Livingston Survey Documentation
Federal Reserve Bank of Philadelphia
November 6, 2014

The Livingston Survey data set contains forecasts of economic variables from a survey of forecasters. The survey was begun in June 1946 by Joseph Livingston, a columnist for the *Philadelphia Inquirer*. Livingston continued the survey until his death in 1990, at which time the Federal Reserve Bank of Philadelphia took it over.

The survey is conducted twice a year, in June and December. The survey newsletter, consisting of the median forecast of each variable, is available from the Federal Reserve Bank of Philadelphia.[1] The survey consists of forecasts of 18 different variables describing national output, prices, unemployment, and other macroeconomic data. Files containing the mean and median responses for the levels of variables, as well as the individual responses, are available on the Philadelphia Fed's web page. We also provide files containing the growth rates of the mean and median responses.

Section 1 discusses how we reorganized the survey's data set in 2004. The data set is now much easier to use. **Section 2** summarizes the structure of the survey. **Section 3** documents how the data are organized on our web page. **Section 4** discusses how to construct growth rates from the forecasted levels and our base values. **Section 5** describes our files for the rate of growth in the median (or mean) forecasts for the levels of survey variables. **Section 6** discusses our measures of cross-sectional forecast dispersion. **Section 7** discusses the survey's forecasts for the Consumer Price Index, one of the most important variables in the survey. **Section 8** discusses important features of each variable in the survey and any caveats.

1. Reorganization of the Data Set

In June 2004, in response to numerous problems with the structure of the Livingston Survey data set, we decided to change the way in which we present the data on our web page. This section describes the changes.

Previously, we presented the data in text files, using a complicated nomenclature system to label the variable and forecast horizon. Often, the labels did not appear directly above the data they described, and the labels differed from those described in the documentation. This caused users quite a bit of confusion and increased the cost of working with the data. We now simplify the presentation considerably by using Excel workbooks, and we have abandoned the old, complicated nomenclature system. Users of the old Livingston data will remember that each variable had a root mnemonic that was prefixed to a code that described the forecast horizon. For example, the forecasts for the level of the CPI were labeled as CPIZ (the monthly base value), CPI0 (the forecast for the month of the survey), CPI6 (the six-month-ahead forecast), CPI12 (the 12-month-ahead forecast), CPIJZ (the annual base value for a June survey), CPIJ0

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[1] The first survey to use the median forecasts in the write-ups was the survey of June 2000. All previous write-ups, including those written by Joseph Livingston, used the mean forecast.

(the annual average forecast for the year of the survey), and CPI1J (the annual average for the next year).

The new system features the following improvements:

- All median forecasts are stored in an Excel workbook containing multiple worksheets, corresponding to the variable being forecast. (The mean forecasts are stored in a different workbook.) The worksheets are labeled descriptively, to indicate the variable forecast.

- There is one worksheet for each variable, and each worksheet uses the same generic column headers to indicate the forecast horizon. For example, the column header *Forecast0Month* appears in each worksheet and denotes the forecast for the month (or quarter) of the survey and the column header *Forecast6Month* denotes the six-month-ahead (or two-quarter-ahead) forecast.

- Problems with misaligned column headers have been eliminated.

- We have eliminated the confusing distinction between the column headers used for the annual forecasts in a June survey and those for a December survey.

2. Overview of the Livingston Survey

The survey consists of forecasts of 18 different variables describing national output, prices, unemployment, and other macroeconomic data. It features forecasts for quarterly variables (real GNP/GDP, nominal GNP/GDP, real nonresidential fixed investment, and corporate profits after tax), variables available at a monthly observation frequency (industrial production, total private housing starts, the PPI, the CPI, unemployment, average weekly earnings, retail sales, and automobile sales), and variables available at a daily observation frequency (prime rate, 10-year Treasury bond rate, 90-day Treasury bill rate, and S&P 500 stock price index).

For variables available **<u>quarterly</u>**, the forecast dates are:

- The value of the variable in the current quarter (beginning with the June 1992 survey), defined as the quarter in which we conducted the survey;
- The value of the variable two quarters beyond the current quarter;
- The value of the variable four quarters beyond the current quarter;
- In June surveys, two annual-average forecasts:
    - For the current year, defined as the year in which we conducted the survey;
    - For the following year.
- In December surveys, three annual-average forecasts:
    - For the current year (beginning with the June 1992 survey), defined as noted above;
    - For the next year;
    - For the year after.

For variables available **<u>monthly</u>**, the forecast dates are:

- The value of the variable in the current month (beginning with the June 1992 survey), defined as the month in which we conducted the survey;
- The value of the variable six months beyond the current month;
- The value of the variable 12 months beyond the current month;
- In June surveys, two annual-average forecasts:
    - For the current year, defined as the year in which we conducted the survey;
    - For the following year.
- In December surveys, three annual-average forecasts:
    - For the current year (beginning with the June 1992 survey), defined as noted above;
    - For the next year;
    - For the year after.

For variables available **<u>daily</u>**, the forecast dates are:

- The value of the variable at the end of the current month (beginning with the June 1992 survey), defined as the month in which we conducted the survey;
- The value of the variable at the end of the month six months beyond the current month;
- The value of the variable at the end of the month 12 months beyond the current month;
- In a June survey: The value of the variable at the end of December of the next year;
- In a December survey: The value of the variable at the end of December two years beyond the year in which we conducted the survey.

Beginning with the survey of June 1990 (excluding the survey in December 1990), two other questions ask for long-term forecasts:

- The 10-year annual-average rate of CPI inflation;
- The 10-year annual-average rate of growth in real GDP.

