate on three-month Treasury bills using forecasts for headline PCE inflation. Annualized percentage points. See the section on "Implied Forecasts" for additional information. **First survey to include this variable:** 2007:Q1.
RR1_TBILL_CPCE **RR2_TBILL_CPCE** **RR3_TBILL_CPCE**	(Implied) Forecasts for the real rate on three-month Treasury bills using forecasts for core PCE inflation. Annualized percentage points. See the section on "Implied Forecasts" for additional information. **First survey to include this variable:** 2007:Q1.
CPIF5	Five-year forward, five-year annual-average headline CPI inflation using the fourth-quarter average of the underlying monthly price index levels. Annualized percentage points. The horizon covers the five-year period that begins with the fourth quarter of the year that is four years after the survey year and ends with the fourth quarter of the year that is nine years after the survey year. **First survey to include this variable:** 2005:Q3.
PCEF5	Five-year forward, five-year annual-average headline chain-weighted PCE inflation using the fourth-quarter average of the underlying monthly price index levels. Annualized percentage points. The horizon covers the five-year period that begins with the fourth quarter of the year that is four years after the survey year and ends with the fourth quarter of the year that is nine years after the survey year. **First survey to include this variable:** 2007:Q1.

File Structure: Column Header Nomenclature and Forecast Horizons. We organize the files by the date of the survey. Each row gives the projections from a different survey. The first two columns give the year and quarter in which the survey was conducted. The remaining columns give the forecasts.

As you move across a given row, the columns give the forecast for a different quarterly or annual horizon. We distinguish among the horizons by appending "1" through "6" (quarterly forecasts) or "A" and "B" (annual-average forecasts) to a root name identifying the variable forecast. The number "1" represents the "forecast" for the quarter prior to the quarter in which the survey is conducted. The forecasters know the values of the variables for this quarter at the time they submit their projections. For example, for NIPA variables, these values are the BEA's advance estimate for the quarter. The forecasters are permitted to forecast a revision to the BEA's advance estimate but most do not. Thus, the data in this column correspond closely to the BEA's advance estimate. The number "2" represents the forecast for the current quarter, defined as the quarter in which the survey is conducted. The numbers "3" through "6" represent the forecasts for the four quarters after the current quarter. The letters "A" and "B" represent annual-average forecasts for the current year (the year in which the survey is conducted) and the following year.

Beginning with the 2005:Q3 survey, we extended the annual forecast horizon one year for headline CPI inflation. We use the letters "A," "B," and "C" to denote the annual fourth-quarter over fourth-quarter inflation forecasts for the year in which we conducted the survey ("A") and the following two years ("B" and "C").

Beginning with the 2007:Q1 survey, we added three new inflation variables to the questionnaire: core CPI inflation, PCE inflation, and core PCE inflation. Paralleling the aforementioned extension of the headline CPI inflation annual horizon, we also extended the annual horizon for the new variables one year beyond the usual two-year ahead horizon. For these three new inflation variables, the letters "A," "B," and "C" represent fourth-quarter over fourth-quarter inflation forecasts for the current year and the next two years. Thus, the meaning of the letters "A," "B," and "C" for the new inflation variables is the same as for headline CPI inflation.

Beginning with the 2009:Q2 survey, we extended the annual forecast horizon by two years for the civilian unemployment rate and real GDP. Beginning with the 2009:Q3 survey, we extended the annual forecast horizon by two years for the three-month Treasury bill rate and 10-year Treasury bond rate. For these four variables, the letters "A," "B," "C," and "D" represent annual-average forecasts for the current year and the next three years.

File Structure: Example. **Table 3** gives an example of the forecast horizons included at three successive quarterly survey dates: 2005:Q3, 2005:Q4, and 2006:Q1. In the survey conducted in the third quarter of 2005, the forecasters knew the BEA's advance estimate for 2005:Q2, and they provided quarterly forecasts for 2005:Q3 through 2006:Q3. Their projection for 2005:Q3 is a forecast for the current quarter because that is the quarter in which the forecasters are standing when they make their projections. (Some call this the one-step-ahead forecast while others call it the 0-step-ahead forecast or the nowcast.) The forecasters' annual-average projections were those for 2005 and 2006.

Note two features about the format of our files. First, as you move down a particular column, you get the sequence of a given step-ahead forecast. For example, the column labeled NGDP2 gives the sequence of current-quarter (or nowcast) forecasts. The column labeled NGDP6 gives the sequence of 5-step-ahead forecasts (if you count NGDP2 as the one-step-ahead forecast). *Be careful about these sequences*! The forecasts for levels are always scaled to the base year that was in effect at the time of the survey. Over time, as benchmark revisions to the data occur, the scale changes. (Below, we provide additional information on base years.)

Second, the years included in the annual forecast horizon ("A" and "B") change in each first-quarter survey. In the surveys conducted from 2005:Q1 through 2005:Q4, for example, the forecasters provided annual-average projections for the current year (2005) and the next year (2006). In the survey of 2006:Q1, the current year is 2006 and the next year is 2007, so the forecasters provided projections for those years. As noted below in the section on probability forecasts, similar comments apply to the annual forecast horizons for the survey's density projections for annual-average over annual-average growth in the level of real GDP (variable: PRGDP) and the level of the GDP price index (variable: PRPGDP), the survey's density projections for fourth-quarter over fourth-quarter growth in the level of the core CPI price index (variable: PRCCPI) and the fourth-quarter over fourth-quarter growth in the level of the core PCE price index (variable: PRCPCE), and the survey's density projections for the annual-average level of the unemployment rate (variable: PRUNEMP).

Table 3. Example: Forecast Horizons for Nominal GDP at Three Survey Dates

Survey Date (Year, Quarter)		Quarterly Historical Value	Quarterly Projections: Quarter Forecast					Annual-Average Projections: Year Forecast	
(1) Year	(2) Quarter	(3) NGDP1	(4) NGDP2	(5) NGDP3	(6) NGDP4	(7) NGDP5	(8) NGDP6	(9) NGDPA	(10) NGDPB
2005	3	2005:Q2	2005:Q3	2005:Q4	2006:Q1	2006:Q2	2006:Q3	2005	2006
2005	4	2005:Q3	2005:Q4	2006:Q1	2006:Q2	2006:Q3	2006:Q4	2005	2006
2006	1	2005:Q4	2006:Q1	2006:Q2	2006:Q3	2006:Q4	2007:Q1	2006	2007

Table notes. The table shows how we organize the survey's median (or mean) responses for three survey dates: 2005:Q3, 2005:Q4, and 2006:Q1. The entries in columns (1)–(2) show the year and quarter when we conducted the survey. The entry in column (3) shows the observation date for the last known historical quarter at the time we sent the questionnaire to the panelists. The entries in columns (4)–(8) show the quarterly observation dates forecast. The entries in columns (9)–(10) show the annual observation dates forecast: Notice how the annual-average forecast horizons are fixed within a calendar year and change in each first-quarter survey. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public.

At each survey date, we record the projections for various horizons in the same row. **NGDP1** is the real-time quarterly historical value for the previous quarter—that is, the quarter before the quarter when we conducted the survey. **NGDP2** is the forecast (nowcast) for the current quarter—that is, the quarter when we conducted the survey. **NGDP3 to NGDP6** are the forecasts for the following four quarters. **NGDPA and NGDPB** are the annual-average projections for the current year (the year when we conducted the survey) and the following year.

Changes in Base Year. There have been a number of changes of base year in NIPA since the survey began. As noted above, the forecasts for levels in our data set use the base year that was in effect when we sent the forecasters the survey questionnaire. In particular, we do not rescale the forecasts of previous surveys when there is a change in base year. **Table 4** provides the base year in effect for NIPA variables for each range of survey dates. The base year for the survey's forecasts for industrial production has also changed over time. These base years appear in **Table 5**.

Table 4. Base Years for NIPA Variables in the Survey of Professional Forecasters

Range of Survey Dates	Base Year
1968:Q4 to 1975:Q4	1958
1976:Q1 to 1985:Q4	1972
1986:Q1 to 1991:Q4	1982
1992:Q1 to 1995:Q4[4]	1987
1996:Q1 to 1999:Q3[5]	1992
1999:Q4 to 2003:Q4	1996
2004:Q1 to 2009:Q2	2000
2009:Q3 to 2013:Q2	2005
2013:Q3 to 2018:Q2	2009
2018:Q3 to 2023:Q3	2012
2023:Q4 to present	2017

Table 5. Base Years for Industrial Production in the Survey of Professional Forecasters

Range of Survey Dates	Base Year
1968:Q4 to 1971:Q3	1957–1959
1971:Q4 to 1985:Q2	1967
1985:Q3 to 1990:Q1	1977
1990:Q2 to 1996:Q4	1987
1997:Q1 to 2002:Q4	1992
2003:Q1 to 2005:Q4	1997
2006:Q1 to 2010:Q2	2002
2010:Q3 to 2015:Q2	2007
2015:Q3 to 2021:Q2	2012
2021:Q3 to present	2017

[4] In the survey of 1992:Q1, the survey's measure of output switches from GNP to GDP.
[5] In the survey of 1996:Q1, the survey's measures of NIPA prices and quantities switches to chain-weighted measures.

Caveats: Breaks in the Historical Series of Projections and Additional Information for Selected Variables. The historical time series in this survey are quite lengthy. A limited number of series are subject to some discontinuities. This section documents these breaks and provides additional information for selected variables.

- **Moody's Corporate Aaa Bond Yield (BOND)**. This variable is inconsistent before 1990:Q4. Prior to the survey of 1990:Q4, the variable used was the new, high-grade corporate bond yield (*Business Conditions Digest* variable 116.) This rate was generated at the U.S. Treasury primarily for internal use. The advantage of using it beginning in 1981:Q3 was that it was readily available. But many forecasters did not track this variable and, instead, sent in forecasts of closely related variables, such as Moody's Aaa bond rate. The levels of these other variables may have differed by as much as 50 basis points. To eliminate this problem, we switched to using Moody's Aaa bond rate in 1990:Q4, and now the forecasts are consistent. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public.

