Philadelphia Fed Forecasting Surveys: Their Value for Research*

BY DEAN CROUSHORE

T he Federal Reserve Bank of Philadelphia has conducted both the Survey of Professional Forecasters and the Livingston Survey for 20 years. Both surveys of private-sector forecasters provide researchers, central bankers, news media, and the public with detailed forecasts of major macroeconomic variables. The surveys have proved helpful for people who are planning for the future, and they have also provided useful input into the decisions of policymakers at the Federal Reserve and elsewhere. In this article, Dean Croushore provides an overview of the surveys and discusses the ways in which researchers have used the surveys.

The Federal Reserve Bank of Philadelphia has conducted both the Survey of Professional Forecasters and the Livingston Survey for 20 years. Both surveys of private-sector forecasters provide researchers, central bankers, news media, and the public with detailed forecasts of major macroeconomic variables. The surveys have been made available to the public at no charge, reflecting the public education mission of the Federal Reserve. The surveys have proved helpful for people who are planning for the future. They have also provided useful input into the decisions of policymakers at the Federal Reserve and elsewhere. This article will provide an overview of the surveys and discuss the ways in which researchers have used the surveys.

The Livingston Survey is the older of the two Philadelphia Fed surveys. It started when Joseph Livingston, a Philadelphia newspaper reporter, wanted to get a sense of what forecasters thought would happen to the economy in the next year, and so he began sending a survey to prominent economists around the country.[1] He continued to publish his survey every six months, gathering and reporting on the forecasts and tracking their evolution over time. His survey, which was the only collection of private-sector forecasts of macroeconomic variables in the country at the time, gained a national following. Economic researchers began using the survey extensively in the early 1970s to test theories about people's expectations. By 1978, Livingston was having trouble keeping up with all of the requests for the data and turned the data over to the Philadelphia Fed's Research Department, which organized the data in a computer database and made them available to researchers on request. Livingston still ran the survey, but the Philadelphia Fed compiled the results and maintained the database. Livingston provided the first report of the survey's results in his column in the *Philadelphia Inquirer.* When Livingston died in 1989, the Fed took over the administration of the survey and carried on Livingston's legacy. Since the advent of the Internet, the Fed has made all of the historical Livingston data available on its website.[2]

Dean Croushore is a professor of economics at the University of Richmond and a visiting scholar in the Research Department of the Philadelphia Fed. This article is available free of charge at www. philadelphiafed.org/research-and-data/ publications/.

*The views expressed here are those of the author and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

[1] Herb Taylor's 1992 article describes the survey and Livingston's newspaper columns reporting on the survey. For an in-depth discussion of the setup of the survey and a description of early research using it, see my 1997 article.

[2] The Philadelphia Fed's website (at: www. philadelphiafed.org/research-and-data/real-time-center/livingston-survey/) contains background material about the Livingston Survey, news releases from the survey going back to 1991, data files containing both forecasts of individuals and means or medians across the forecasters for each variable in each survey, and an academic bibliography listing research papers that have used the survey.

The Survey of Professional Forecasters began as the idea of Victor Zarnowitz and others at the American Statistical Association and the National Bureau of Economic Research. They began the ASA/NBER Economic Outlook Survey in 1968 and successfully carried it out for 22 years. The survey was similar to the Livingston Survey in that it asked private-sector forecasters for their projections for the next year for major macroeconomic variables. But the ASA/NBER survey was conducted more frequently than the Livingston Survey (quarterly instead of semi-annually), asked for quarterly forecasts (instead of Livingston's half-year forecasts), and included some unique questions about the probabilities of different outcomes, instead of asking just for the point forecasts (that is, the most likely outcome) reported by the Livingston Survey. In 1990, the ASA/NBER turned the survey over to the Philadelphia Fed, which rechristened it the Survey of Professional Forecasters (SPF).[3]

Why do people need forecasts? When planning their personal budgets, people need to know what the forecast for inflation is; when planning production, firms need to forecast demand for their products; when buying and selling financial assets, investors need to forecast both inflation and future interest rates;

and when setting policy, government analysts need to know how the economy is likely to fare in the future. Forecasting surveys can help all of these groups figure out the most likely outcomes for the variables that most concern them.