Two Examples. In the survey of June 1992, we asked for forecasts for the quarters and months shown in the table below:

Forecasts in the June 1992 Survey

Variable Frequency	High Frequency Forecasts	Annual Forecasts
Quarterly	1992:Q2, 1992:Q4, and 1993:Q2	1992 and 1993 (annual average)
Monthly	1992:June, 1992:Dec, and 1993:June	1992 and 1993 (annual average)
Daily	1992:June, 1992:Dec, and 1993:June (last day of the month indicated)	1993:Dec (last day of the month indicated)

In the survey of December 1992, we asked for forecasts for the quarters and months shown in the table below:

Forecasts in the December 1992 Survey

Variable Frequency	High Frequency Forecasts	Annual Forecasts
Quarterly	1992:Q4, 1993:Q2, and 1993:Q4	1992, 1993, and 1994 (annual average)
Monthly	1992:Dec, 1993:June, and 1993:Dec	1992, 1993, and 1994 (annual average)
Daily	1992:Dec, 1993:June, and 1993:Dec (last day of the month indicated)	1994:Dec (last day of the month indicated)

Any researcher seriously thinking about using the data from the Livingston survey should read John Carlson's article "A Study of Price Forecasts."[2] Carlson's article explores the pros and cons of the Livingston Survey's data set. This documentation also contains a section that examines the Consumer Price Index in great detail and explains some of the known problems with this particular variable.

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[2] Carlson, John. "A Study of Price Forecasts," *Annals of Economic and Social Measurement*, Vol. 6, No. 1, Winter 1977, pp. 27-56.

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3. File and Variable Descriptions: Forecasts for Levels of Variables

A number of Excel workbooks contain the survey's forecasts for the levels of variables. Each workbook contains 16 worksheets, and each worksheet uses the same generic column headers to describe the forecasts. There is one worksheet for each variable, and the worksheet contains a different forecast step in each column (described by the column header). This section describes the workbooks, the worksheets, and the column headers.

The workbooks and a short description are shown in the table below.

Description of Livingston Survey Files: Forecasts for the Levels of Variables

Livingston Survey Workbook Name	*Description of Contents*
Means_old.xls	Time series of mean responses for the levels of variables in surveys through that of December 2003.
Means_new.xls	Time series of mean responses for the levels of variables in surveys starting with that of June 2004.
Medians_old.xls	Time series of median responses for the levels of variables in surveys through that of December 2003.
Medians_new.xls	Time series of median responses for the levels of variables in surveys starting with that of June 2004.
RawData_old.xls	Panel data of individual responses for the levels of variables in surveys through that of December 2003.
RawData_new.xls	Panel data of individual responses for the levels of variables in surveys starting with that of June 2004.

Each of the Excel workbooks listed above contains 16 worksheets, named to describe the variable forecast, as shown in the table below.

Description of the Worksheets in Each Workbook: Levels of Variables

Worksheet Name	Description	Important Comments
	Quarterly Variables	
RGDPX	Real Gross Domestic Product	Billions of real dollars. Seasonally adjusted. Annual rate. Prior to the surveys of 1992, real GNP.
GDPX	Nominal Gross Domestic Product	Billions of dollars. Seasonally adjusted. Annual rate. Prior to the surveys of 1992, nominal GNP.
BFIX	Real Business Fixed Investment	Billions of real dollars. Seasonally adjusted. Annual rate. Prior to the surveys of 1990, new plant and equipment expenditures.
CPAT	Corporate Profits After Tax	Billions of dollars. Seasonally adjusted. Annual rate. With inventory valuation adjustment (IVA) and capital consumption adjustment (CCAdj). Prior to surveys of 2006, without inventory valuation adjustment and capital consumption adjustment.
	Monthly Variables	
IP	Industrial Production Index	Index level. Seasonally adjusted.
TPHS	Total Private Housing Starts	Millions of units. Annual rate. Seasonally adjusted. Prior to the surveys of 1969, nonfarm housing starts.
PPI	Producer Price Index for Finished Goods	Prior to the June 2014 Livingston survey, our measure of the PPI was that for finished goods according to the Stage of Processing (SOP) aggregation system. Following the change in BLS's procedures, the survey switched to the Final Demand-Intermediate Demand (FD-ID) aggregation system for the PPI for finished goods. Seasonally adjusted index level. Prior to the survey of December 2004, <u>not</u> seasonally adjusted index level.
CPI	Consumer Price Index	Seasonally adjusted index level. Prior to the survey of December 2004, <u>not</u> seasonally adjusted index level.

UNPR	Civilian Unemployment Rate	Percentage points. Seasonally adjusted.
WMFG	Average Weekly Earnings in Manufacturing	Dollars per week. Not seasonally adjusted.
RTTR	Nominal Retail Sales and Food Services	Billions of dollars. Monthly rate. Seasonally adjusted. Retail sales prior to switch from SIC to NAICS.
AUTODF	Auto Sales, Domestic plus Imported, Retail	Millions of units. Annual rate. Seasonally adjusted.

Description of the Worksheets in Each Workbook: Levels of Variables (continued)

Worksheet Name	Description	Important Comments
		Daily Variables
PRIME	Prime Interest Rate	Annualized percentage points. Forecasts are for the last day of the period.
TBOND	Rate on 10-Year Treasury Bond	Annualized percentage points. Constant maturity. Prior to the survey of December 2002, rate on 30-year Treasury bond. Forecasts are for the last day of the period.
TBILL	Rate on 3-Month Treasury Bill	Annualized percentage points. Discount basis. Secondary market. Forecasts are for the last day of the period.
SPIF	S&P 500 Stock Price Index.	Index level. Forecasts are for the last day of the period.

