



# SURVEY OF PROFESSIONAL FORECASTERS

## **Introducing: An Industry Classification for the Survey of Professional Forecasters**

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In May 2008, the Federal Reserve Bank of Philadelphia released information about the industry affiliation of its panelists in the Survey of Professional Forecasters. The new information associates each panelist with one of two broad industries: financial service provider and nonfinancial service provider. Such information, as we explain below, can be useful to researchers in understanding the incentives forecasters face when they generate their projections. This note describes our motivation for adding the new information, the methodology we used to assemble the data, and our definitions of the industries. We also provide an initial look at how the forecasters' projections can differ depending on the industry in which they are employed.

### **Background and Motivation**

The Philadelphia Fed's quarterly Survey of Professional Forecasters has always kept the identities of survey participants anonymous. We do not release the names of the forecasters with their projections. However, the Bank's web page for the survey provides the individual projections of our panelists and a confidential identification number that allows researchers to track a particular panelist's forecasts over time. Indeed, the survey's data set is widely studied by economic researchers who use it to test their theories.<sup>2</sup>

One conventional theory says that forecast errors—the difference between a historical value and the corresponding forecast—should be unbiased. Another argues that it should not be possible to use any publicly available data on the economy to improve the accuracy of a forecast. The validity of these theories, however, relies on some strong assumptions about the goals and objectives of the forecaster, as well as the constraints he faces. Generally speaking, the assumptions imply that a forecaster's primary objective is to produce the most accurate forecast he can.

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<sup>1</sup> The authors thank Tom Stark for his assistance on this project.

<sup>2</sup> A bibliography of academic studies using the data from the Survey of Professional Forecasters is available on the Philadelphia Fed's web page at: <http://www.philadelphiafed.org/econ/spf/bibliography.cfm>.

Another, more recent view is that considerations beyond accuracy can influence a forecaster's behavior. Lamont (2002) studies the role of reputational effects on accuracy, while Laster, Bennett, and Geoum (1999) examine the role of publicity. Theories—both conventional and new—about the properties of forecasts can be tested on a data set, such as the one from the Survey of Professional Forecasters, that includes some information about the forecasters generating the projections. This is where our work on industry classification enters.

Two related factors motivate our interest in industry classification. First, the alternative theories mentioned above and additional ones discussed in Stark (1997) suggest that a forecaster's industry affiliation could be important in understanding his projections. Second, we have received many requests over the years from academic researchers for specific information about the forecasters on our panel. These researchers, no doubt, are interested in testing some of the theories discussed above. The anonymity of the survey limits just how much information we can provide. However, a two-sector classification is broad enough to not threaten the anonymity of our panelists.

## Methodology

The Survey of Professional Forecasters began in the fourth quarter of 1968. For the first 23 years, the survey was conducted by the American Statistical Association and the National Bureau of Economic Research. The Philadelphia Fed assumed responsibility for the survey in June 1990 and conducted its first survey for the second quarter of 1990.<sup>3</sup> The second quarter of 1990 is the first period for which we can determine an industry classification for the panelists. We cannot provide the classifications for earlier periods because we do not have enough hard-copy historical records listing the industry affiliations of our panelists.

Many of the survey's panelists change their professional affiliations over time. Over the period since the second quarter of 1990, the Philadelphia Fed has maintained records of our panelists, including their professional affiliations. Indeed, an important part of our procedures for conducting a survey is to update our records with any new information we receive from the panelists when they submit their forecasts for each survey. Using these records, we constructed a variable called *industry*. The variable, now included in the survey's data set of individual responses and available on our web page, takes one of three values, depending on the forecaster's place of employment. We assign a value of one to the variable when the forecaster's employer is a financial service provider, two when the employer is not a financial service provider, and three when we are not sure. In some cases, our decisions were quite easy because the forecaster was employed in a firm, such as a large bank, insurance company, or manufacturing company, whose main line of business is well known. In other cases, the name of the firm was less familiar, but with a little research, we were able to learn enough about the nature of the firm's business to assign a value of one or two. However, we adopted a very conservative approach in assigning values. If we were the least bit uncertain about the nature of the business of a forecaster's firm, we assigned a value of three.

We now discuss our definitions of the industries. According to our classification, a financial service provider is a firm that provides its customers with some form of financial services. Such services could include financial asset management or payment services. Examples of such firms in the survey include insurance companies, banks, and companies that manage financial assets. In contrast, nonfinancial service providers include manufacturers, universities, and pure research and consulting firms. In the documentation available for the survey on our web page, we provide additional technical discussion of our methods.