The Philadelphia Fed's surveys are not the only surveys of forecasters. A well-known U.S. survey is the Blue Chip Economic Indicators, which

a European version of the Survey of Professional Forecasters in 1999 after consulting with the Philadelphia Fed on its methods.

The table on page 3 lists the major macroeconomic variables covered by the surveys, for which the respondents provide short-term forecasts (for the next one to two years). In addition to those variables, the surveys ask for long-term forecasts — the SPF asks

was started by Robert Eggert in 1976. The Blue Chip concept was to publish forecasts monthly (compared with the quarterly SPF and the semi-annual Livingston Survey) and to publish the names of each forecaster along with his or her forecast (forecasters for both the SPF and the Livingston were anonymous). In addition, the National Association for Business Economics (NABE) has produced a quarterly survey of forecasters since the early 1960s, and the *Wall Street Journal* also conducts a similar survey that is reported in great detail on its website. Direct measurement of consumers' inflation expectations is gathered by the monthly Reuters/University of Michigan survey of consumers, which asks a random sample of consumers for their forecasts of inflation. For other countries there have been a number of surveys, most notably *Consensus Forecasts,* which gathers detailed forecasts for all major developed countries in the world and less detailed forecasts for numerous other countries. Also, the European Central Bank started

about forecasts for inflation in both the CPI and PCE price index for the next five years and the next 10 years, while the Livingston Survey asks about real GDP growth and CPI inflation for the next 10 years. In addition, in every survey, the SPF asks about the probability of a decline in real GDP in each of the next five quarters and about the probability that real GDP, the inflation rate in the GDP price index, the CPI excluding food and energy, and the personal consumption expenditures (PCE) price index excluding food and energy will fall into certain ranges. The latter questions are designed to get an idea of the degree of uncertainty that forecasters attach to their forecasts. Each survey also asks special questions from time to time on a variety of topics of current interest.

Both the SPF and the Livingston Survey provide anonymity for the forecasters. The survey news release lists the names of the forecasters, but a reader cannot tell which forecaster provided which forecast. The benefit of anonymity is that the forecasters

[3] For more on the setup of the Survey of Professional Forecasters and its origins, see my 1993 article. The Philadelphia Fed's website (at www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/) contains background material about the survey, news releases from the survey going back to 1990, data files containing both forecasts of individuals and means or medians across the forecasters for each variable in each survey, an academic bibliography listing research papers that have used the survey, and forecast error statistics that present data on the accuracy of the survey forecasts.

Variables Included in the Surveys

Both Surveys	
nominal gross domestic product (GDP)	real (inflation-adjusted) GDP
unemployment rate	inflation (consumer price index, CPI)
industrial production	corporate profits after tax
business fixed investment	housing starts
interest rate on three-month Treasury bills	interest rate on 10-year Treasury notes
Livingston Survey	
producer price index	S&P 500 stock prices
average weekly earnings	prime interest rate
retail trade sales	auto sales
Survey of Professional Forecasters	
interest rate on AAA bonds	payroll employment
GDP price index	consumer price index excluding food and energy prices
personal consumption expenditures price index	personal consumption expenditures price index excluding food and energy prices
consumption	residential fixed investment
federal government spending	state and local government spending
net exports	changes in private inventories

may be more likely to reveal their true forecasts if they know that their name will not be associated with a particular forecast. If they think that their forecast is very different from that of other forecasters, they would have no incentive to hide it. However, if they were providing their forecasts in a nonanonymous survey (such as the *Wall Street Journal* or the Blue Chip survey), they might prefer to shade their forecasts closer to the consensus, out of fear that they will be seen as being out of the mainstream. Other forecasters might be looking for attention and might intentionally make their forecasts stand out from the crowd. The anonymity of the SPF and Livingston avoids these problems.[4]

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[4] In his study, Owen Lamont looked at a nonanonymous survey, finding that forecasters tended to distort their forecasts to manipulate their reputations, while Tom Stark's study found no such evidence for the SPF, which is anonymous.