The worksheets for the levels of variables share the following generic column headers, which describe the horizon of the forecast values in the column or, in some columns, the historical values.

Column Headers in the Worksheets: Levels of Variables[3]

Column Header	Description
Date	Date of the survey. This is the year in which we conducted the survey and either the month June or the month December.
BasePeriod	Last quarterly or monthly historical value known at the time we sent the survey questionnaire to the panelists.
Forecast0Month	Forecast for the month or quarter in which the survey is taken. For monthly variables: June or December. For quarterly variables: Q2 or Q4.
Forecast6Month	Forecast for the month that is six months beyond the survey date (or for the quarter that is two quarters beyond the survey date).
Forecast12Month	Forecast for the month that is 12 months beyond the survey date (or for the quarter that is four quarters beyond the survey date).

Column Headers in the Worksheets: Levels of Variables (continued)

Column Header	Description
BaseYear	Last annual-average historical value known at the time we sent the survey questionnaire to the panelists.
Forecast0Year	Annual-average forecast for the year in which we conducted the survey.
Forecast1Year	Annual-average forecast for the next year.
Forecast2Year	Annual-average forecast the year after.
Forecast10Year	Forecast for annual average growth over the next 10 years (RGDPX and CPI worksheets only).

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[3] See the section below on "Growth Rates and Base Values" for a detailed description of some problems with the variables, *BasePeriod* and *BaseYear*. For variables available at a daily frequency (PRIME, TBOND, TBILL, and SPIF), the forecasts and base values are those for the last day of the indicated period. See the tables above ("Forecasts in the June 1992 Survey" and "Forecasts in the December 1992 Survey") for two examples of how the nomenclature system works.

Two additional columns appear in the panel data set of individual responses (*RawData_old.xls* and *RawData_new.xls*). The header *ID* gives a number that identifies each individual. The same ID number is used across surveys, so you can use it to track how a forecaster's projection changes over time. The header *Category* classifies the forecaster's affiliation, according to the codes listed in the table below.

Participants' Category Codes in RawData_old.xls and RawData_new.xls

Code	Category
A	Academic Institution
B	Commercial Banking
C	Consulting
F	Federal Reserve
G	Government
T	Industry Trade Group
R	Insurance Company
I	Investment Banking
L	Labor
S	Nonfinancial Business
U	Other / Unknown

The *category* codes for each participant change over time. Before the survey of June 1981, the participants have the same code throughout their association with the survey. If a participant worked for an investment banking group in the 1960s and then acquired employment in commercial banking in the 1970s, the survey's code lists this participant as an investment banker. We apologize for this inconsistency in the data, but the past records of the participants are incomplete. The codes after June 1981 capture the participants' changing affiliations over time.

In the survey of December 2009, we introduced two new category codes: *Consulting* and *Industry Trade Group*. Panelists were allowed to retroactively switch their category code into one of these categories for previous surveys. The panelists who have done so correspond to ID numbers 264, 366, 383, 384, 394, 427, and 444. The currently available data set reflects these changes.

4. Growth Rates and Base Values

The primary Livingston survey data set contains forecasts for the *levels* of variables. For many purposes, however, forecasts for growth rates are better. If you are interested in computing the implied forecast for the annualized growth of a variable between two forecast dates, say between six months ahead of the survey date and 12 months ahead for industrial production, you can use a formula such as

$$\left[\left(\frac{Forecast12Month}{Forecast6Month}\right)^{\frac{12}{6}} - 1\right]*100$$

where *Forecast12Month* is the forecast for the level 12 months after the survey date, and *Forecast6Month* is the forecast for the level six months after the survey date. You may choose, of course, to use either the mean forecast or the median forecast.

Beginning with the survey of June 1992, we also provide forecasts for the level of the variable in the month of the survey (June or December). So you could compute an implied forecast for annualized growth between the month of the survey and, say, 12 months later, using a formula such as

$$\left[\left(\frac{Forecast12Month}{Forecast0Month}\right)^{\frac{12}{12}} - 1\right]*100$$

where *Forecast0Month* is the forecast for the level of the variable in the month in which we conducted the survey. In a June survey, *Forecast0Month* is the forecast for the level in June. In a December survey, it is the forecast for the level in December.

If you are interested in computing the implied rate of forecasted growth in the annual-average index level between the year in which we conducted the survey and the next year, the following formula will do the trick:

$$\left[\left(\frac{Forecast1Year}{Forecast0Year}\right) - 1\right]*100$$

In this formula, *Forecast0Year* and *Forecast1Year* are the forecasts for the annual-average level of the industrial production index in the year of the survey and the next year, respectively.

The survey's data set also provides information on the last historical monthly (or quarterly) value known at the time we sent the questionnaire to the panelists. The last known annual values are also provided. These are the variables denoted *BasePeriod* and *BaseYear*, respectively. With these base values, one could compute an implied forecast for annualized growth over the period

between the period of the last known historical value and the period of a forecast value, using a formula such as

$$\left[\left(\frac{Forecast6Month}{BasePeriod}\right)^{\frac{12}{k}} - 1\right] * 100$$

where k represents the number of periods between *BasePeriod* and *Forecast6Month*.

In the previous version of this documentation, we described the base values as the last historical values known at the time the survey questionnaire was mailed. For example, in a June survey, the questionnaires are mailed in May, and the last known historical values are those for April (monthly variables) or Q1 (quarterly variables). For the daily variables, these values would be those for the last day in April. In a December survey, the questionnaire is mailed in November, and the base values would be those for October or Q3.