As we mentioned above, our survey participants sometimes change their affiliations over time. In some cases, when a forecaster changes his affiliation, we had to change his value of the *industry* variable. For example, if a forecaster used to work for a pure research firm but changed his job to a commercial bank, the value of his *industry* variable would change from two to one. Sometimes, we had to change a forecaster's value for the

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<sup>3</sup> See Dean Croushore's *Business Review* article for additional information on the history of the Survey of Professional Forecasters.

industry variable from one or two, to three. This would happen if the forecaster changed jobs, and we were unable to determine the new employer's line of business. Thus, in constructing this variable, we examined our historical records for each forecaster in every survey since the second quarter of 1990, when the Federal Reserve Bank of Philadelphia conducted its first survey.

The number of participants falling into one of the three industry categories can change over time. This happens because the panelists' affiliations change or because the composition of the panel changes from survey to survey. In addition, large one-time changes can occur when we expand the panel, as we did prior to the surveys of the third and fourth quarters of 1990, and before the surveys of the second quarter of 1995 and the second quarter of 2005. **Figure 1** tracks the number of participants in each group over time. For each survey date on the horizontal axis, we plot the number of forecasters associated with financial service providers, nonfinancial service providers, and those whose industry we were not able to determine. In addition, we also plot the total number of participants. Prior to the survey of 1995 Q2, the number of forecasters we were unable to classify was never greater than two. The number rose to seven when new panelists were added for the survey of 1995 Q2. Most recently, the number stands at two. The number of financial service providers peaked at 27 in 1995 Q2 and currently stands at 21. Since 1997, nonfinancial service providers represent the largest industry sector on the survey's panel, though the gap between this sector and the financial service provider sector has narrowed considerably in recent years.

## A First Look at the Data

In this section, we look at the consensus forecasts of those employed in the financial service-providing and nonfinancial service-providing industries from the second quarter of 1990 to the first quarter of 2008. The Survey of Professional Forecasters includes over 18 different macroeconomic variables at quarterly and annual horizons. We focus our attention on three variables of key macroeconomic importance: CPI inflation, unemployment, and the rate of growth in real GDP. These variables provide a broad outlook on the most important facets of the U.S. economy: prices, the labor market, and aggregate economic activity. Using the data of individual forecasts available on our web page and our new *industry* variable, we construct two data sets. One includes only the forecasts of those whom we classify as financial service providers; the other includes the forecasts of the nonfinancial service providers. Comparisons between the two industries are shown in Figures 2 to 5.

**Figure 2** shows the median CPI inflation forecasts for the financial service providers and the nonfinancial service providers at the survey date shown on the horizontal axis.<sup>4</sup> We see that differences between the industries are rarely more than 0.5 percentage point. Since 2001, panelists from the nonfinancial service industry have tended to forecast somewhat higher inflation.

We follow a similar methodology for unemployment and real GDP. **Figure 3** shows the analysis for the median forecast for the unemployment rate.<sup>5</sup> Here we see small, but persistent differences between the two industries. Over the period since 2003, the forecasts of the two industries have been particularly close.

Turning to growth in real GDP, we show in **Figures 4 and 5** two ways of comparing the forecasts for the two industries. **Figure 4** plots the consensus projection for one-year-ahead, four-quarter-average growth. The figure shows a number of periods in which the projections differ as much as 0.5 percentage point, particularly in the late 1990s and early 2000s, when panelists in the financial service sector were more optimistic than those in the nonfinancial service sector.<sup>6</sup> There are, however, little differences in the period since 2004.

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<sup>4</sup> The data plotted are the forecasted one-year-ahead, four-quarter geometric average CPI inflation. Please see the technical appendix for more details on this variable and the others discussed below.

<sup>5</sup> The data plotted are the forecasted one-year-ahead, four-quarter-average unemployment rate.

<sup>6</sup> The figure also shows that in the surveys of 1990 Q2 and 1990 Q3, the forecast discrepancies between the two groups were about 1.0 percentage point. However, there were only nine forecasters in 1990 Q2 and 13 forecasters in 1990 Q3.

Forecast horizons as long as four quarters, such as those examined above, could mask important differences between the projections at shorter horizons. For example, Figure 4 shows that the median projection for four-quarter-average growth never calls for a contraction in real GDP, even though the period since the second quarter of 1990 covers two recessions.