- **Moody's Corporate Baa Bond Yield (BAABOND)**. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public.

- **Corporate Profits (CPROF)**. This variable is inconsistent before 2006:Q1. Prior to the survey of 2006:Q1, it is corporate profits after tax *excluding* IVA and CCAdj. The historical values of this particular measure are subject to large discrete jumps when there is a change in tax law affecting depreciation provisions. The time series of projections for this series in the Survey of Professional Forecasters may or may not capture the jumps in historical values, depending on whether the forecasters anticipated the corresponding changes in tax law. Beginning with the survey of 2006:Q1, we switched to the after-tax measure that *includes* IVA and CCAdj.

- **Small Sample in the Survey of 1990:Q2**. The Philadelphia Fed took over the survey in the summer of 1990. We were too late to send out a survey in 1990:Q2. However, to avoid having a missing data point, we mailed a 1990:Q2 survey form along with the 1990:Q3 survey form. We asked that only those who had a written record of their forecasts of three months earlier fill out the 1990:Q2 survey. As a result, the number of respondents was only nine. We felt that even a small, after-the-fact sample was better than no sample at all.

- **Problem with Annual Forecasts and Probability Forecasts—Surveys 1985:Q1, 1986:Q1, and 1990:Q1**. Generally, annual forecasts pertain to the current year and the following year. However, an error was made in the first-quarter surveys of 1985 and 1986. In those quarters, for the first 19 variables listed above (excluding EMP), the first annual forecast is for the previous year and the second annual forecast is for the current year. However, we cannot be sure from the NBER's records whether the

same is true for the probability variables PRGDP and PRPGDP. In addition, in the first quarter of 1990, for the same variables listed above, the same error was made, so that the first annual forecast is for the previous year and the second annual forecast is for the current year. The probability variables were done correctly in that survey, so they pertain to the current year and the following year.

- **Real GNP prior to the Survey of 1981:Q3**. The survey did not ask the panelists to forecast this variable prior to the survey of 1981:Q3. In order to provide a longer time series for this variable, we compute real GNP from 1968:Q4 to 1981:Q2 by using the formula NGDP / PGDP * 100. We compute the implied forecast for each panelist, then the means and medians.

- **Long-Term Forecasts for the Yield on 10-Year Constant-Maturity Treasury Bonds (BOND10)**. Beginning with the survey of 2014:Q1, we changed the way in which we ask the forecasters for their long-term (10-year annual average) forecast for the yield on 10-year constant-maturity Treasury bonds. We made the change because the question had always been ambiguously phrased. Such ambiguity might produce difficulties in interpreting the survey's responses. This change may or may not affect the way in which the panelists answer the question. Note that this variable (BOND10) enters the survey only in the first quarter of the year. However, each quarter the survey asks for short-term projections for the 10-year Treasury rate.

  o In first-quarter surveys prior to that of 2014:Q1: We asked the forecasters for their expectation of the "annual average over the next 10 years of the return to 10-year Treasury bonds." This could mean: (1) the return to buying a 10-year Treasury bond on the survey date and holding it until maturity; or (2) the 10-year average return to buying a 10-year Treasury bond every day (or month or quarter) over the next 10 years and holding each bond until maturity. [The second interpretation is somewhat more consistent with the survey's overall design because the SPF has always asked for quarterly projections for the 10-year Treasury rate (nowcast and next four quarters) and annual-average projections (current year and future years).]

  o In first-quarter surveys beginning with that of 2014:Q1: We ask the forecasters for their expectation of the "annual average yield on 10-year constant-maturity Treasury bonds over the next 10 years." We also make it clear that we mean the average of a panelist's projections for the current year and the following nine years and that the long-term survey projection should be consistent with the short-term survey projection for the current year and the following three years.

3. Growth Rates: Median and Mean Forecasts and Technical Definitions

Median and Mean Forecasts for Growth Rates.

Two files contain median and mean forecasts for *growth* of selected survey variables: *MedianGrowth.xlsx* and *MeanGrowth.xlsx*. We construct these forecast growth rates by first computing the median or mean forecast for the level of the variable (X), as given in *MedianLevel.xlsx* and *MeanLevel.xlsx*. We then compute the rate of growth (g), using the formula

$$\hat{g}_{t+k|t-1} = 100 \left[\left(\frac{\hat{X}_{t+k|t-1}}{\hat{X}_{t+k-1|t-1}} \right)^4 - 1 \right], \quad k = 0,1,\ldots,4$$

where $\hat{g}_{t+k|t-1}$ represents the forecast for quarter-over-quarter growth in period $t+k$ made on the basis of observations known through period $t-1$, and $\hat{X}_{t+k|t-1}$ represents the corresponding mean or median forecast for the level. Our notation makes use of the fact that a survey is conducted in quarter t, and the forecasters make their projections on the basis of historical observations dated $t-1$ and earlier. The (quarterly) projections are for periods $t, t+1, \ldots, t+4$. Thus, when $k = 0$, we have the forecast for growth in the current quarter, the quarter in which the survey was conducted. As explained above, $\hat{X}_{t-1|t-1} = X_{t-1}$, where X_{t-1} represents the historical value for the quarter before the survey quarter, as reported by government statistical agencies at the time the survey questionnaire is sent to the forecasters.[6]

Caveat. Note that the discussion of this sub-section excludes the forecasts for the headline and core CPI price index and the headline and core PCE price index. For these variables, the panelists submit their projections in growth-rate form only (that is, for inflation rates). Hence, the survey's median and mean projections for CPI and PCE inflation are means and medians of a growth rate (inflation), not growth rates of the mean and median projection for the level of the price index.

An Example. Forecast growth rates are computed from the forecasts for levels in the files, *MedianLevel.xlsx* and *MeanLevel.xlsx*. Using the nomenclature for these files developed above, we can write the forecast for growth for nominal GDP in the current quarter and the next quarter as

---

[6] The forecasters are permitted to forecast a revision to the last quarter of history (X_{t-1}). Most do not. Thus, in almost all cases, $\hat{X}_{t-1|t-1} = X_{t-1}$.

$$\hat{g}_{t|t-1} = 100 \left[\left(\frac{NGDP2_t}{NGDP1_t} \right)^4 - 1 \right]$$

$$\hat{g}_{t+1|t-1} = 100 \left[\left(\frac{NGDP3_t}{NGDP2_t} \right)^4 - 1 \right]$$

while the forecast growth rate for the last quarter in the quarterly horizon of each survey is that given by

$$\hat{g}_{t+4|t-1} = 100 \left[\left(\frac{NGDP6_t}{NGDP5_t} \right)^4 - 1 \right].$$

The format of our files of forecast growth rates parallels that described above for the forecasts of levels. Here are some noteworthy features:

- We provide forecast growth rates for the following variables: nominal GNP/GDP (NGDP), GNP/GDP price index (PGDP), corporate profits (CPROF), nonfarm payroll employment (EMP), industrial production index (INDPROD), housing starts (HOUSING), real GNP/GDP (RGDP), real personal consumption expenditures (RCONSUM), real nonresidential fixed investment (RNRESIN), real residential fixed investment (RRESINV), real federal government consumption and gross investment (RFEDGOV), and real state and local government consumption and gross investment (RSLGOV).

- Growth rates are those for quarter-over-quarter growth, expressed in annualized percentage points, beginning with the forecast for the current quarter.

- Each worksheet lists the year and quarter in which the survey was conducted.

- The column headers in each worksheet follow the same nomenclature described above. (We use "d" in the column header to denote a growth rate.) In particular, the number "2" appended to a column header represents a forecast for the quarter in which the survey is conducted. The numbers "3" to "6" represent the quarter-over-quarter growth rate forecasts for the following four quarters.

- Two worksheets are associated with the forecasts for the level of nonfarm payroll employment (EMP): EMP_AVG and EMP_PCG. The first (EMP_AVG) gives the implied forecast for the per month flow of new jobs, defined as the first difference of the forecast for the quarterly average level, divided by three. The second (EMP_PCG) gives the forecast growth rate, in annualized percentage points.

Technical Definitions of Growth Rates.

The survey includes forecasts for quarterly, quarter-over-quarter growth rates and for annual growth rates. A number of critical points are worth noting at the outset about these forecasts for growth rates:

- For all variables except headline and core CPI inflation and headline and core PCE inflation: The survey's official growth rates are those for the rate of growth of the mean or median forecast for the level. That is, the survey's reported growth rate is the rate of growth of the mean or median forecast for the level, not the mean or median forecast for the growth rate.

- For headline and core CPI inflation and headline and core PCE inflation: The official growth rate (that is, inflation itself) is the mean or median forecast for the inflation rate itself.

- All growth rates are expressed in annualized percentage points. The formulas use discrete compounding, not continuous compounding.

We use the preceding critical points to motivate the following general mathematical definitions for growth rates in the survey. Researchers and business analysts should keep these definitions in mind for understanding the survey's results and also for computing the realizations associated with the forecasts.

Quarterly, Quarter-over-Quarter Growth Rates. Let X_t represent the quarterly-average level of a variable in the quarter indexed by t.