The timing of the SPF and Livingston surveys differs, in part because the SPF is conducted four times each year, while the Livingston survey is conducted just twice a year. More important, since the SPF focuses on the national income accounts, the survey forms are sent to participants immediately following the initial release of the GDP data for the preceding quarter, which occurs in late January, April, July, and October each year. The forecasters are given about 10 days to

respond to the survey questions, and they then e-mail their responses to the Philadelphia Fed before the middle of the following month (when key data on consumer prices are released). The Livingston Survey's timing is based on the release of the consumer price index data in May and November, with the forecasts due before the next month's release of the consumer price index.

EVALUATING THE SURVEY FORECASTS

Given the uses to which people, firms, and policymakers put the surveys, it is important that the forecasts be accurate. Of course, no forecast is going to be on the mark all the time. Economists have tested the surveys extensively. Simple tests examine the forecast errors over time to see if they are zero, on average, which would be the hallmark of an unbiased forecast. Another test is how precise the forecast is, that is, how large the average error is. More sophisticated tests look at the correlation between forecast errors and information available to forecasters when they made their forecasts; if such a correlation exists, the forecasters in the survey are not using that information efficiently.

A visual inspection of the data sometimes suffices to see whether a particular forecast has forecast errors that are zero, on average. Figure 1 shows a scatter plot in which the value of the inflation rate (based on the GDP deflator over a one-year period) is plotted on the vertical axis and the forecasts from the Livingston Survey for that year are plotted on the horizontal axis. The 45-degree line in the figure helps you gauge the accuracy of the forecasts because if the forecasts were perfect, every point in the diagram would be on that line. The fact that most of the points in the graph are close to the 45-degree

line suggests that the forecasts are fairly accurate. Formal statistical tests confirm that the mean forecast error in this series is not statistically significantly different from zero.[5] Despite the unbiasedness of the survey forecasts over the entire period from the early 1970s to the mid-2000s, there are numerous periods in which the survey forecasts appear to have performed poorly. Figure 2 shows the actual values of inflation (measured using the GDP price index) over a one-year period compared with the SPF forecasts for the corresponding period.

The SPF forecasts for inflation were clearly far from the mark in the early and late 1970s, with very large forecast errors. Perhaps these forecast errors were understandable, given the unprecedented increase in the growth of the money supply that occurred during that decade, which caught forecasters by surprise. In the early 1980s, the forecasts were wrong in the opposite direction, as inflation fell much more than the forecasters thought it would. Similarly, in most of the 1990s, the forecasters made a string of forecast errors, with inflation continually coming in lower than the forecasters had projected. In that period, productivity growth surged, and it took some time before the forecasters realized that the economy was not overheating, but rather that potential output was increasing more rapidly than before, so inflation would not be rising significantly.[6] Thus, the forecasters clearly go through periods in which they make persistent forecast errors.

In addition to periods in which the forecasters make persistent forecast

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[5] See my 2010 paper.

[6] These concepts are explored in more detail in my 2010 paper.