**Figure 5** examines projections for two-quarter-average growth. Notice that this variable differs in two ways from the previous ones. First, the forecast horizon is shorter: two quarters instead of four quarters. This should lead to consensus forecasts showing more variability, particularly around periods of contraction. Second, the first quarter included in the two-quarter forecast is the “current quarter” (defined as the quarter in which the survey was conducted), rather than the quarter after the survey was conducted. This distinction is important because current-quarter forecasts for quarterly variables, like real GDP, can be influenced heavily by within-quarter information on monthly variables, such as the unemployment rate and nonfarm payroll employment, as reviewed by Stark (2000). Could the forecasters in each industry differ in the extent to which they condition their projections on this information?

Over the period that the Philadelphia Fed has conducted the survey, the deadline for returning our questionnaires has followed the date on which the Bureau of Labor Statistics releases its employment report containing information on the state of the labor market in the first month of the quarter. Thus, our panelists could condition their projections on new information about the labor market. If the forecasters in each industry differ in the extent to which they use the new information to form their projections for real GDP, we would expect to see some inter-industry divergence in the consensus forecasts for growth.

**Figure 5** shows that the consensus forecasts of both industries called for a contraction around the recessions of 1990–1991 and 2001. However, there is little inter-industry difference between the forecasts. Outside periods of recession, we see some differences in the forecasts, but they seem minor. In the most recent survey of the first quarter of 2008, economists employed in the financial service industry projected two-quarter-average growth of just less than 1 percent (annual rate), while their nonfinancial service counterparts projected growth of just less than 1.5 percent.

Tables 1 and 2 provide some descriptive statistics on the forecasts from the two industries. **Table 1** reports the correlations between the forecasts generated by the financial service providers and nonfinancial service providers.<sup>7</sup> The forecasts for all variables show a high degree of correlation. For example, the correlation is almost unity for the unemployment rate forecasts. The variable with the lowest correlation is four-quarter-average real GDP growth, which had a correlation of 0.93.

**Table 2** compares the root-mean-squared forecast errors (RMSFE) across the industries in two ways. The two columns under the label “History: Initial Release” show the RMSFE for the forecasts made each quarter using each variable’s initial release as the historical data.<sup>8</sup> The results indicate that for the one-year-ahead CPI inflation (INF4), the RMSFE for financial service providers is higher than the RMSFE for nonfinancial service providers. The reverse is true for the four-quarter-average unemployment rate (U4) and two-quarter-average real GDP growth (G2). The table also shows that RMSFE for four-quarter-average real GDP growth (G4) is the same for the two groups. Thus, neither type of forecaster was consistently better or worse than the other in regard to accuracy. Analogous results are shown in the two columns under the label “History: Latest Vintage,” where the RMSFE is computed using the latest vintage (2008 Q1) as the historical data. The RMSFEs using the latest vintage are in general larger than those using the initial releases. This suggests that both types of forecasters make more accurate forecasts for the initial releases of data and are less accurate in forecasting

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<sup>7</sup> We excluded the surveys from 1990 Q2 and 1990 Q3 from Table 1 and Table 2 because of small sample size in the two surveys.

<sup>8</sup> The historical data are taken from the real-time data set that is available to the public on the Federal Reserve Bank of Philadelphia’s website.