If the variable is available at a monthly observation frequency, we have the definition given by $X_t = (1/3)\left(X^{(m)}_{1t} + X^{(m)}_{2t} + X^{(m)}_{3t}\right)$, where $X^{(m)}_{1t}, X^{(m)}_{2t}, X^{(m)}_{3t}$ are the monthly levels of the first, second, and third months of quarter t, respectively. The quarterly, quarter-over-quarter growth rate is

$$gX_t^{(Q/Q)} = 100\left[\left(\frac{X_t}{X_{t-1}}\right)^4 - 1\right].$$

This formula defines a quarterly, quarter-over-quarter growth rate for:

- Every variable in the survey for which we report a quarterly growth rate. In particular, that includes real GDP and components, nominal GDP, GDP price index, headline and core CPI inflation, headline and core PCE inflation, industrial production, nonfarm payroll employment, and housing starts. It also includes the

survey's implied forecasts for real interest rates through the term for expected inflation.

- The random variable behind "Probability a Decline in Real GNP/GDP" (whose densities are called RECESS1, RECESS2, …, RECESS5).

- The random variable behind the "Anxious Index" (whose density is the same as RECESS2).

Annual-Average Over Annual-Average Growth Rates. Let Y_t represent the annual-average level of a variable in the year indexed by t.

If the variable is available at a monthly observation frequency, we have the definition given by $Y_t = (1/12)\left(Y_{1t}^{(m)} + Y_{2t}^{(m)} + ... + Y_{12t}^{(m)}\right)$, where $Y_{1t}^{(m)}, Y_{2t}^{(m)}, ..., Y_{12t}^{(m)}$ are the monthly levels of the 12 months of year t, respectively. If the variable is available at a quarterly observation frequency, $Y_t = (1/4)\left(Y_{1t}^{(q)} + Y_{2t}^{(q)} + Y_{3t}^{(q)} + Y_{4t}^{(q)}\right)$, where $Y_{1t}^{(q)}, Y_{2t}^{(q)}, Y_{3t}^{(q)}, Y_{4t}^{(q)}$ are the quarterly levels for the four quarters of year t. The annual annual-average over annual-average growth rate is

$$gY_t^{(AA/AA)} = 100\left[\left(\frac{Y_t}{Y_{t-1}}\right) - 1\right].$$

This formula defines an annual growth rate for:

- Every variable in the survey for which we report an annual growth rate, except headline and core CPI inflation and headline and core PCE inflation. That includes real GDP and components, nominal GDP, GDP price index, industrial production, nonfarm payroll employment, and housing starts.

- The random variable behind the density projections for annual real GDP growth (PRGDP) and annual GDP price inflation (PRPGDP).

Fourth-Quarter Over Fourth-Quarter Growth Rates. Let Z_t represent the fourth-quarter value of a variable in the year indexed by t.

If the variable is available at a monthly observation frequency, we have the definition given by $Z_t = (1/3)\left(Z_{1t}^{(4)} + Z_{2t}^{(4)} + Z_{3t}^{(4)}\right)$, where $Z_{1t}^{(4)}, Z_{2t}^{(4)}, Z_{3t}^{(4)}$ are the monthly levels of the three months of the fourth quarter of year t, respectively. The fourth-quarter over fourth-quarter growth rate is

$$gZ_t^{(Q4/Q4)} = 100\left[\left(\frac{Z_t}{Z_{t-1}}\right)-1\right].$$

This formula defines an annual growth rate for:

- Headline and core CPI inflation and headline and core PCE inflation.

- The random variables behind the density projections for core CPI inflation (PRCCPI) and core PCE inflation (PRCPCE).

Long-Term Growth Rates. The survey also includes projections for five-year and/or 10-year annual-average projections for real GDP growth (RGDP10), productivity growth (PROD 10), and CPI and PCE inflation (CPI5YR, PCE5YR, CPI10, PCE10). Some important points to note about these long-term projections are:

- We do not tell the forecasters the formulas to use for these long-term projections.

- For 10-year annual-average growth in real GDP and productivity, we assume the forecasters use the geometric average of the annual-average over annual-average calculation described above. That is, we assume the forecasters chain together 10 forecasts for annual-average over annual-average growth.

- For five- and 10-year annual-average CPI and PCE inflation, we have a good reason to believe the forecasters use the fourth-quarter over fourth-quarter calculation described above, at least in the surveys we conducted starting with the one for 2011:Q1. (The reason is that the 2011:Q1 survey questionnaire is the first one in which we began to provide automatic checks in the survey questionnaire allowing the forecasters to examine the internal consistency across their one-, two-, and three-year ahead annual fourth-quarter over fourth-quarter inflation projections and their five- and 10-year annual-average inflation projections. Because the annual projections use the fourth-quarter over fourth-quarter formula, we assume the check for internal consistency implicitly forces a fourth-quarter over fourth-quarter calculation on the panelists' projections for long-term inflation.)

Rules vs. Discretion:
How Do We Know the Panelists Use the Correct Formulas?

In short, we do not know with certainty that the SPF panelists are following our rules for growth rates. They may well be using their own discretion on the appropriate form of the growth rate. However, for the reasons listed below, we strongly believe most panelists follow our rules.

- Our procedures for processing survey returns include running a number of checks for the internal consistency of each panelist's projections. Among these checks are ones for the appropriate growth rates.

- If we suspect a panelist is not following our rules, we will contact the panelist and discuss our concerns.

- Prior to a new panelist entering the survey, we send an information packet that includes, among other items, a document (available on the Philadelphia Fed's web page for the survey) entitled "Data Sources and Descriptions." That document describes the variables in the survey as well as the growth-rate transformations. Each year, we resend "Data Sources and Descriptions" to all forecasters on the panel.

- The survey questionnaire itself is quite explicit in describing the appropriate growth rates. (Examples of the questionnaire are available on the Philadelphia Fed's web page for the survey.)

4. Forecasts of Individual Participants

An Excel workbook with multiple worksheets contains the individual responses of the forecasters: *SPFmicrodata.xlsx*. Each worksheet in the workbook covers the surveys of a different variable from 1968:Q4 to present.

With three exceptions, these worksheets are organized in the same manner described above for the files of median and mean responses:

- *First Exception*. The first exception is that we include an additional column giving the forecaster's confidential identification number (ID). This column appears after the columns giving the year and quarter in which the survey was conducted. The identification numbers are consistent over time, allowing you to trace a given forecaster's responses from one survey to the next. See the section below for some caveats on using individual identification numbers.

- *Second Exception*. The second exception is that we include another column giving the forecaster's industry classification (INDUSTRY). This column appears after the columns giving the year, quarter, and individual identification number. Each forecaster in each survey (1990:Q2 to present) is assigned a "1," "2," or "3" for the industry classification depending on whether he works in a firm that we characterize as a financial service provider ("1") or a nonfinancial service provider ("2"). A value of "3" is used when we don't know the industry. A forecaster's classification can change when he changes his affiliation. In other words, we track the forecaster's classification in real time. See the section below for more information on the INDUSTRY column.

- *Third Exception*. The third exception is that we include six additional worksheet tabs in the workbook: PRGDP, PRPGDP, PRUNEMP, PRCCPI, PRCPCE, and RECESS.

  - The worksheet (variable) PRGDP gives the probability that the annual-average over annual-average percent change in GDP falls in a particular range. The percent changes are computed from the forecasts for annual-average levels.

  - The worksheet PRPGDP gives the probability that the annual-average over annual-average percent change in GDP price index falls in a particular range. The percent changes are computed from the forecasts for annual-average levels.

  Please note that these two worksheets (PRGDP and PRPGDP) contain data that are very tricky to work with because: (1) the ranges change over time, (2) the number of annual forecast horizons changes over time, and (3) in early surveys, the output variable was nominal output, not real output. A section below discusses these points in detail.

- o The worksheet PRUNEMP gives the probabilities that the annual average of the civilian unemployment rate falls in a particular range.

- o The worksheet PRCCPI gives the probability that the fourth-quarter over fourth-quarter percent change in core CPI falls in a particular range. Please note that these probability ranges are for growth in the current year (the year in which the survey was conducted) and the following year, as shown in Table 9.

- o The worksheet PRCPCE gives the probability that the fourth-quarter over fourth-quarter percent change in core PCE falls in a particular range. Please note that these probability ranges are for growth in the current year (the year in which the survey was conducted) and the following year, as shown in Table 9.

- o The worksheet RECESS gives the probability of a decline in the *level* of real GDP in the current quarter and the following four quarters. These are declines in the level of real GDP from one quarter to the next, beginning with a decline in the current quarter (the quarter in which the survey was conducted) compared with the quarter prior.

Caveats on Using the Individual Identification Numbers.

As noted above, we code the data set of individual responses with an identification number for each forecaster. In principle, this identifier allows you to track an individual's responses over time. However, for two reasons, users of these data should exercise some caution in interpreting the identifiers:

- First, in the surveys conducted by the ASA/NBER, the same identification number could represent different forecasters. In these surveys, we have noticed some occurrences in which an individual participates, suddenly drops out of the panel for a large number of periods, and suddenly re-enters, suggesting that the same identifier might have been assigned to different forecasters. Unfortunately, we cannot investigate the historical record of these individuals because we do not have hard-copy historical records from the early surveys.

- Second, in the surveys conducted by the Philadelphia Fed, it can be difficult to assign an identification number to an individual who changes his place of employment but remains in the survey. The question is: Should the identification number follow the individual or should it remain with the original firm? Over the years, we have tried to use the following guideline in deciding: If a forecast seems associated more with the firm than the individual, the identification number stays with the firm, and we assign a new identification number to the individual. If the forecast seems more clearly associated with the panelist, the identification number follows the panelist to his new place of employment.

INDUSTRY Classification.

In the second half of 2007, we searched our computer files and hard-copy records to retroactively classify the industry with which each panelist is affiliated, beginning with the survey in 1990:Q2 (the first SPF conducted by the Federal Reserve Bank of Philadelphia). Loosely speaking, we code the industry as a "1" for a financial service provider, "2" for a nonfinancial service provider, and "3" if we are uncertain. We took a very conservative approach in assigning 1's and 2's: we use "1" or "2" only when we are very certain. If we do not know the firm at which the panelist is employed, we code the INDUSTRY variables as "3." Even when we know the firm, we sometimes code INDUSTRY as "3" if we have no information about the firm. Below, we list examples of the types of firms that we code as "1" or "2."