errors, the forecasters in the surveys may be inefficient in their use of other information. Economists test this idea by examining the relationship between the survey's forecast errors and data that were known when the forecasters made their forecasts. For example, Laurence Ball and I found that output forecast errors were associated with changes in the real (inflation-adjusted) federal funds rate (the interest rate on short-term loans between banks, which is the Federal Reserve's main policy instrument), which means that the forecasters did not accurately modify their forecasts in response to a change in monetary policy. This can be seen in Figure 3, which plots the output forecast error from the SPF (the actual rate of output growth minus the forecasted rate of output growth) against the lagged change in the real federal funds rate. The negative relationship between these two variables implies that the output forecasts from the SPF are not efficient with respect to changes in monetary policy.
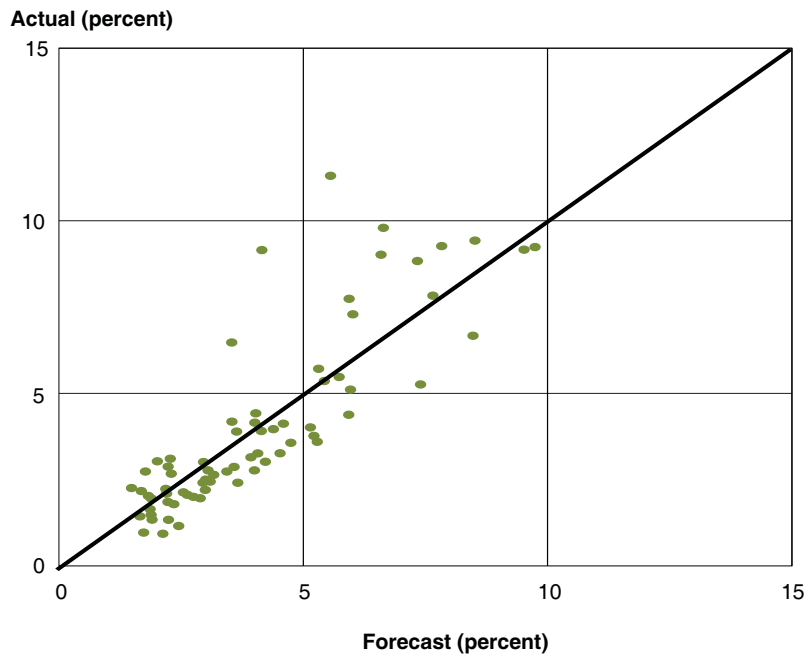
A little-explored aspect of the SPF is the probability distribution forecasts it provides. Each forecaster is asked to list the probability that real GDP growth and inflation in the GDP price index will fall into certain ranges. In the most recent surveys, the forecasters are asked to state the probability that real GDP growth in the next year will be 6 percent or more, 5.0 to 5.9 percent, 4.0 to 4.9 percent, 3.0 to 3.9 percent, 2.0 to 2.9 percent, 1.0 to 1.9 percent, 0.0 to 0.9 percent, -1.0 to -0.1 percent, -2.0 to -1.1 percent, and -2.0 percent or less. The same question is also asked for real GDP growth in the following year. For the percent change in the GDP price index, the ranges are two percentage points higher, so the top range is 8 percent or more, and so on.

FIGURE 1

Forecasts Versus Actuals: Livingston Survey

Actual (percent)

Forecast (percent)