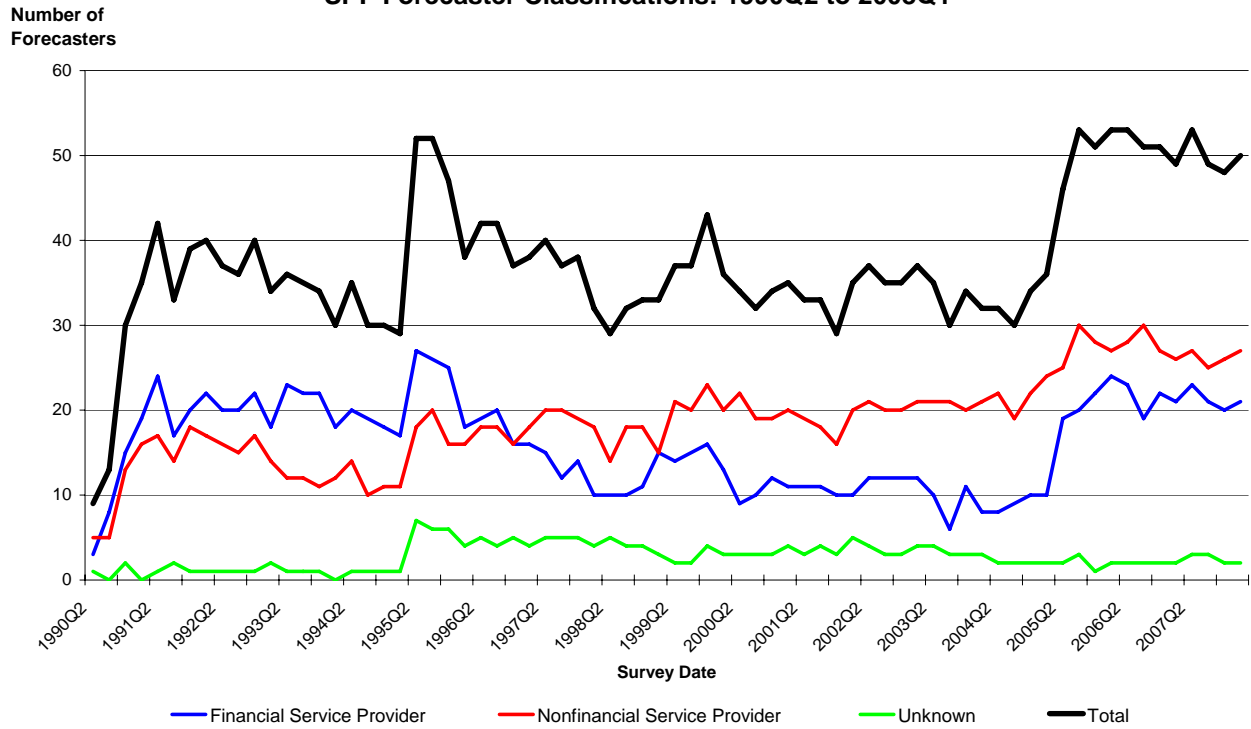
revised data.

## **Summary and Conclusions**

The Philadelphia Fed's Survey of Professional Forecasters has always kept the identities of survey participants anonymous. We do not publish the names of our forecasters with their projections. However, in recent years, we have received some requests from academic researchers for information about our panelists. Such information could prove useful in understanding the goals, objectives, and constraints faced by professional forecasters when they generate their projections. In response, in May 2008, the Philadelphia Fed constructed a new *industry* variable. The variable, available on our web page in our data set of individual responses, allows analysts to classify our panelists into two broad industry categories: financial service providers and nonfinancial service providers.

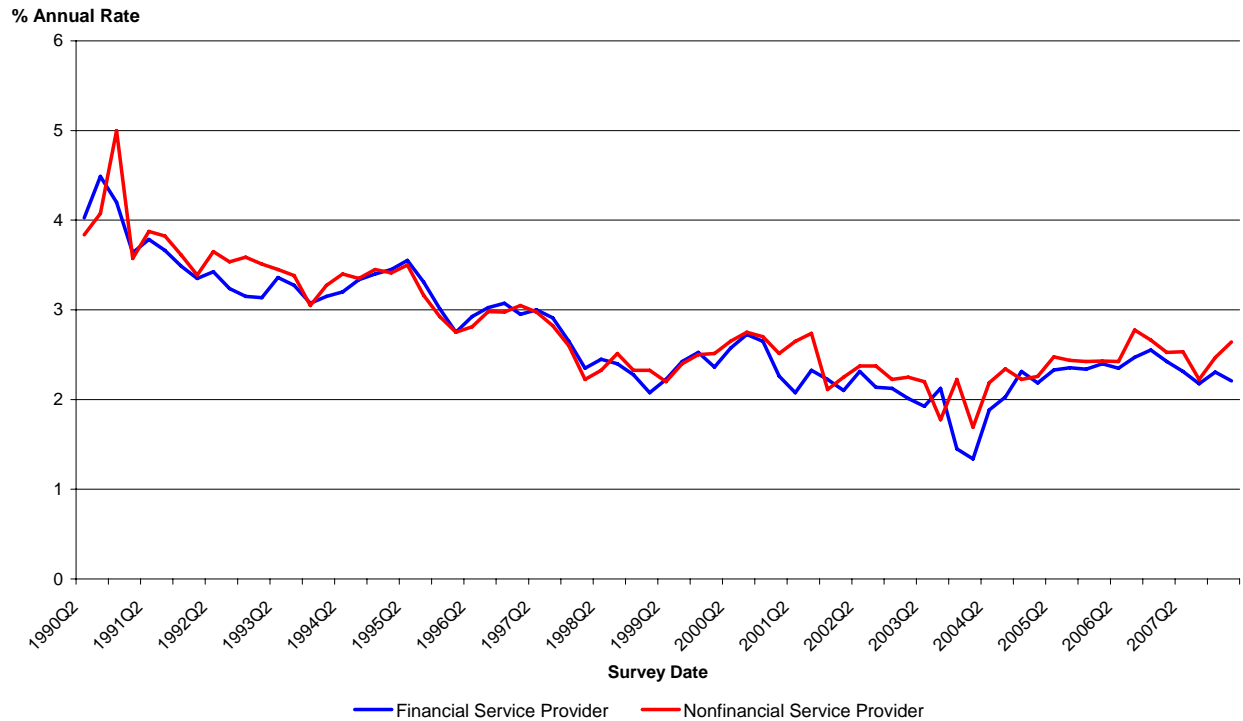
This note describes the methodology that we used to construct the new variable and provides an early look at the new data. Using the data set of individual observations that is available on our web page, we created a data set for each industry. We examined the resulting consensus forecasts of each industry for CPI inflation, unemployment, and real GDP. In some cases, we observed that the consensus forecasts of financial service providers can differ from those of nonfinancial service providers over a number of periods. We hope our new *industry* variable will encourage additional research in this area.