We assign a "1" to the following list of financial service providers:

1. Insurance
2. Investment Banking
3. Commercial Banking
4. Payment Services
5. Hedge Funds
6. Mutual Funds
7. Association of Financial Service Providers
8. Asset Management

We assign a "2" to the following list of nonfinancial service providers:

1. Manufacturers
2. Universities
3. Forecasting Firms
4. Investment Advisors
5. Pure Research Firms
6. Consulting Firms

5. One-Year-Ahead and 10-Year-Ahead Inflation Forecasts

The file *Inflation.xlsx* contains expectations for one-year-ahead annual-average inflation, measured either by the GDP price index (INFPGDP1YR) or the CPI (INFCPI1YR), and expectations for the annual-average rate of CPI inflation over the next 10 years (INFCPI10YR).

The two one-year-ahead series are expectations for average inflation over the four quarters following the quarter when we conducted the survey. We compute these series from the underlying median forecasts in the following manner:

- For INFPGDP1YR, we use the forecasts for the level of the price index in the columns PGDP2 and PGDP6 of the worksheet PGDP in the workbook *MedianLevel.xlsx*.

- For INFCPI1YR, we use the geometric average of the quarter-over-quarter median forecasts for CPI inflation, corresponding to the columns CPI3 to CPI6 of the worksheet CPI in the same workbook.

The formulas are given by:

$$INFPGDP1YR_t = 100\left[\left(\frac{PGDP6_t}{PGDP2_t}\right) - 1\right]$$

and

$$INFCPI1YR_t = 100\left\{\left[\left(1 + \frac{CPI3_t}{100}\right)\left(1 + \frac{CPI4_t}{100}\right)\left(1 + \frac{CPI5_t}{100}\right)\left(1 + \frac{CPI6_t}{100}\right)\right]^{1/4} - 1\right\}.$$

The formulas differ—even though they measure a rate of change in the same way—because the forecasters provide their projections for the GDP price index in levels, but they report their forecasts for the CPI as quarter-over-quarter growth rates.

6. Mean Probability Forecasts

The file *Prob.xlsx* contains the mean responses for the survey's six probability variables in the following worksheets:

- **PRGDP**. The worksheet PRGDP gives the mean responses for the probabilities that the *annual-average over annual-average* percent change in the level of chain-weighted real GDP falls into a number of alternative ranges. The probabilities sum to 100 (up to a rounding error).

  Note a number of technical details. First, the annual-average over annual-average percent change is defined as the percent change in the annual-average level from one year to the next, where the annual-average level is the average of the quarterly levels over the four quarters of a calendar year. Second, the probability estimates are for *fixed event* forecasts: In each quarterly survey of a given calendar year, the panelists provide their probability estimates for annual-average over annual-average growth in the current year (defined as the year in which we conducted the survey) and the following years. Third, over 1992 to 1995, the survey uses fixed-weighted real GDP. Surveys prior to 1992 use fixed-weighted real GNP.

- **PRPGDP**. The worksheet PRPGDP gives the mean responses for the probabilities that the *annual-average over annual-average* percent change in the level of the GDP chain-weighted price index falls into a number of alternative ranges. The probabilities sum to 100 (up to a rounding error). The technical details are as described above for PRGDP. Over 1992 to 1995, the survey uses the implicit deflator for GDP. Surveys prior to 1992 use the implicit deflator for GNP.

- **PRCCPI**. The worksheet PRCCPI gives the mean responses for the probabilities that the *fourth-quarter over fourth-quarter* percent change in the level of the core CPI price index falls into a number of alternative ranges. The probabilities sum to 100 (up to a rounding error).

  Note a number of technical details. First, the fourth-quarter over fourth-quarter percent change is defined as the percent change in the fourth-quarter level from one year to the next, where the fourth-quarter level is the average of the monthly levels over the three months of the fourth quarter. Second, the probability estimates are for *fixed event* forecasts: In each quarterly survey of a given calendar year, the panelists provide their probability estimates for fourth-quarter over fourth-quarter growth in the current year (defined as the year in which we conducted the survey) and the following years.

  Note also an important difference in the way that the probability ranges are defined for PRGDP and PRPGDP on the one hand and for PRCCPI (and PRCPCE) on the other. For PRGDP and PRPGDP, the probability ranges are for growth in the annual-average level of GDP and the GDP price index. For PRCCPI (and PRCPCE), the ranges are for fourth-quarter over fourth-quarter growth.

- **PRCPCE**. The worksheet PRCPCE gives the mean responses for the probabilities that the *fourth-quarter over fourth-quarter* percent change in the level of the chain-weighted core PCE price index falls into a number of alternative ranges. The technical details are as described above for PRCCPI.

  Note an important difference in the way that the probability ranges are defined for PRGDP and PRPGDP on the one hand and for PRCCPI and PRCPCE on the other. For PRGDP and PRPGDP, the probability ranges are for growth in the annual-average level of GDP and the GDP price index. For PRCCPI and PRCPCE, the ranges are for fourth-quarter over fourth-quarter growth.

- **PRUNEMP**. The worksheet PRUNEMP gives the mean responses for the probabilities that the *annual average* of the civilian unemployment rate falls into a number of alternative ranges.

  Note a number of technical details. First, the annual-average unemployment rate is the arithmetic average of the level of the unemployment rate over the 12 months of the year. Second, the probability estimates are for *fixed event* forecasts: In each quarterly survey of a given calendar year, the panelists provide their probability estimates for the annual-average unemployment rate in the current year (defined as the year in which we conducted the survey) and the following years.

- **RECESS**. The worksheet RECESS gives the mean responses for the probability of a decline in the *level* of chain-weighted real GDP in the current quarter and the following four quarters. These are declines in the level of chain-weighted real GDP from one quarter to the next, beginning with a decline in the current quarter (the quarter in which the survey was conducted) compared with the quarter prior. Over 1992 to 1995, the survey uses fixed-weighted real GDP. Surveys prior to 1992 use fixed-weighted real GNP.

Probabilities: Additional Comments on PRGDP and PRPGDP.

Note that, conceptually, the percent changes for these two variables are those for the annual-average levels. These two worksheets contain data that are very tricky to work with because:

- The ranges change over time.
- The number of annual forecast horizons changes over time.
- In early surveys, the output variable was nominal output, not real output.

Some details follow. The variable PRGDP is the mean probability that the percent change in GDP falls in a particular range. From 1968:Q4 to 1981:Q2, this was the probability of nominal GNP falling in a particular range, while from 1981:Q3 to 1991:Q4, this variable refers to real GNP. From 1992:Q1 on, this variable refers to real GDP. Thus, over the entire history of the survey, this variable has switched from nominal to real and GNP to GDP. The variable PRPGDP is the mean probability that the percent change in the price index for GDP

(for GNP prior to 1992:Q1) falls in a particular range. The ranges for both these variables have changed over time.

Major changes in these probability distribution questions occurred in the 1981:Q3 and 1992:Q1 surveys. The old version (prior to 1981:Q3) asked for the probability attached to each of 15 possible percent changes in nominal GNP and the implicit deflator, usually from the previous year to the current year. The new version (1981:Q3 on) asks for percent changes in real GNP and the implicit deflator, usually for the current and following year. However, there are only six categories for each of the two years, instead of the 15 categories in the old version. Then, in 1992:Q1, the number of categories was changed to 10 for each of the two years, and output was changed from GNP to GDP. In 2009:Q2, the number of categories was changed to 11 and two additional years of annual forecast were added. In 2020:Q2, changes were made to the probability bins for PRGDP, but the number of categories remained at 11. As noted above, the probability variables prior to 1981:Q3 usually referred to percent changes for the current year. From 1981:Q3 on, the two probability variables usually refer to the current year and the following year. However, there are some exceptions. In certain surveys prior to 1981:Q3, most often in the fourth quarter, the probability variables referred to the percent change in nominal GNP and the deflator in the following year, rather than the current year. The surveys for which this is true are 1968:Q4, 1969:Q4, 1970:Q4, 1971:Q4, 1972:Q3–Q4, 1973:Q4, 1975:Q4, 1976:Q4, 1977:Q4, 1978:Q4, and 1979:Q2–Q4. (For example, the probability ranges in the 1968:Q4 survey should pertain to growth in 1968, but in fact the survey asked about probabilities for growth in 1969.)

In addition, we are uncertain about the years referred to in the surveys of the first quarters of 1985 and 1986 and have not found documentation that can confirm our suspicion that the years do not follow the standard of the current year and the following year. For surveys since 1990:Q2 (when the Philadelphia Fed took over the survey), the probability ranges always pertain to the current year and the following year.

Tables 6 and **7** show how the ranges have changed over the years.

Probabilities: Additional Comments on PRCCPI and PRCPCE.

These two variables were added to the survey in 2007:Q1. Note that the percent changes for these two variables are measured in fourth-quarter over fourth-quarter growth rates of the price indices. **Table 8** shows the probability ranges for PRCCPI and PRCPCE.

Probabilities: Additional Comments on PRUNEMP.

This variable was added to the survey in 2009:Q2. It is the probability that unemployment will fall into each of 10 ranges. In 2014:Q1 and 2020:Q2, changes were made to the probability bins for PRUNEMP. **Table 9** shows the probability ranges for PRUNEMP.

Probabilities: Additional Comments on RECESS.