However, in the process of reorganizing the data set, we discovered many discrepancies between our description of the base values and the actual base values listed in the data set. The only exception is the case of the CPI. For this variable, we have verified that the *BasePeriod* values correspond to the real-time historical value of the CPI in April (June survey) and October (December survey).

A Caveat. The Philadelphia Fed offers the following advice concerning the base values in the data set (*BasePeriod* and *BaseYear*) corresponding to all surveys through the survey of December 2003: You should use these values to compute a forecast growth rate with great caution. As noted above, the only exception is the CPI: For this variable, the *BasePeriod* values are accurate in all surveys.

Beginning with the survey of June 2004, the base-period values(*BasePeriod* and *BaseYear*) are accurate for all variables.

Data Set Partitioning. For the reasons cited above, on our web page, we partition the forecasts for levels of variables into data before the survey of June 2004 and data after. For all surveys starting with June 2004, the base values (*BasePeriod* and *BaseYear*) are the last historical values known at the time the survey questionnaires are mailed. The questionnaire for a June survey is mailed in May, and the December questionnaire is mailed in November. Thus, the base values are defined as the values for the months, quarters, and years shown in the table below.

Base Values in Surveys from June 2004 - present

Survey Date	BasePeriod		
	Daily Variable	Monthly Variable	Quarterly Variable[4]
June Survey	Last Day of April	April	Q1
December Survey	Last Day of October	October	Q3

The annual base values (*BaseYear*) are those for the annual average in the year preceding the year in which we conducted the survey (monthly and quarterly variables) or for the last day of that year (daily variables).

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[4] Because of a one-month delay in the release of data on corporate profits, the quarterly base value for this variable is that for the quarter preceding the quarter shown in the table. In a June survey, this is Q4; in a December survey, this is Q2.

5. File and Variable Descriptions: Growth Rates of Median and Mean Forecasts for Levels

In November 2013, we released Excel files containing various growth rates for the median and mean forecasts for levels of survey variables. This section describes the files and documents our computations. In all cases, we express our growth rates in annualized percentage points.

Description of Files. The file called *MedianGrowthRate.xls* shows our growth-rate calculations for the rate of growth in the median forecast for levels of selected survey variables. The file called *MeanGrowthRate.xls* does the same for the mean forecast for levels. Each file shows the calculations for the following survey variables:

Variables Included in Our Calculations for Growth Rates

Survey Variable Name	Description
RGDPX	Real GDP. Seasonally adjusted. Prior to the surveys of 1992, real GNP.
GDPX	Nominal GDP. Seasonally adjusted. Prior to the surveys of 1992, nominal GNP.
BFIX	Real Business Fixed Investment. Seasonally adjusted. Prior to the surveys of 1990, new plant and equipment expenditures.
IP	Industrial production index. Seasonally adjusted.
PPI	Producer Price Index for Finished Goods. In the June 2014 Livingston survey, following the change in BLS's procedures, the survey switched to the Final Demand-Intermediate Demand (FD-ID) aggregation system for the PPI for finished goods from the Stage of Processing (SOP) aggregation system. Seasonally adjusted. Prior to the survey of December 1994, not seasonally adjusted.
CPI	Consumer Price Index. Seasonally adjusted. Prior to the survey of December 1994, not seasonally adjusted.
WMFG	Nominal Average Weekly Earnings in Manufacturing. Not seasonally adjusted.
RTTR	Nominal Retail Sales and Food Services. Seasonally adjusted. Retail sales prior to switch from SIC to NAICS.

Growth-Rate Computations. We now give the formulas for our calculations for growth. Note that we first compute the median (or mean) forecast for the level of a survey variable. We then compute the rate of growth, as shown below, expressed in annualized percentage points. We begin with some caveats shown in the text box below.

Caveats on Growth Rates

As noted above, we are uncertain about the accuracy of our historical values for the variables that we call *BasePeriod* and *BaseYear* in surveys prior to that of June 2004. These variables represent the last real-time historical values for the month (or quarter) and year known at the time we sent the questionnaires to the forecasters. The only exception is the *BasePeriod* variable for the CPI, which is accurate in all surveys.

In addition, the timing of the Livingston surveys is such that government statistical agencies could release a revision to the last historical value between the date that we send the survey questionnaire to the panelists and the date of the deadline for returns. Some forecasters might use the revised value in forming their projection for the level; others might not.

Some growth-rate computations (described below) use the variables *BasePeriod* and *BaseYear* in the denominator. In these cases, we use the values available when we sent the forecasters the questionnaire. That is, the denominator might not reflect a revision that occurred between the date of the questionnaire and the date of the deadline for returns.

A file of alternative *BasePeriod* values for GDPX (nominal GNP, nominal GDP) and RGDPX (real GNP, real GDP) is available on the Philadelphia Fed's web page for the Livingston survey. The alternative *BasePeriod* values capture the revision that the U.S. Bureau of Economic Analysis releases for the national income accounts after we send the questionnaire to the panelists.