**Figure 1**  
**SPF Forecaster Classifications: 1990Q2 to 2008Q1**



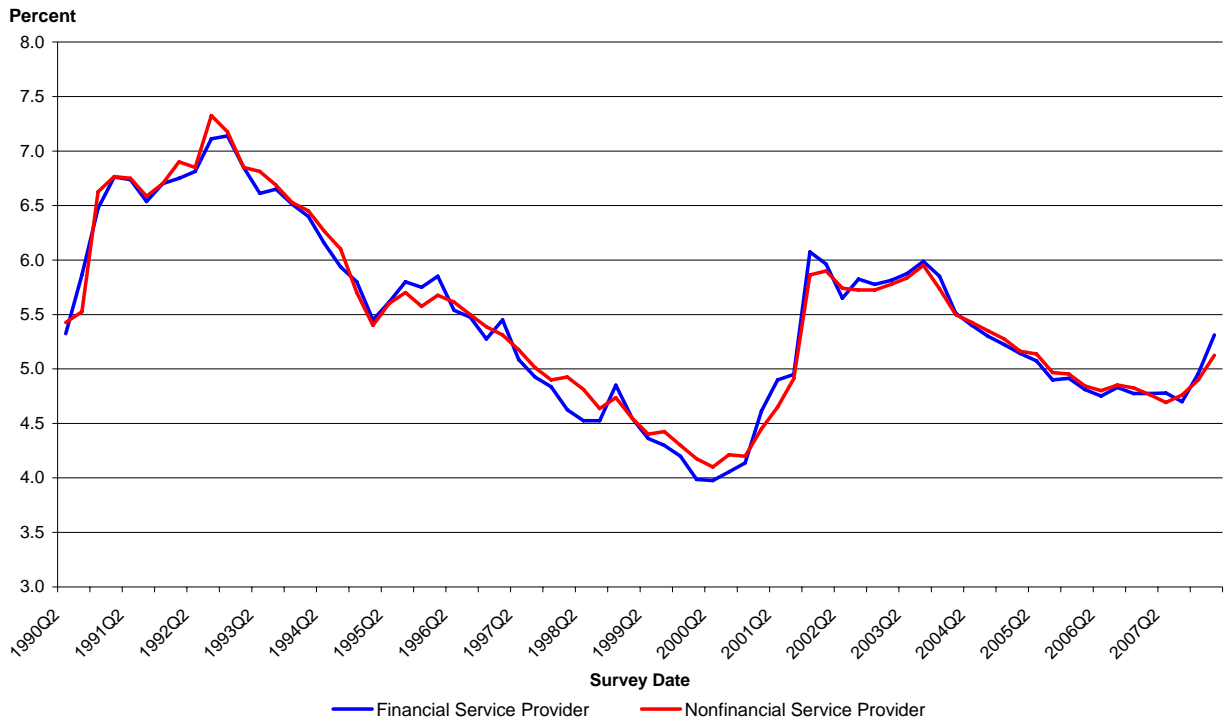
Source: Survey of Professional Forecasters, Research Department, Federal Reserve Bank of Philadelphia