The variable RECESS is the probability of a decline in real GDP (real GNP prior to 1992:Q1) in the current quarter and the following four quarters. We label these RECESS1 to RECESS5. Please note that this is the probability of a decline in the *level* of real GDP from *one quarter to the next*. RECESS1, for example, refers to a decline in the current quarter from the previous quarter, and RECESS2 refers to a quarter-over-quarter decline in the next quarter. This is sometimes hard to explain to users of the data, but we can provide precise content with the following probability statements, using the nomenclature established above for the quarterly forecasts for the level of real GDP:

$$\text{Recess1}_t = \text{Prob}\left(RGDP2_t < RGDP1_t\right)$$
$$\text{Recess2}_t = \text{Prob}\left(RGDP3_t < RGDP2_t\right)$$
$$\vdots$$
$$\text{Recess5}_t = \text{Prob}\left(RGDP6_t < RGDP5_t\right)$$

where $\text{Prob}(x)$ is the probability of event x, and RGDP2 to RGDP6 are the quarterly forecasts for the level of real GDP in the current quarter (RGDP2) and the next four quarters. RGDP1 refers, of course, to the historical value for the quarter before the quarter in which the survey is conducted.

Table 6. Probability Ranges for PRPGDP (GDP Prices)

Variable Number ↓	Survey Dates					
	1992:Q1 to 2013:Q4	1985:Q2 to 1991:Q4	1981:Q3 to 1985:Q1	1974:Q4 to 1981:Q2	1973:Q2 to 1974:Q3	1968:Q4 to 1973:Q1
	Ranges (Annual-Average over Annual-Average Percent Changes, Percentage Points)					
1	8+	10+	12+	16+	12+	10+
2	7 to 7.9	8 to 9.9	10 to 11.9	15 to 15.9	11 to 11.9	9 to 9.9
3	6 to 6.9	6 to 7.9	8 to 9.9	14 to 14.9	10 to 10.9	8 to 8.9
4	5 to 5.9	4 to 5.9	6 to 7.9	13 to 13.9	9 to 9.9	7 to 7.9
5	4 to 4.9	2 to 3.9	4 to 5.9	12 to 12.9	8 to 8.9	6 to 6.9
6	3 to 3.9	< 2	< 4	11 to 11.9	7 to 7.9	5 to 5.9
7	2 to 2.9			10 to 10.9	6 to 6.9	4 to 4.9
8	1 to 1.9			9 to 9.9	5 to 5.9	3 to 3.9
9	0 to 0.9			8 to 8.9	4 to 4.9	2 to 2.9
10	< 0			7 to 7.9	3 to 3.9	1 to 1.9
11				6 to 6.9	2 to 2.9	0 to 0.9
12				5 to 5.9	1 to 1.9	-1 to -0.1
13				4 to 4.9	0 to 0.9	-2 to -1.1
14	Same as 1 – 10 for next year	Same as 1 – 6 for next year	Same as 1 – 6 for next year	3 to 3.9	-1 to -0.1	-3 to -2.1
15				< 3	< -1	< -3
16				Not included	Not included	Not included
17				Not included	Not included	Not included
18				Not included	Not included	Not included
19				Not included	Not included	Not included
20				Not included	Not included	Not included

Table 6 (cont.). Probability Ranges for PRPGDP (GDP Prices)

Variable Number ↓	Survey Dates
	2014:Q1 to Present
	Ranges (Annual-Average over Annual-Average Percent Changes, Percentage Points)
1	4.0 or more
2	3.5 to 3.9
3	3.0 to 3.4
4	2.5 to 2.9
5	2.0 to 2.4
6	1.5 to 1.9
7	1.0 to 1.4
8	0.5 to 0.9
9	0.0 to 0.4
10	Will decline
11	
12	
13	
14	Same as
15	1 – 10
16	for next year
17	
18	
19	
20	

Table 7. Probability Ranges for PRGDP (Output)

Variable Number ↓	Survey Dates		
	1992:Q1 to 2009:Q1 (Real GDP)	**1981:Q3 to 1991:Q4 (Real GNP)**	**1968:Q4 to 1981:Q2 (Nominal GNP)**
	Ranges (Annual-Average over Annual-Average Percent Changes, Percentage Points)		
1	6+	6+	
2	5 to 5.9	4 to 5.9	
3	4 to 4.9	2 to 3.9	
4	3 to 3.9	0 to 1.9	
5	2 to 2.9	-2 to -0.1	
6	1 to 1.9	< -2	
7	0 to 0.9		Same as PRPGDP
8	-1 to -0.1		
9	-2 to -1.1		
10	< -2		
11			
12			
13			
14	Same as 1 – 10 for next year	Same as 1 – 6 for next year	
15			
16			
17			
18			
19			
20			

Table 7 (cont.). Probability Ranges for PRGDP (Output)

Variable Number ↓	Survey Dates	
	2020:Q2 to Present (Real GDP)	2009:Q2 to 2020:Q1 (Real GDP)
	Ranges (Annual-Average over Annual-Average Percent Changes, Percentage Points)	
1	16+	6+
2	10.0 to 15.9	5.0 to 5.9
3	7.0 to 9.9	4.0 to 4.9
4	4.0 to 6.9	3.0 to 3.9
5	2.5 to 3.9	2.0 to 2.9
6	1.5 to 2.4	1.0 to 1.9
7	0.0 to 1.4	0.0 to 0.9
8	-3.0 to -0.1	-1.0 to -0.1
9	-6.0 to -3.1	-2.0 to -1.1
10	-12.0 to -6.1	-3.0 to -2.1
11	<-12.0	<-3.0
12 to 22	Same as 1 – 11 for next year	Same as 1 – 11 for next year
23 to 33	Same as 1 – 11 for year 3	Same as 1 – 11 for year 3
34 to 44	Same as 1 – 11 for year 4	Same as 1 – 11 for year 4

Table 8. Probability Ranges for PRCCPI and PRCPCE
(Core CPI Prices and Core PCE Prices)

Variable Number ↓	Survey Dates	
	2007:Q1 to Present	
	Ranges (Fourth-Quarter over Fourth-Quarter Percent Changes)	
	PRCCPI	**PRCPCE**
1	4.0 or more	4.0 or more
2	3.5 to 3.9	3.5 to 3.9
3	3.0 to 3.4	3.0 to 3.4
4	2.5 to 2.9	2.5 to 2.9
5	2.0 to 2.4	2.0 to 2.4
6	1.5 to 1.9	1.5 to 1.9
7	1.0 to 1.4	1.0 to 1.4
8	0.5 to 0.9	0.5 to 0.9
9	0.0 to 0.4	0.0 to 0.4
10	Will decline	Will decline
11		
12		
13		
14	Same as 1 – 10 for next year	Same as 1 – 10 for next year
15		
16		
17		
18		
19		
20		

Table 9. Probability Ranges for PRUNEMP (Unemployment)

Variable Number ↓	Survey Dates		
	2020:Q2 to Present	2014:Q1 to 2020:Q1	2009:Q2 to 2013:Q4
	Ranges (Annual-Average Level, Percent)		
1	> 15.0	> 9.0	> 11.0
2	12.0 to 14.9	8.0 to 8.9	10.0 to 10.9
3	10.0 to 11.9	7.5 to 7.9	9.5 to 9.9
4	8.0 to 9.9	7.0 to 7.4	9.0 to 9.4
5	7.0 to 7.9	6.5 to 6.9	8.5 to 8.9
6	6.0 to 6.9	6.0 to 6.4	8.0 to 8.4
7	5.0 to 5.9	5.5 to 5.9	7.5 to 7.9
8	4.0 to 4.9	5.0 to 5.4	7.0 to 7.4
9	3.0 to 3.9	4.0 to 4.9	6.0 to 6.9
10	< 3.0	< 4.0	< 6.0
11 to 20	Same as 1 – 10 for next year	Same as 1 – 10 for next year	Same as 1 – 10 for next year
21 to 30	Same as 1 – 10 for year 3	Same as 1 – 10 for year 3	Same as 1 – 10 for year 3
31 to 40	Same as 1 – 10 for year 4	Same as 1 – 10 for year 4	Same as 1 – 10 for year 4

7. Presentation of Data by Individual Variable

In September 2008, we published an alternative way of presenting the SPF data on our website. The new arrangement presents the SPF data by individual variable. On the main index page (https://www.philadelphiafed.org/surveys-and-data/data-files), we group the data files into ten sub-groups:

- U.S. Business Indicators
- Real GDP and Its Components
- CPI and PCE Inflation
- Long-Term Inflation Forecasts
- Additional Long-Term Forecasts
- Equilibrium Unemployment
- Probability on Ranges
- Probability of Decline in Real GNP/GDP
- Anxious Index
- Implied Forecasts

This arrangement lets researchers find a particular variable quickly. Each SPF variable has its own web page to let users select the individual, mean, median, mean growth, or median growth responses for that particular variable. For example, by choosing the link Nominal Gross National Product/Gross Domestic Product (NGDP) from the main index page, a user can browse the page for NGDP (https://www.philadelphiafed.org/surveys-and-data/ngdp) and select the desired data. For some variables, we also provide links to the real-time data and the forecast error statistics.

8. Natural Rate of Unemployment

In third-quarter surveys, we ask the forecasters to provide their estimates of the natural rate of unemployment (UBAR). An important part of the analysis is the breakdown of the responses into two groups: (1) those who use the natural rate concept in preparing their forecasts, and (2) those who do not. The variable "DUMMY_UBAR" is coded as "1" for those who use the concept and "0" for those who do not. The variable "UBAR" is used to record the natural rate forecasts. Our newsletter reports the median response for those who use the concept. Note also that our files of mean and median responses, measures of dispersion, and individual responses use only the responses of those panelists who tell us that they use the natural rate of unemployment in preparing their projections.