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(1) G_BasePeriod_To_Forecast0Month

This is the rate of growth over the period from the last monthly or quarterly historical value available to the panelists when we sent them the questionnaire to the month or quarter in which we conducted the survey. Note that the denominator was a historical value at the time we conducted the survey.

$$G\_BasePeriod\_To\_Forecast0Month =$$

$$= \begin{cases} 100\left[\left(\dfrac{Forecast0Month}{BasePeriod}\right)^{12/2} - 1\right], & \text{monthly data} \\[4mm] 100\left[\left(\dfrac{Forecast0Month}{BasePeriod}\right)^{4/1} - 1\right], & \text{quarterly data} \end{cases}$$

(2) G_BasePeriod_To_Forecast6Month

This is the rate of growth over the period from the last monthly or quarterly historical value available to the panelists when we sent them the questionnaire to the month that is six months beyond the survey date or two quarters beyond the survey date. Note that the denominator was a historical value at the time we conducted the survey.

$$G\_BasePeriod\_To\_Forecast6Month =$$

$$= \begin{cases} 100\left[\left(\dfrac{Forecast6Month}{BasePeriod}\right)^{12/8} - 1\right], & \text{monthly data} \\[4mm] 100\left[\left(\dfrac{Forecast6Month}{BasePeriod}\right)^{4/3} - 1\right], & \text{quarterly data} \end{cases}$$

(3) G_BasePeriod_To_Forecast12Month

This is the rate of growth over the period from the last monthly or quarterly historical value available to the panelists when we sent them the questionnaire to the month that is 12 months beyond the survey date or four quarters beyond the survey date. Note that the denominator was a historical value at the time we conducted the survey.

$$G\_BasePeriod\_To\_Forecast12Month =$$

$$= \begin{cases} 100\left[\left(\dfrac{Forecast12Month}{BasePeriod}\right)^{12/14} - 1\right], & \text{monthly data} \\[3ex] 100\left[\left(\dfrac{Forecast12Month}{BasePeriod}\right)^{4/5} - 1\right], & \text{quarterly data} \end{cases}$$

(4) G_Forecast0_To_6Month

This is the rate of growth over the period from the month or quarter in which we conducted the survey to the month that is six months beyond the survey date or the quarter that is two quarters beyond the survey date.

$$G\_Forecast0\_To\_6Month =$$

$$= \begin{cases} 100\left[\left(\dfrac{Forecast6Month}{Forecast0Month}\right)^{12/6} - 1\right], & \text{monthly data} \\[3ex] 100\left[\left(\dfrac{Forecast6Month}{Forecast0Month}\right)^{4/2} - 1\right], & \text{quarterly data} \end{cases}$$

(5) G_Forecast0_To_12Month

This is the rate of growth over the period from the month or quarter in which we conducted the survey to the month that is 12 months beyond the survey date or the quarter that is four quarters beyond the survey date.

$$G\_Forecast0\_To\_12Month =$$

$$= \begin{cases} 100\left[\left(\dfrac{Forecast12Month}{Forecast0Month}\right)^{12/12} - 1\right], & \text{monthly data} \\[3ex] 100\left[\left(\dfrac{Forecast12Month}{Forecast0Month}\right)^{4/4} - 1\right], & \text{quarterly data} \end{cases}$$

(6) G_Forecast6_To_12Month

This is the rate of growth over the period from the month that is six months beyond the survey date (or two quarters beyond the survey date) to the month that is 12 months beyond the survey date (or four quarters beyond the survey date).

$$G\_Forecast6\_To\_12Month =$$

$$= \begin{cases} 100\left[\left(\dfrac{Forecast12Month}{Forecast6Month}\right)^{12/6} - 1\right], & \text{monthly data} \\[3ex] 100\left[\left(\dfrac{Forecast12Month}{Forecast6Month}\right)^{4/2} - 1\right], & \text{quarterly data} \end{cases}$$

(7) G_BaseYear_To_Forecast0Year

This is the rate of growth in the annual-average level over the period from the year before we conducted the survey to the year in which we conducted the survey. This is a one-year growth rate. Note that the denominator was a historical value at the time we conducted the survey.

$$G\_BaseYear\_To\_Forecast0Year =$$

$$100\left[\left(\frac{Forecast0Year}{BaseYear}\right)^{1/1} - 1\right]$$

(8) G_BaseYear_To_Forecast1Year

This is the rate of growth in the annual-average level over the period from the year before we conducted the survey to the year that is one year beyond the survey year. This is a two-year growth rate. Note that the denominator was a historical value at the time we conducted the survey.

$G\_BaseYear\_To\_Forecast1Year =$

$$100\left[\left(\frac{Forecast1Year}{BaseYear}\right)^{1/2} - 1\right]$$

(9) G_BaseYear_To_Forecast2Year

This is the rate of growth in the annual-average level over the period from the year before we conducted the survey to the year that is two years beyond the survey year. This is a three-year growth rate. Note that the denominator was a historical value at the time we conducted the survey.

$G\_BaseYear\_To\_Forecast2Year =$

$$100\left[\left(\frac{Forecast2Year}{BaseYear}\right)^{1/3} - 1\right]$$

(10) G_Forecast0_To_1Year

This is the rate of growth in the annual-average level over the period from the year in which we conducted the survey to the next year. This is a one-year growth rate.

$G\_Forecast0\_To\_1Year =$

$$100\left[\left(\frac{Forecast1Year}{Forecast0Year}\right)^{1/1} - 1\right]$$

(11) G_Forecast0_To_2Year

This is the rate of growth in the annual-average level over the period from the year in which we conducted the survey to the year that is two years beyond the survey year. This is a two-year growth rate.

$$G\_Forecast0\_To\_2Year =$$

$$100\left[\left(\frac{Forecast2Year}{Forecast0Year}\right)^{1/2} - 1\right]$$

(12) G_Forecast1_To_2Year

This is the rate of growth in the annual-average level over the period from the year beyond the survey year to the year that is two years beyond the survey year. This is a one-year growth rate.

$$G\_Forecast1\_To\_2Year =$$

$$100\left[\left(\frac{Forecast2Year}{Forecast1Year}\right)^{1/1} - 1\right]$$

6. Discussion of Measures of Cross-Sectional Forecast Dispersion

In November 2014, we released three measures of cross-sectional forecast dispersion. Our computations are in three XLS files called: *Dispersion1.xls*, *Dispersion2.xls*, and *Dispersion3.xls*. There is one file for each dispersion measure, and each file contains all survey variables for that measure. In some cases, we exclude variables because the dispersion measure is not relevant for the variable. Note also that each file also contains dispersion estimates for projections at a number of alternative horizons. Detailed descriptions follow.