**Figure 2**  
**Median Forecast for One-Year-Ahead Four-Quarter Average CPI Inflation**



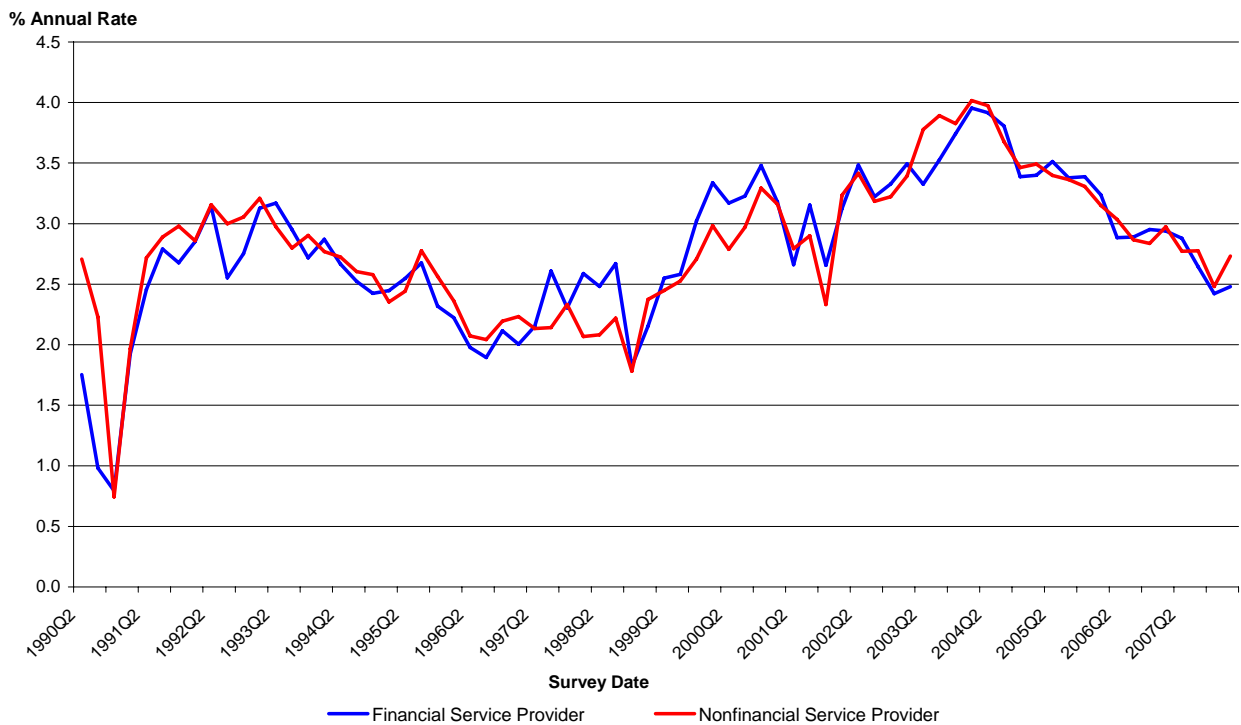
Source: Survey of Professional Forecasters, Research Department, Federal Reserve Bank of Philadelphia