In October 2008, we added a new UBAR worksheet tab to each of the following Excel files:

1. *Micro1.xlsx*, *Micro2.xlsx*, *Micro3.xlsx, Micro4.xlsx,* and *Micro5.xlsx* for individual responses.

   In October 2019, we combined the five individual responses files (*Micro1.xlsx* to *Micro5.xlsx*) into a single file, *SPFmicrodata.xlsx*.

2. *MedianLevel.xlsx* and *MeanLevel.xlsx* for means and medians responses.

We have also produced three additional Excel files for the UBAR variable:

1. *Individual_UBAR.xlsx*
2. *Mean_UBAR_Level.xlsx*
3. *Median_UBAR_Level.xlsx*

9. Cross-Sectional Forecast Dispersion

We organize the files for cross-sectional measures of forecast dispersion in two ways: by dispersion measure and by individual variable.

Dispersion: Files Organized by Measure of Dispersion.

The files *Dispersion_1.xlsx, Dispersion_2.xlsx,* and *Dispersion_3.xlsx* contain the cross-sectional forecast dispersion for selected survey variables. Each file corresponds to a different measure of dispersion. The three files are organized in the same manner. Each is an Excel workbook containing multiple worksheets, with each worksheet containing the forecast dispersion for a particular variable. You move among the worksheets by choosing the appropriate tab at the bottom. These tabs refer to the variable being forecast. The first column in each worksheet gives the year and quarter in which the survey was conducted. The remaining columns give the 25th percentile, the 75th percentile, and the forecast dispersion for current quarter (T) and the following four quarters (T+1, …, T+4).

Please note that not all dispersion measures are available for each survey variable. In particular, we avoid measures that are influenced by arbitrary changes in the scale of the data, such as those that arise when the base year changes in a benchmark revision.

For most survey variables, we use "level" to refer to the level of the variable — for example, the level of real GDP in chain-weighted dollars. However, for CPI and PCE inflation, we define the level as a quarter-over-quarter (Q/Q) growth rate, in annualized percentage points, because the forecasters provide their projections for these variables in growth rates.

We construct *Dispersion_1.xlsx* by first computing the 75th percentile and the 25th percentile of the forecasts for the level of the variable (X). We then compute dispersion measure *D1* as the difference between the 75th percentile and the 25th percentile, using the formula

$$X\_D1_{t+k|t-1} = \hat{X}\_P75\_D1_{t+k|t-1} - \hat{X}\_P25\_D1_{t+k|t-1}, \quad k = 0,1,\ldots,4$$

where $X\_D1_{t+k|t-1}$ represents the inter-quartile forecast dispersion for the level of the variable X in period $t+k$ made on the basis of observations known through period $t-1$, and $\hat{X}\_P75\_D1_{t+k|t-1}$ and $\hat{X}\_P25\_D1_{t+k|t-1}$ represent the corresponding 75th and 25th percentiles for the level forecasts. Our notation makes use of the fact that a survey is conducted in quarter t, and the forecasters make their projections on the basis of historical observations dated $t-1$ and earlier.

We construct *Dispersion_2.xlsx* by first computing the 75th percentile and the 25th percentile of the projections for Q/Q growth (in annualized percentage points) of the variable (X). We then compute dispersion measure *D2* as the difference between the 75th percentile and the 25th percentile of the Q/Q growth forecasts, using the formula

$$X\_D2_{t+k|t-1} = \hat{X}\_P75\_D2_{t+k|t-1} - \hat{X}\_P25\_D2_{t+k|t-1}, \quad k = 0,1,\ldots,4$$

where $X\_D2_{t+k|t-1}$ represents the inter-quartile forecast dispersion for the Q/Q growth of the variable X in period $t+k$ made on the basis of observations known through period $t-1$, and $\hat{X}\_P75\_D2_{t+k|t-1}$ and $\hat{X}\_P25\_D2_{t+k|t-1}$ represent the corresponding 75th and 25th percentiles for the Q/Q growth forecasts.

We construct *Dispersion_3.xlsx* by first computing the 75th percentile and the 25th percentile for the level of the variable (X). We then compute dispersion measure *D3* as the percent difference between the 75th percentile and the 25th percentile of the projections in levels, using the formula

$$X\_D3_{t+k|t-1} = \hat{X}\_P75\_D3_{t+k|t-1} - \hat{X}\_P25\_D3_{t+k|t-1}, \quad k = 0,1,\ldots,4$$

where $X\_D3_{t+k|t-1}$ represents the inter-quartile forecast dispersion for the percent difference between the 75th percentile and the 25th percentile of the projections in level of the variable X in period $t+k$ made on the basis of observations known through period $t-1$, and $\hat{X}\_P75\_D3_{t+k|t-1}$ and $\hat{X}\_P25\_D3_{t+k|t-1}$ represent the corresponding natural logarithms of the 75th and 25th percentiles for the level multiplied by 100.

Dispersion: Files Organized by Individual Variable.

We also construct an alternative way of presenting the forecast dispersion data. In this arrangement, each SPF variable has its own file (Excel workbook) to let users select different measures of cross-sectional forecast dispersion (*D1*, *D2*, and *D3*) for that particular variable. Each Excel workbook contains up to three worksheets, with each worksheet containing a different dispersion measure for a particular variable. You move among the worksheets by choosing the appropriate tab at the bottom. These tabs refer to the *D1*, *D2*, and *D3* measures of dispersion (described above). The first column in each worksheet gives the year and quarter in which the survey was conducted. The remaining columns give the 25th percentile, the 75th percentile, and the forecast dispersion for the current quarter (T) and the following four quarters (T+1, …, T+4).

Please note that not all dispersion measures are available for each survey variable. In particular, we avoid measures that are influenced by arbitrary changes in the scale of the data, such as those that arise when the base year changes in a benchmark revision.

For most survey variables, we use the "level" to refer to the level of the variable — for example, the level of real GDP in chain-weighted dollars. However, for CPI and PCE inflation, we define the level as a quarter-over-quarter (Q/Q) growth rate, in annualized percentage points, because the forecasters provide their projections for these variables in growth rates.

Caveat on the Use of 25th and 75th Percentiles for Quarter-over-Quarter Growth

Please note that the method for constructing the 25th and 75th percentiles of quarter-over-quarter growth rates differs from the method we use to construct the survey's official projections for growth.

To construct the 25th and the 75th percentiles for growth, we first compute the growth rates for each panelist from his forecast for the level of a variable. We then compute the percentiles.

To construct the survey's official measures for mean and median growth, we first compute the mean and median forecast for the level of the variable. We then compute the rate of growth of the mean or median level. In other words, the survey's official measures for growth are the rate of growth of the mean or median level, not the mean or median growth rate.

This caveat on 25th and 75th percentiles applies to the following SPF variables, for which panelists submit their projections for levels. For these variables, you should not plot the survey's official measures for growth with the 25th and 75th percentiles. Such a plot could be misleading.

- Nominal Gross National Product/Gross Domestic Product (NGDP)
- Price Index for Gross National Product/Gross Domestic Product (PGDP)
- Corporate Profits After Tax (CPROF)
- Nonfarm Payroll Employment (EMP)
- Industrial Production Index (INDPROD)
- Housing Starts (HOUSING)
- Real Gross National Product/Gross Domestic Product (RGDP)
- Real Personal Consumption Expenditures (RCONSUM)
- Real Nonresidential Fixed Investment (RNRESIN)
- Real Residential Fixed Investment (RRESINV)
- Real Federal Government Consumption Expenditures & Gross Investment (RFEDGOV)
- Real State and Local Government Consumption Expenditures & Gross Investment (RSLGOV)

This caveat does not apply to the following SPF variables because the forecasters provide their projections for these variables in growth-rate form only. Thus, the survey's official measures for growth may be compared with the 25th and 75th percentiles.

- Headline and core CPI inflation (CPI, CORECPI)
- Headline and core PCE inflation (PCE, COREPCE)
- 10-year annual-average projections for growth, including 10-year annual-average inflation projections
- Five-year annual-average inflation projections
- Five-year forward, five-year annual-average inflation projections

10. Implied Forecasts

Overview. In August 2012, we released the projections for 21 new variables. These new variables do not appear directly in the survey. Rather, we compute the projections as linear combinations of the forecasts for variables already in the survey. For this reason, we refer to the new projections as "implied forecasts." We compute the implied forecasts for:

- Yield spreads,
- Forward inflation rates, and
- Real interest rates.

For the new variables listed below, we compute each panelist's implied forecast at each survey date and forecast horizon. Then, for each survey, we compute the cross-sectional mean forecasts, the cross-sectional median forecasts, and measures of dispersion. (A previous section provides more information on measures of dispersion.)

Table 10 below describes the variables for which we compute implied forecasts.[7]

Table 10. The Implied Forecasts Cover These Variables

Yield Spreads (Annualized Percentage Points)	
1. SPR_TBOND_TBILL	Nominal Rate on 10-Year Treasury Bonds Minus Nominal Rate on Three-Month Treasury Bills
2. SPR_BAA_AAA	Nominal Rate on Moody's Baa Corporate Bonds Minus Nominal Rate on Moody's Aaa Corporate Bonds
3. SPR_BAA_TBOND	Nominal Rate on Moody's Baa Corporate Bonds Minus Nominal Rate on 10-Year Treasury Bonds
4. SPR_AAA_TBOND	Nominal Rate on Moody's Aaa Corporate Bonds Minus Nominal Rate on 10-Year Treasury Bonds
Forward Inflation Rates (Annualized Percentage Points)	
5. CPIF5	Five-Year Forward Five-Year Annual-Average Headline CPI Inflation Rate
6. PCEF5	Five-Year Forward Five-Year Annual-Average Headline PCE Inflation Rate
Real Interest Rates: Nominal Rate on Three-Month Treasury Bills Minus GDP Price Inflation (Annualized Percentage Points)	
7. RR1_TBILL_PGDP	Three-Month Treasury Bill Minus by Same-Quarter GDP Price Inflation
8. RR2_TBILL_PGDP	Three-Month Treasury Bill Minus Next-Quarter GDP Price Inflation
9. RR3_TBILL_PGDP	Three-Month Treasury Bill Minus Average of Same-Quarter GDP Price Inflation and Next-Quarter GDP Price Inflation

[7] The discussion of this section covers the survey's forecasts at quarterly horizons. The quarterly horizons cover the current quarter (that is, the quarter when we conduct the survey) and the four quarters following the current quarter. The survey also produces forecasts at annual horizons. (See "Median and Mean Forecasts for Levels" for more information on the annual forecast horizons.) The implied forecasts for yield spreads are available at these annual horizons.