The column headers for our dispersion files list the date of the survey as *monyy*, where *mon* is the month in which we conducted the survey (JUN for a June survey and DEC for a December survey) and *yy* is the year in which we conducted the survey. The column headers also provide information on the variable forecast, the forecast horizon for which we compute the measure of dispersion, and the measure of dispersion itself, using the nomenclature given by:

Variable Name_Forecast Horizon_Dispersion Measure

where *Variable Name* is the name we assign to the survey variable (the same names shown elsewhere in this document), *Forecast Horizon* gives information on the forecast horizon for which we compute a dispersion measure (described below), and *Dispersion Measure* is D1, D2, or D3, corresponding with the three alternative measures of dispersion.

The following table provides the variable names.

Survey Variables for Which We Compute Measures of Dispersion
Variable Name appears in the column header of the files for dispersion.

Variable Name	Brief Description
RGDPX	Real GDP
GDPX	Nominal GDP
BFIX	Real Business Fixed investment
CPAT	Nominal Corporate Profits After Tax
IP	Industrial Production Index
TPHS	Housing Starts
PPI	Producer Price Index
CPI	Consumer Price Index
UNPR	Unemployment Rate
WMFG	Average Weekly Earnings in Manufacturing
RTTR	Nominal Retail Sales
AUTODF	Auto Sales
PRIME	Prime Interest Rate
TBOND	Rate on 10-Year Treasury Bond
TBILL	Rate on 3-Month Treasury Bill
SPIF	S&P 500 Stock Price Index
RGDPX10Y	10-Year Annual Average Growth for Real GDP
CPI10Y	10-Year Annual Average Inflation

The table below provides a brief description of the alternative measures of dispersion, along with the XLS file name for the measure.

Brief Description of Dispersion Measures
Dispersion Measure appears in the column header of the files for dispersion.

File Name	Dispersion Measure	Brief Description
Dispersion1.xls	D1	Interquartile cross-sectional range of forecasts for levels of survey variables.
Dispersion2.xls	D2	Interquartile cross-sectional range of forecasts for growth rates of survey variables.
Dispersion3.xls	D3	Percent difference between 75th and 25th percentiles for levels of survey variables.

We now discuss the details of our computations for the measures of dispersion and the forecast horizons for which we compute dispersion.

Dispersion1.xls: Estimates of Dispersion for the Forecasts for Levels of Variables [D1].

We compute these estimates of dispersion as the difference between the 75th percentile and the 25th percentile of the projections for the level of a survey variable. Let X denote the level of a survey variable. We define the difference between the 75th percentile and the 25th percentile of the projections as

$$X\_D1_{t+\tau} = \hat{X}(75th)_{t+\tau} - \hat{X}(25th)_{t+\tau}$$

where D1 indicates the first dispersion measure, t is the survey date, τ is the forecast horizon, $\hat{X}(75th)_{t+\tau}$ is the 75th percentile forecast response for the level of variable X, and $\hat{X}(25th)$ is the 25th percentile response. We compute the interquartile ranges for the projections at the horizons shown in the table below.

Forecast Horizons for Dispersion Measure D1
Code Name appears in the column header of the file called Dispersion1.xls.

Description of Horizon	Code Name
Forecast for the month or quarter in which we conducted the survey, as listed in the column called date.	0M_D1
Forecast for the month (quarter) that is six months (two quarters) after the month (quarter) in which we conducted the survey.	6M_D1
Forecast for the month (quarter) that is 12 months (four quarters) after the month (quarter) in which we conducted the survey.	12M_D1
Forecast for the year in which we conducted the survey, as listed in the column called date.	0Y_D1
Forecast for the year that is one year after the year in which we conducted the survey.	1Y_D1
Forecast for the year that is two years after the year in which we conducted the survey.	2Y_D1

Dispersion2.xls: Estimates of Dispersion for the Forecasts for Growth Rates [D2].

We compute these estimates of dispersion as the difference between the 75th percentile and the 25th percentile of the projections for the annualized rate of growth of a survey variable. Let X denote the level of a survey variable. We define the difference between the 75th percentile and the 25th percentile of the projections for growth as

$$X\_D2_{t+\tau} = \hat{g}_X(75th)_{t+\tau} - \hat{g}_X(25th)_{t+\tau}$$

where D2 indicates the second dispersion measure, t is the survey date, τ is the forecast horizon, $\hat{g}_X(75th)_{t+\tau}$ is the 75th percentile forecast response for the growth of variable X, and $\hat{g}_X(25th)$ is the 25th percentile response. We compute the interquartile ranges for the projections at the horizons shown in the table below.

Forecast Horizons for Dispersion Measure D2
Code Name appears in the column header of the file called Dispersion2.xls.