**Figure 3**  
**Median Forecast for One-Year-Ahead Four-Quarter-Average Unemployment**



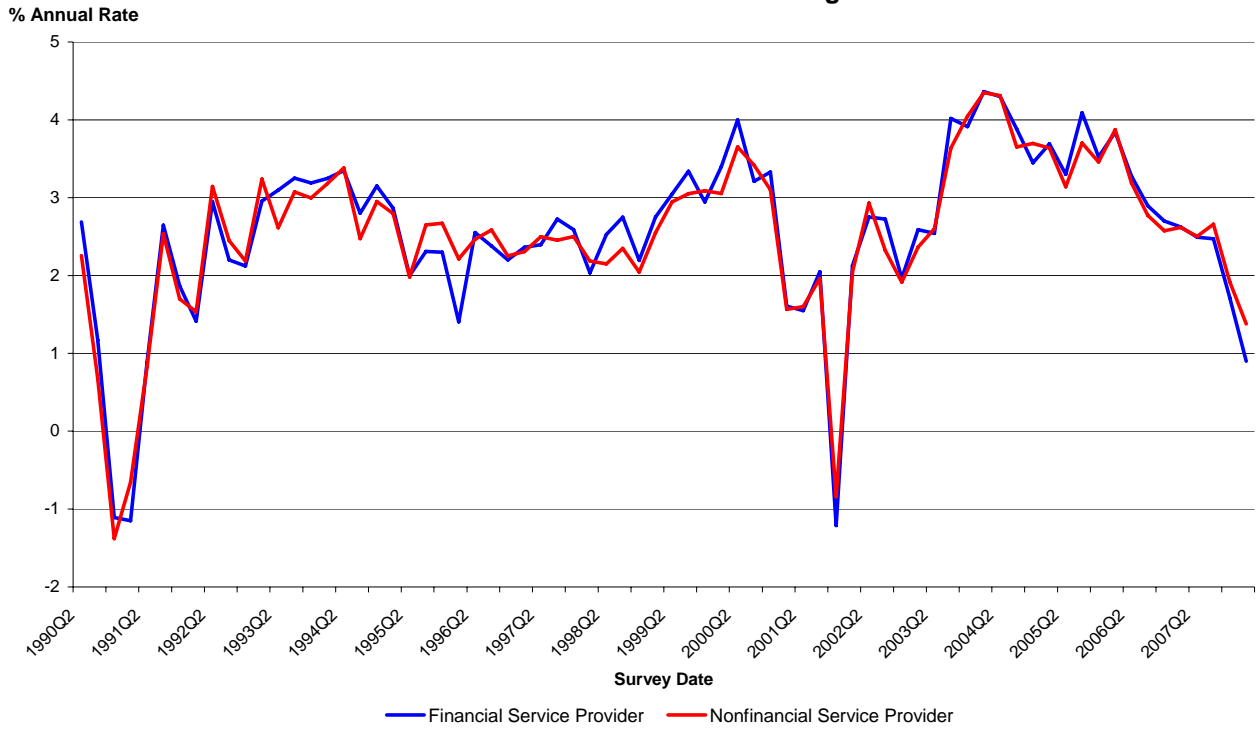
Source: Survey of Professional Forecasters, Research Department, Federal Reserve Bank of Philadelphia

**Figure 4**  
**Median Forecast for One-Year-Ahead Four-Quarter-Average Real GDP Growth**



Source: Survey of Professional Forecasters, Research Department, Federal Reserve Bank of Philadelphia

**Figure 5**  
**Median Forecast for Annualized Two-Quarter-Average Real GDP Growth**



Source: Survey of Professional Forecasters, Research Department, Federal Reserve Bank of Philadelphia



**Table 1**  
**Correlations Between Financial Industry Forecasts  
and Nonfinancial Industry Forecasts**

Variable	Correlation
U4	0.99
INF4	0.94
G4	0.93
G2	0.98

Note: This table reports the correlations between the forecasts generated by the financial service providers and nonfinancial service providers for the following variables: U4 is the median forecast for one-year-ahead four-quarter-average unemployment; INF4 is the median forecast for one-year-ahead four-quarter geometric average CPI inflation; G4 is the median forecast for one-year-ahead four-quarter-average real GDP growth; G2 is the median forecast for annualized two-quarter-average real GDP growth.

**Table 2**  
**Root-Mean-Squared Forecast Error (RMSFE)**

Variable	<u>History: Initial Release</u>		<u>History: Latest Vintage</u>	
	Financial	Nonfinancial	Financial	Nonfinancial
U4	0.36	0.38	0.37	0.39
INF4	0.87	0.85	0.88	0.88
G4	1.29	1.29	1.45	1.43
G2	1.40	1.41	1.57	1.54

Note: This table compares the root-mean-squared forecast errors (RMSFE) across the variables in two ways. The two columns under “History: Initial Release” show the RMSFE for forecasts from financial service providers and nonfinancial service providers, using the initial releases as the historical data. The two columns under “History: Latest Vintage” show the RMSFE for forecasts using the 2008 Q1 release as the historical data. The variable U4 is the median forecast for one-year-ahead four-quarter-average unemployment; INF4 is the median forecast for one-year-ahead four-quarter geometric average CPI inflation; G4 is the median forecast for one-year-ahead four-quarter-average real GDP growth; G2 is the median forecast for annualized two-quarter-average real GDP growth.

## Technical Appendix

This appendix provides the formulas that we used to generate our results. All computations begin by separating the individual responses for each survey according to the industry classification variable.