Table 10 (cont.). The Implied Forecasts Cover These Variables

Real Interest Rates: Nominal Rate on Three-Month Treasury Bills Minus Headline CPI Inflation (Annualized Percentage Points)	
10. RR1_TBILL_CPI	Three-Month Treasury Bill Minus Same-Quarter CPI Inflation
11. RR2_TBILL_CPI	Three-Month Treasury Bill Minus Next-Quarter CPI Inflation
12. RR3_TBILL_CPI	Three-Month Treasury Bill Minus Average of Same-Quarter CPI Inflation and Next-Quarter CPI Inflation
Real Interest Rates: Nominal Rate on Three-Month Treasury Bills Minus Core CPI Inflation (Annualized Percentage Points)	
13. RR1_TBILL_CCPI	Three-Month Treasury Bill Minus Same-Quarter Core CPI Inflation
14. RR2_TBILL_CCPI	Three-Month Treasury Bill Minus Next-Quarter Core CPI Inflation
15. RR3_TBILL_CCPI	Three-Month Treasury Bill Minus Average of Same-Quarter Core CPI Inflation and Next-Quarter Core CPI Inflation
Real Interest Rates: Nominal Rate on Three-Month Treasury Bills Minus Headline PCE Inflation (Annualized Percentage Points)	
16. RR1_TBILL_PCE	Three-Month Treasury Bill Minus Same-Quarter PCE Inflation
17. RR2_TBILL_PCE	Three-Month Treasury Bill Minus Next-Quarter PCE Inflation
18. RR3_TBILL_PCE	Three-Month Treasury Bill Minus Average of Same-Quarter PCE Inflation and Next-Quarter PCE Inflation
Real Interest Rates: Nominal Rate on Three-Month Treasury Bills Minus Core PCE Inflation (Annualized Percentage Points)	
19. RR1_TBILL_CPCE	Three-Month Treasury Bill Minus Same-Quarter Core PCE Inflation
20. RR2_TBILL_CPCE	Three-Month Treasury Bill Minus Next-Quarter Core PCE Inflation
21. RR3_TBILL_CPCE	Three-Month Treasury Bill Minus Same-Quarter Core PCE Inflation and Next-Quarter Core PCE Inflation

Implied Forecasts: Computations. We begin by defining the existing survey variables that we use to construct the implied forecasts. These variables enter the survey directly. **Table 11** below provides the definitions.

Now, let t index a quarterly survey date.

Also, let $x_{t+\tau|t-1}$, $\tau = -1, 0, 1, ..., 4$ denote a panelist's forecast for the quarterly value that variable x will take in period $t + \tau$, as reported in the survey of period t, with quarterly historical values known through period $t-1$. (For simplicity, we suppress the use of subscripts to distinguish one panelist's projection from another's.)

For example, $x_{t|t-1}$ denotes the current-quarter forecast (or nowcast) for quarter t in the survey of quarter t, and $x_{t+1|t-1}$ denotes the corresponding forecast for the quarter after the nowcast quarter. Note that $x_{t-1|t-1}$ represents the last quarter of history in the forecasters' information set when they form their projections for the survey of period t. (As noted above, the forecasters are permitted to forecast a revision to the last quarterly historical value, but most do not.)

Table 11. Component Variables Used in Computing the Implied Forecasts
(Various Quarterly Forecast Horizons Indicated)

Long Name	Survey Name (Forecast Horizon Indicated as 1, …,6)	Mathematical Notation (Forecast Horizon: $\tau = -1, 0, ..., 4$)
Nominal Rate on Three-Month Treasury Bills (annualized percentage points)	TBILL1, …, TBILL6	$TBILL_{t+\tau\mid t-1}$
Nominal Rate on 10-Year Treasury Bonds (annualized percentage points)	TBOND1, …, TBOND6	$TBOND_{t+\tau\mid t-1}$
Nominal Rate on Moody's Aaa Bonds (annualized percentage points)	BOND1, …, BOND6	$BOND_{t+\tau\mid t-1}$
Nominal Rate on Moody's Baa Bonds (annualized percentage points)	BAABOND1, …, BAABOND6	$BAABOND_{t+\tau\mid t-1}$
GNP/GDP Price Level	PGDP1, …, PGDP6	$PGDP_{t+\tau\mid t-1}$
Q/Q Rate of Change in the Quarterly-Average Headline CPI Level (annualized percentage points)	CPI1, …, CPI6	$CPI_{t+\tau\mid t-1}$
Q/Q Rate of Change in the Quarterly-Average Core CPI Level (annualized percentage points)	CoreCPI, …, CoreCPI6	$CORECPI_{t+\tau\mid t-1}$

Table 11 (cont.). Component Variables Used in Computing the Implied Forecasts
(Various Quarterly Forecast Horizons Indicated)

Long Name	Survey Name (Forecast Horizon Indicated as 1 , …, 6)	Mathematical Notation (Forecast Horizon: $\tau = -1, 0, ..., 4$)
Q/Q Rate of Change in the Quarterly-Average Headline PCE Price Index Level (annualized percentage points)	PCE1, …, PCE6	$PCE_{t+\tau\mid t-1}$
Q/Q Rate of Change in the Quarterly-Average Core PCE Price Index Level (annualized percentage points)	CorePCE1, …, CorePCE6	$COREPCE_{t+\tau\mid t-1}$
Five- and 10-Year Inflation Projections (Annualized Percentage Points)		
Long Name	**Survey Name**	
Five-Year Annual-Average Headline CPI Inflation (Horizon: Year of Survey and Following Four Years)	CPI5YR	
Five-Year Annual-Average Headline PCE Inflation (Horizon: Year of Survey and Following Four Years)	PCE5YR	
10-Year Annual-Average Headline CPI Inflation (Horizon: Year of Survey and Following Nine Years)	CPI10	
10-Year Annual-Average Headline PCE Inflation (Horizon: Year of Survey and Following Nine Years)	PCE10	

Computations for Yield Spreads. We compute each panelist's implied forecasts using the formulas shown below. Then, for each survey and across all panelists, we compute the mean projections, the median projections, and measures of cross-section dispersion.

$$SPR\_TBOND\_TBILL_{t+\tau|t-1} = TBOND_{t+\tau|t-1} - TBILL_{t+\tau|t-1}, \qquad \tau = -1, 0, ..., 4$$

$$SPR\_BAA\_AAA_{t+\tau|t-1} = BAABOND_{t+\tau|t-1} - BOND_{t+\tau|t-1}, \qquad \tau = -1, 0, ..., 4$$

$$SPR\_BAA\_TBOND_{t+\tau|t-1} = BAABOND_{t+\tau|t-1} - TBOND_{t+\tau|t-1}, \quad \tau = -1, 0, ..., 4$$

$$SPR\_AAA\_TBOND_{t+\tau|t-1} = BOND_{t+\tau|t-1} - TBOND_{t+\tau|t-1}, \qquad \tau = -1, 0, ..., 4$$

Table 12 below maps the mathematical names on the left-hand side of the preceding equation for SPR_TBOND_TBILL to the variables names in the survey's Excel files. Note that the Excel file dates the observations at the survey date (t) and indicates the forecast horizon with a suffix. The mapping is similar for the remaining variables whose equations are shown immediately above.

Table 12. Example: Variable Names for SPR_TBOND_TBILL
(Quarterly Forecast Horizons)

Mathematical Name ($\tau = -1, 0, ..., 4$)	Variable Name in Excel File (Dated at the Survey Quarter, t)
$SPR\_TBOND\_TBILL_{t-1|t-1}$	$SPR\_TBOND\_TBILL1_t$ (Historical value for $t-1$)
$SPR\_TBOND\_TBILL_{t|t-1}$	$SPR\_TBOND\_TBILL2_t$ (Nowcast for quarter t from survey t)
$SPR\_TBOND\_TBILL_{t+1|t-1}$	$SPR\_TBOND\_TBILL3_t$ (Forecast for quarter $t+1$ from survey t)
$SPR\_TBOND\_TBILL_{t+2|t-1}$	$SPR\_TBOND\_TBILL4_t$ (Forecast for quarter $t+2$ from survey t)
$SPR\_TBOND\_TBILL_{t+3|t-1}$	$SPR\_TBOND\_TBILL5_t$ (Forecast for quarter $t+3$ from survey t)
$SPR\_TBOND\_TBILL_{t+4|t-1}$	$SPR\_TBOND\_TBILL6_t$ (Forecast for quarter $t+4$ from survey t)

Computations for Real Interest Rates. We compute the projection for the nominal interest rate on three-month Treasury bills minus the projection for inflation. We do this first for each panelist, using the formulas shown below. Then, for each survey and across all panelists, we compute the mean projections, the median projections, and measures of cross-section dispersion.

Because there is not a perfect correspondence between the period covered by the interest rate and the period for inflation, we compute three measures of the real interest rate (RR1, RR2, and RR3). The measures differ according to the horizon for the inflation projection. The first measure subtracts the same-quarter inflation projection from the interest-rate projection. The second measure subtracts the one-quarter-ahead inflation projection. The third measure subtracts the average inflation projection (same quarter and one-quarter ahead) from the interest-rate projection.