FIGURE 2

Median Inflation Forecast from SPF

Percent

Actual

Forecast
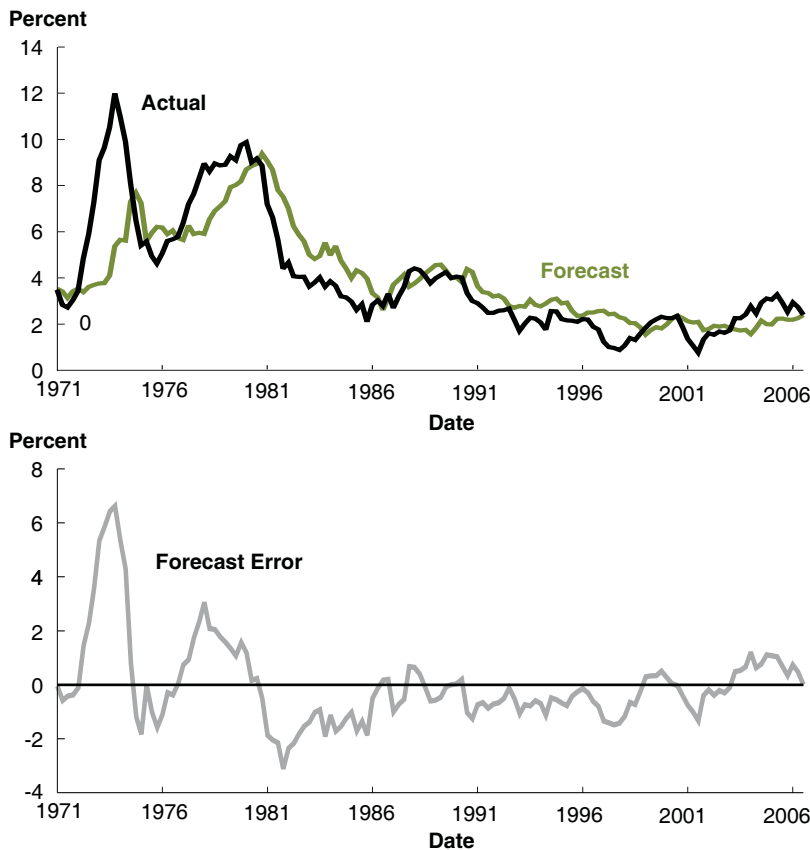
Date

Percent

Forecast Error

Date

Frank Diebold, Anthony Tay, and Kenneth Wallis analyzed these probability distribution forecasts from the SPF using new methods. Their goal was to test the accuracy of the distribution forecasts, and for the most part, they found that the forecasts were reasonably accurate. However, the forecasts failed to pass some tests: (1) they placed too large a probability on a large decline in inflation; and (2) they made persistent inflation forecast errors, though the forecasters eventually adapted and the errors disappeared. They also found that when inflation was low, uncertainty about inflation was also low.

Overall, recent research on the accuracy of the SPF and Livingston forecasts has found that they are reasonable, even if there are a few areas in which they are imperfect. However, as the literature using the surveys for research evolved over time, the accuracy of the forecasts was often called into question.

USING THE SURVEYS TO ANSWER RESEARCH QUESTIONS

We now turn to a discussion about the areas of research in which researchers have used the SPF and Livingston Survey. These include investigating whether people have rational expectations, studying how people form their expectations, conducting empirical studies of macroeconomic theories, and

[7] This section discusses many of the major research studies that have used the surveys. For a more complete list of such studies, see the bibliographies posted on the Philadelphia Fed's website at www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/academic-bibliography.cfm and www.philadelphiafed.org/research-and-data/real-time-center/livingston-survey/academic-bibliography.cfm.

FIGURE 3

Output Forecast Errors and Change in Real Fed Funds Rate

Output Forecast Error
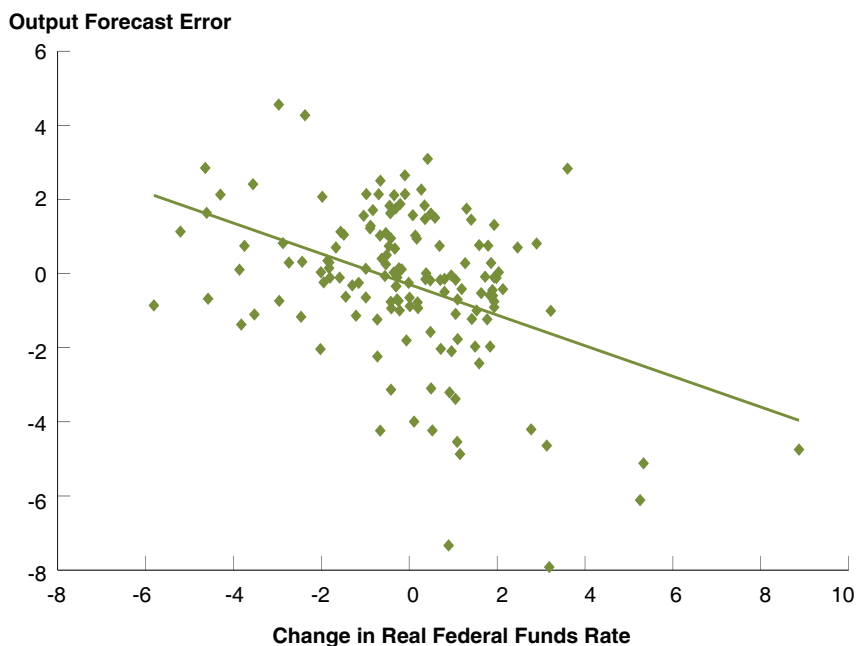
Economists have written major research papers using both the SPF and Livingston surveys, beginning with Stephen Turnovsky. Turnovsky tried to show how forecasters formed their expectations, and he developed an early test of rationality of the forecasts using the Livingston Survey. The first paper to use the SPF (actually its predecessor, the ASA/NBER survey) was one by Vincent Su and Josephine Su, which evaluated the accuracy of the survey forecasts using only a few years of data.