### Figure 2

For each industry, we compute the median forecast for quarter-over-quarter CPI inflation. This was done for each of the quarters forecast in the survey. Using these medians, we then compute the four-quarter geometric average inflation forecast. The four-quarter horizon encompasses the four quarters beginning with the first quarter after the survey date. If we define period  $t$  as the quarter of a survey, and  $\pi_{t+\tau|t}^j$  as the median forecast for quarter-over-quarter CPI inflation for period  $t + \tau$  made by the panelists in industry  $j$ , in percentage points, where  $j$  is one for financial service providers and two for nonfinancial service providers, our one-year-ahead four-quarter-average inflation forecast associated with the panelists of industry  $j$  is given by

$$\pi 4_{t+4|t}^j = 100 \left\{ \left[ \left( 1 + \frac{\pi_{t+1|t}^j}{100} \right) \left( 1 + \frac{\pi_{t+2|t}^j}{100} \right) \left( 1 + \frac{\pi_{t+3|t}^j}{100} \right) \left( 1 + \frac{\pi_{t+4|t}^j}{100} \right) \right]^{0.25} - 1 \right\}$$

### Figure 3

For this variable, we construct for each industry ( $j$ ), the median four-quarter-average forecast defined by

$$U 4_{t+4|t}^j = \frac{U_{t+1|t}^j + U_{t+2|t}^j + U_{t+3|t}^j + U_{t+4|t}^j}{4},$$

where  $U_{t+\tau|t}^j$  is the median forecast made in period  $t$  for the quarterly average of the unemployment rate for period  $t + \tau$ . The superscript  $j$  denotes forecasts made by the panelists in industry  $j$ , where  $j$  is one for financial service providers and two for nonfinancial service providers.

### Figure 4

Our survey data for the individual projections include the panelists' forecasts for the level of real GDP. We compute the implied median projection for four-quarter growth from the median projections for the level, using the formula given by

$$G 4_{t+4|t}^j = 100 \left[ \frac{Y_{t+4|t}^j}{Y_{t|t}^j} - 1 \right],$$

where  $Y_{t+4|t}^j$  is the median forecast made in period  $t$  for the four-quarter-ahead level of real GDP. The superscript  $j$  denotes forecasts made by the panelists in industry  $j$ , where  $j$  is one for financial service providers and two for nonfinancial service providers. The variable  $Y_{t|t}^j$  is the median forecast for the current quarter's (the

quarter in which the survey was conducted) level of real GDP made by the panelists of industry j.

### Figure 5

We define this variable using the medians of the forecasters' projections for the level of real GDP. As shown in the calculation below, we compute the rate of growth from the quarter before the survey quarter to the quarter after the survey quarter:

$$G2_{t+1|t}^j = 100 \left[ \left( \frac{Y_{t+1|t}^j}{Y_{t-1|t}^j} \right)^2 - 1 \right].$$

The variable  $Y_{t+1|t}^j$  is the median forecast made at time t for the level of real GDP at t+1. The superscript j denotes forecasts made by the panelists in industry j, where j is one for financial service providers and two for nonfinancial service providers. The variable  $Y_{t-1|t}^j$  is the median forecast at time t for the previous quarter's level of real GDP made by the panelists in industry j. Note that  $Y_{t-1|t}^j$  is usually the historical value provided in the survey's questionnaire; however, we allow the forecasters to base their projections on a forecast for a revision to this historical value.

## References

Croushore, Dean. "Introducing: The Survey of Professional Forecasters," Federal Reserve Bank of Philadelphia *Business Review* (November/December 1993), pp. 3-13.

Lamont, Owen. "Macroeconomic Forecasts and Microeconomic Forecasters," *Journal of Economic Behavior and Organization*, 48:3 (July 2002), pp. 265-80.

Laster, David, Paul Bennett, and In Sun Geoum. "Rational Bias in Macroeconomic Forecasts," *Quarterly Journal of Economics*, 114:1 (February 1999), pp. 293-318.

Stark, Tom. "Does Current-Quarter Information Improve Quarterly Forecasts for the U.S. Economy?" Federal Reserve Bank of Philadelphia Working Paper 00-2 (January 2000).

Stark, Tom. "Macroeconomic Forecasts and Microeconomic Forecasters in the Survey of Professional Forecasters," Federal Reserve Bank of Philadelphia Working Paper 97-10 (August 1997).