Nominal Rate on Three-Month Treasury Bills Minus GNP/GDP Price Inflation

$$RR1\_TBILL\_PGDP_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - 100\left[\left(\frac{PGDP_{t+\tau|t-1}}{PGDP_{t+\tau-1|t-1}}\right)^4 - 1\right], \quad \tau = 0,...,4$$

$$RR2\_TBILL\_PGDP_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - 100\left[\left(\frac{PGDP_{t+\tau+1|t-1}}{PGDP_{t+\tau|t-1}}\right)^4 - 1\right], \quad \tau = 0,...,3$$

$$RR3\_TBILL\_PGDP_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - 100\left[\left(\frac{PGDP_{t+\tau+1|t-1}}{PGDP_{t+\tau-1|t-1}}\right)^{\frac{4}{2}} - 1\right], \quad \tau = 0,...,3$$

Table 13 below maps the mathematical names on the left-hand-side of the preceding equation for RR1_TBILL_PGDP to the variables names in the survey's Excel files. Note that the Excel file dates the observations at the survey date (t) and indicates the forecast horizon with a suffix. The mapping is similar for the remaining variables whose equations are shown directly above and for the additional measures of real interest rates given below.

Table 13. Example: Variable Names for RR1_TBILL_PGDP
(Quarterly Forecast Horizons)

Mathematical Name ($\tau = 0,...,4$)	Variable Name in Excel File (Dated at the Survey Quarter, t)
$RR1\_TBILL\_PGDP_{t|t-1}$	$RR1\_TBILL\_PGDP\_2_t$ (Nowcast for quarter t from survey t)
$RR1\_TBILL\_PGDP_{t+1|t-1}$	$RR1\_TBILL\_PGDP\_3_t$ (Forecast for quarter $t+1$ from survey t)
$RR1\_TBILL\_PGDP_{t+2|t-1}$	$RR1\_TBILL\_PGDP\_4_t$ (Forecast for quarter $t+2$ from survey t)
$RR1\_TBILL\_PGDP_{t+3|t-1}$	$RR1\_TBILL\_PGDP\_5_t$ (Forecast for quarter $t+3$ from survey t)
$RR1\_TBILL\_PGDP_{t+4|t-1}$	$RR1\_TBILL\_PGDP\_6_t$ (Forecast for quarter $t+4$ from survey t)

Nominal Rate on Three-Month Treasury Bills Minus Headline CPI Inflation

$$RR1\_TBILL\_CPI_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - CPI_{t+\tau|t-1}, \qquad \tau = 0,...,4$$

$$RR2\_TBILL\_CPI_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - CPI_{t+\tau+1|t-1}, \qquad \tau = 0,...,3$$

$$RR3\_TBILL\_CPI_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - 100\left\{\left[\left(1+\frac{CPI_{t+\tau|t-1}}{100}\right)\left(1+\frac{CPI_{t+\tau+1|t-1}}{100}\right)\right]^{\frac{1}{2}}-1\right\}, \qquad \tau = 0,...,3$$

Nominal Rate on Three-Month Treasury Bills Minus Core CPI Inflation

$$RR1\_TBILL\_CCPI_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - CORECPI_{t+\tau|t-1}, \qquad \tau = 0,...,4$$

$$RR2\_TBILL\_CCPI_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - CORECPI_{t+\tau+1|t-1}, \qquad \tau = 0,...,3$$

$$RR3\_TBILL\_CCPI_{t+\tau|t-1} = TBILL_{t+\tau|t-1}$$
$$-100\left\{\left[\left(1+\frac{CORECPI_{t+\tau|t-1}}{100}\right)\left(1+\frac{CORECPI_{t+\tau+1|t-1}}{100}\right)\right]^{\frac{1}{2}}-1\right\}, \qquad \tau = 0,...,3$$

Nominal Rate on Three-Month Treasury Bills Minus Headline PCE Inflation

$$RR1\_TBILL\_PCE_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - PCE_{t+\tau|t-1}, \qquad\qquad \tau = 0,...,4$$

$$RR2\_TBILL\_PCE_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - PCE_{t+\tau+1|t-1}, \qquad\qquad \tau = 0,...,3$$

$$RR3\_TBILL\_PCE_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - 100\left\{\left[\left(1+\frac{PCE_{t+\tau|t-1}}{100}\right)\left(1+\frac{PCE_{t+\tau+1|t-1}}{100}\right)\right]^{\frac{1}{2}}-1\right\}, \quad \tau = 0,...,3$$

Nominal Rate on Three-Month Treasury Bills Minus Core PCE Inflation

$$RR1\_TBILL\_CPCE_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - COREPCE_{t+\tau|t-1}, \qquad\qquad \tau = 0,...,4$$

$$RR2\_TBILL\_CPCE_{t+\tau|t-1} = TBILL_{t+\tau|t-1} - COREPCE_{t+\tau+1|t-1}, \qquad\qquad \tau = 0,...,3$$

$$RR3\_TBILL\_CPCE_{t+\tau|t-1} = TBILL_{t+\tau|t-1}$$

$$-100\left\{\left[\left(1+\frac{COREPCE_{t+\tau|t-1}}{100}\right)\left(1+\frac{COREPCE_{t+\tau+1|t-1}}{100}\right)\right]^{\frac{1}{2}}-1\right\}, \quad \tau = 0,...,3$$

Computations for Forward Inflation Rates. We use the survey's projections for five-year annual-average inflation and 10-year annual-average inflation. (Note that the survey's projections for five-year annual-average inflation cover the first five years of the 10-year horizon.)

We compute each panelist's implied forecast for inflation over the second five years of the 10-year horizon, using the formulas shown below. Then, for each survey and across all panelists, we compute the mean projections, the median projections, and measures of cross-section dispersion.

$$CPIF5_t = 100 \left[\frac{\left(1 + \frac{CPI10_t}{100}\right)^2}{\left(1 + \frac{CPI5YR_t}{100}\right)} - 1 \right] \quad (= \text{Five-year forward five-year annual-average CPI inflation})$$

$$PCEF5_t = 100 \left[\frac{\left(1 + \frac{PCE10_t}{100}\right)^2}{\left(1 + \frac{PCE5YR_t}{100}\right)} - 1 \right] \quad (= \text{Five-year forward five-year annual-average PCE inflation})$$

11. List of Changes to This Document

The table below lists the changes made to this document.

Date of Change	Description of Change
May 2008	INDUSTRY classification added in Section 4.
September 2008	Timing of the survey added in Section 1.
September 2008	Presentation of data by individual variable added in Section 7.
October 2008	Natural rate of unemployment (NAIRU) added in Section 8.
July 2009	Made minor changes to some narrative to reflect the BEA's July 2009 benchmark revision to the national income and product accounts.
November 2009	Extended RGDP series back to 1968:Q4. Previously, RGDP started in 1981:Q3.
January 2010	Added Moody's Baa corporate bond yield. Added two more years of annual forecasts for the civilian unemployment rate, three-month Treasury bill rate, 10-year Treasury bond rate, and real GDP. Added two additional years for probability of changes in real GDP. Added probability of civilian unemployment rates.
June 2010	The base year for the industrial production indexes changed from 2002 to 2007.
September 2010	Added a new section entitled "Cross-Sectional Forecast Dispersion."
August 2011	Extended RGDPC, RGDPD, UNEMPC, UNEMPD, PRGDP1–PRGDP44, and PRUNEMP1–PRUNEMP40 series back to 2009:Q2. Previously, these series started in 2010:Q1. Extended TBILLC, TBILLD, TBONDC, and TBONDD series back to 2009:Q3. Previously, these series started in 2010:Q1.
August 2012	Added a new section entitled "Implied Forecasts."
February 2014	Modified the bin definitions for PRPGDP and PRUNEMP. Added a new definition for the long-term projection for the 10-year constant-maturity Treasury yield (BOND10).
July 2015	Updated Table 5 to indicate a new base year for industrial production, beginning with the survey of 2015:Q3.
September 2015	Added the 25th percentiles and the 75th percentiles to the files for cross-sectional forecast dispersion.
December 2015	Augmented our descriptions of the survey's density projections (section 6, "Mean Probability Forecasts").
May 2016	Added some clarifying language on growth rates throughout the documentation.

May 2017	On May 12, 2017, the survey's data files on the Bank's website were changed to a .xlsx extension instead of .xls. We adjusted this document accordingly. Moody's now views the historical values for the Aaa and Baa corporate bond yields (BOND and BAABOND) as proprietary. Accordingly, the Philadelphia Fed is not permitted to release these historical values to the public.
November 2017	Added additional clarifying details on many of the survey's variables, most notably the natural rate of unemployment (UBAR) and the density projections for GDP and GDP prices (PRGDP, PRPGDP).
August 2018	Updated Table 4 to indicate a new base year for NIPA variables, beginning with the survey of 2018:Q3.
October 2019	Combined the five individual forecast files (*Micro1.xlsx* to *Micro5.xlsx*) into a single file, *SPFmicrodata.xlsx*.
April 2020	Modified the bin definitions for PRGDP and PRUNEMP.
May 2021	Updated Table 5 to indicate a new base year for industrial production, beginning with the survey of 2021:Q3.
October 2023	Updated Table 4 to indicate a new base year for NIPA variables, beginning with the survey of 2023:Q4.

For additional information, please contact:

Dr. Thomas Stark
Assistant Vice President | Assistant Director
Real-Time Data Research Center

Economic Research Department
Federal Reserve Bank of Philadelphia
Ten Independence Mall
Philadelphia, PA 19106-1574
215-574-6436
tom.stark@phil.frb.org
PHIL.SPF@phil.frb.org