Description of Horizon	Code Name
Forecast for annualized growth in percentage points from the *BasePeriod* to the month or quarter in which we conducted the survey. See the discussion above for the definition of *BasePeriod*.	B0M_D2
Forecast for annualized growth in percentage points from the *BasePeriod* to the month (quarter) that is six months (two quarters) after the month (quarter) when we conducted the survey. See the discussion above for the definition of *BasePeriod*.	B6M_D2
Forecast for annualized growth in percentage points from the *BasePeriod* to the month (quarter) that is 12 months (four quarters) after the month (quarter) when we conducted the survey. See the discussion above for the definition of *BasePeriod*.	B12M_D2
Forecast for annualized growth in percentage points from the month (quarter) when we conducted the survey to the month (quarter) that is six months (two quarters) later.	0M6M_D2
Forecast for annualized growth in percentage points from the month (quarter) when we conducted the survey to the month (quarter) that is 12 months (four quarters) later.	0M12M_D2
Forecast for annualized growth in percentage points from the month (quarter) that is six months (two quarters) after the survey date to the month (quarter) that is 12 months (four quarters) after the survey date.	6M12M_D2

Forecast for annual growth in percentage points from the *BaseYear* to the year in which we conducted the survey. See the discussion above for the definition of *BaseYear*.	B0Y_D2
Forecast for annual growth in percentage points from the *BaseYear* to the year that is one year after the survey year. See the discussion above for the definition of *BaseYear*.	B1Y_D2
Forecast for annual growth in percentage points from the *BaseYear* to the year that is two years after the survey year. See the discussion above for the definition of *BaseYear*.	B2Y_D2
Forecast for annual growth in percentage points from the year in which we conducted the survey to the year that is one year later.	0Y1Y_D2
Forecast for annual growth in percentage points from the year in which we conducted the survey to the year that is two years later.	0Y2Y_D2
Forecast for annual growth in percentage points from the year that is one year after the survey year to the year that is two years after the survey year.	1Y2Y_D2

Dispersion3.xls: Proportional Estimates of Dispersion for the Forecasts for Levels of Variables [D3].

We compute these estimates of dispersion as the proportionate difference between the 75th percentile and the 25th percentile of the projections for the levels of a survey variable. Let X denote the level of a survey variable. We define the proportionate difference between the 75th percentile and the 25th percentile of the projections for levels as

$$X\_D3_{t+\tau} = 100 * \left(\log \hat{X}(75th)_{t+\tau} - \log \hat{X}(25th)_{t+\tau} \right)$$

where D3 indicates the third dispersion measure, t is the survey date, τ is the forecast horizon, $\hat{X}(75th)_{t+\tau}$ is the 75th percentile forecast response for the level of variable X, and $\hat{X}(25th)_{t+\tau}$ is the 25th percentile response. We compute the interquartile ranges for the projections at the horizons shown in the table below.

Forecast Horizons for Dispersion Measure D3
Code Name appears in the column header of the file called Dispersion3.xls.

Description of Horizon	*Code Name*
Forecast for the month or quarter in which we conducted the survey, as listed in the column called date.	0M_D3
Forecast for the month (quarter) that is six months (two quarters) after the month (quarter) in which we conducted the survey.	6M_D3
Forecast for the month (quarter) that is 12 months (four quarters) after the month (quarter) in which we conducted the survey.	12M_D3
Forecast for the year in which we conducted the survey, as listed in the column called date.	0Y_D3
Forecast for the year that is one year after the year in which we conducted the survey.	1Y_D3
Forecast for the year that is two years after the year in which we conducted the survey.	2Y_D3

The textbox below provides some caveats on our measures of dispersion.

Caveats on Measures of Dispersion

As noted above (section on growth rates), we are uncertain about the accuracy of our historical values for the variables that we call *BasePeriod* and *BaseYear* in surveys prior to that of June 2004. The only exception is the *BasePeriod* variable for the CPI, which is accurate in all surveys. Thus, our measures of dispersion for the projections of growth rates defined with *BasePeriod* and *BaseYear* should be used with some caution in the surveys that we conducted prior to that of June 2004. This caveat does not apply to measures of dispersion for the CPI that we define with *BasePeriod* values.

Some measures of dispersion, particularly those for growth-rate projections (dispersion measure D2), can be large and erratic in early surveys. This may reflect, in part, economic volatility at the time. It also reflects heavy rounding (to no decimal places) in the projections for the levels of the variables as they are recorded in the data set we inherited from Mr. Livingston. Users of these dispersion measures might want to exclude the early observations from their analysis.

Finally, some measures of dispersion for some variables take the value of zero because there is insufficient cross-section variability in the projections. Typically, this occurs in the forecasts for such monthly variables as unemployment or end-of-month variables such as interest rates when the forecast horizon is short: The short horizon refers to the (nowcast) forecast for June in a June survey and December in a December survey.

7. Discussion of the Consumer Price Index (CPI)

The CPI variable is the most requested variable of the Livingston Survey's data set; it is, therefore, also the most scrutinized. Several minor inconsistencies characterize this variable. The problems usually arise because Joseph Livingston requested forecasts for CPI levels rather than inflation rates. Users should also know that these forecasts are for the not-seasonally-adjusted level of the CPI in surveys prior to December 2004. (The same is true for the forecasts of the Producer Price Index [PPI].) Beginning with the survey of December 2004, we asked the panelists to provide forecasts for the seasonally adjusted index level.

The first concern revolves around the data that the economists used in the completion of the survey. (See also the section, "Growth Rates and Base Values," for a related discussion.) On every survey response form, Livingston would list the most recent monthly or quarterly data to assist economists in making their forecasts. For the June surveys, the CPI figure was either the March or April number, and for the December surveys, the CPI figure was either the September or October number. One criticism of the survey is that Mr. Livingston never asked the participants the base data they used to make their forecasts: the printed data on the survey forms (supplied by Livingston) or more recent data. To construct the inflation rates from forecasts in levels, some assumptions had to be made about which monthly figure the individual participants used at the time they made their forecasts. It was decided that economists used the April CPI figure for the June surveys and the October CPI figure when making predictions for the December survey. (For further details on these choices, see the aforementioned article by Carlson.)

We collected the CPI *BasePeriod* values from the *Survey of Current Business* (SCB) in the month and year that the survey was sent to the economists. For the June surveys, the May SCB was used. For the December surveys, the November SCB was used. (Note that the CPI enters the survey in not-seasonally-adjusted form prior to the survey of December 2004.)

For surveys after December 1991, participants are asked to give the current-month (June and December) forecasts and then base their six-month and 12-month forecasts on their current-month predictions.

The second problem was with rounding. In some years, Livingston rounded the CPI numbers to the nearest one (338.5 would be rounded to 338). Since these rounded CPI figures were listed on the survey forms, the forecasters used rounded CPI figures when making their forecasts. The surveys in which we are positive the CPI figures were rounded run from the June survey of 1985 to the June survey of 1988, a total of seven surveys. There were probably more surveys in which Livingston used rounded data. We can say with confidence that the rounded data affected only a small percentage of the surveys.

8. Special Notes on the Variables

In this section, we describe any special features of the variables in the survey.

GDPX (Nominal Gross Domestic Product)
- Billions of dollars. Seasonally adjusted. Annual rate.
- Prior to 1992, this was nominal gross national product.
- This variable was omitted from the following surveys: June 1950, December 1950, June 1951.

RGDPX (Real Gross Domestic Product)
- Billions of real dollars, with varying base years. Seasonally adjusted. Annual rate.
- Prior to 1992, this was real gross national product.
- Included in the survey since June 1971.
- Forecasts for the 10-year annual average rate of growth included since June 1990.

BFIX (Real Business Fixed Investment)
- Billions of real dollars, with varying base years. Seasonally adjusted. Annual rate.
- Included in the survey since December 1990.

CPAT (Corporate Profits After Tax)
- Billions of dollars. Seasonally adjusted. Annual rate.
- Included in the survey since June 1971.
- Prior to June 2006, this variable is corporate profits after tax, *without* inventory valuation adjustment (IVA) and capital consumption adjustment (CCAdj). We have, however, noticed some surveys in which there appears to have been an arbitrary change, to the after-tax measure that <u>includes</u> IVA and CCA. From the survey of June 2004 to the survey of December 2005, this is the measure that <u>excludes</u> IVA and CCA
- From June 2006 forward, the variable for corporate profits after tax will **<u>include</u>** inventory valuation adjustment (IVA) and capital consumption adjustment (CCAdj). This change has been implemented in response to requests by both panelists and users of the data.
- The quarterly base value (*BasePeriod*) for the quarter preceding the survey month is not available at the time the questionnaire is mailed to the participants. For this variable, we use, instead, the value in the quarter that is two quarters prior to the quarter in which the survey is taken—that is, Q4 in a June survey and Q2 in a December survey.
- Because we use the measure that excludes IVA and CCA, the historical values of this variable are subject to large, discrete jumps when there is a change in tax law affecting depreciation provisions. For information on a recent example, see the Bureau of Economic Analysis's press release of May 26, 2005, available at www.bea.gov. The time series of projections for this series in the Livingston Survey may or may not capture the jump in the historical values, depending on whether the forecasters anticipated the change in tax law.

IP (Industrial Production Index)
- Index level, with varying base years. Seasonally adjusted.

TPHS (Total Private Housing Starts)
- Millions of units. Seasonally adjusted. Annual rate.
- Prior to 1969, nonfarm housing starts.

PPI (Producer Price Index for Finished Goods)
- Index level, with varying base years. Prior to the June 2014 Livingston survey, our measure of the PPI was that for finished goods according to the Stage of Processing (SOP) aggregation system. Following the change in BLS's procedures, the survey switched to the Final Demand-Intermediate Demand (FD-ID) aggregation system for the PPI for finished goods. Not seasonally adjusted in surveys prior to December 2004. Seasonally adjusted beginning with the survey of December 2004.

CPI (Consumer Price Index)
- Index level, with varying base years. Not seasonally adjusted in surveys prior to December 2004. Seasonally adjusted beginning with the survey of December 2004.
- Forecasts for the 10-year annual average rate of growth included since June 1990.

UNPR (Civilian Unemployment Rate)
- Percentage points. Seasonally adjusted.
- Included since June 1961.

WMFG (Average Weekly Earnings in Manufacturing)
- Dollars per week. Not seasonally adjusted.

RTTR (Retail Sales and Food Services)
- Billions of dollars. Seasonally adjusted. Monthly rate.
- Included since December 1959.
- Prior to the switch to NAICS, this variable is retail sales (under the SIC).

AUTODF (Auto Sales, Domestic plus Imported, Retail)
- Millions of units. Seasonally adjusted. Annual rate.
- Included since December 1966.

PRIME (Prime Interest Rate)
- Percentage points.
- Included since June 1981.
- Forecasts are for the last day of the month or year, not averages over the period.
- Beware: Early in the history of this variable, we have noticed some surveys in which the annual forecasts are for the annual average over the year, not the last day of the year. In the surveys beginning with June 2004, the annual forecasts are for the last day of the year.

TBOND (Interest Rate on 10-Year Treasury Bonds)
- Percentage points.
- Included since June 1992.
- Forecasts are for the last day of the month or year, not averages over the period.
- Prior to the survey of December 2002, this was the rate on 30-year Treasury bonds.

TBILL (Interest Rate on Three-Month Treasury Bills)
- Percentage points. Secondary market. Discount basis.
- Included since June 1992.
- Forecasts are for the last day of the month or year, not averages over the period.

SPIF (S&P 500 Stock Price Index)
- Index level.
- Included since December 1990.
- Forecasts are for the last day of the month or year, not averages over the period.