None of the earliest papers to use the Livingston Survey are reliable, however, because John Carlson discovered a major flaw in the data (which has subsequently been fixed). Because the survey's original purpose was for journalism, Livingston did not report the actual forecasts of the

forecasters in his newspaper column. Instead, he modified the forecast data if a data release occurred after the forecasters had submitted their forecasts but before his newspaper column appeared and if the data release would have changed the overall nature of the forecasts.

Carlson gives the following example. Suppose the CPI was released in September and October with a value of 121.1 and the forecasters have an average forecast for the following June of 121.2. Then, if the November data release (which came out after the forecasters had answered the survey but before the survey results were reported) for the CPI is 121.1, the June forecast is reasonable and Livingston would not adjust the forecast. But suppose the November CPI data were released as 121.6. Then if Livingston reported the November number and the June forecast, it would appear that

the forecasters thought there would be deflation, even though they were really forecasting a small amount of inflation. So, Livingston would instead report a forecast of 121.7, which maintains the 0.1 increase in the CPI that the forecasters thought would happen. But this means that the reported forecasts were fictional and depended on Livingston's personal judgment. Carlson remedied this situation by obtaining the true forecast values from Livingston and thus restoring the integrity of the data set. Carlson showed that Livingston's adjustments made the forecasts look better. Studies based on the incorrect data obtained somewhat different results compared with results based on the corrected data.

Rational Expectations. The Philadelphia Fed's surveys of forecasters were initially used by researchers in the early 1970s to investigate the concept of rational expectations, which asserts that people do not make systematic errors in forecasting. A number of early papers had used the Livingston Survey forecasts of inflation and rejected the rational expectations hypothesis because researchers found that the survey forecasts were biased (with a nonzero mean forecast error) and inefficient (because the forecast errors were correlated with data known when the survey was taken).

But in a 1978 study, Donald Mullineaux found a major flaw in the statistical procedure previous studies had used to test for and reject the rationality of expected inflation in the Livingston Survey.[8] Mullineaux then proposed a new test that is not

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[8] The flaw is that the test used in much previous work (known as the Chow test) assumed identically and independently distributed (i.i.d.) errors in a framework where that is unlikely to hold. Mullineaux showed that the assumption can be rejected.

subject to the same statistical problem and found that the properly specified data are consistent with people having rational expectations.

The early literature on rational expectations often ran tests for unbiasedness and inefficiency of the survey forecasts. But those tests were flawed in an important way because they failed to account for the fact that a forecast error in one survey forecast carried over to other surveys because the length of the forecast horizon (eight or 14 months) was longer than the interval between surveys (six months). Thus, a sudden rise in inflation in one period could lead to forecast errors in two or three consecutive surveys, a situation that has come to be known as the overlapping observations problem.

By failing to account for this correlation in the forecast errors, the researchers' tests for unbiasedness and inefficiency were overstating the case against the surveys. Bryan Brown and Shlomo Maital finally remedied this situation, making a key methodological contribution: recognizing the overlapping-observations problem and showing how to adjust the statistical tests so that they gave the correct inference. Brown and Maital then tested the Livingston Survey data for unbiasedness and efficiency. They generally found no bias, unlike many earlier researchers. But they did find some evidence that the Livingston Survey forecast errors were correlated with changes in money growth.[9]

Another challenge to rational expectations using the surveys came from Eugene Fama and Michael Gibbons. They created alternative inflation forecasts based on nominal and real interest rates, as well as

changes in those rates. They showed that the inflation forecasts based on interest rates outperformed the Livingston Survey forecasts of inflation from 1977 to 1982.

Many other researchers became convinced that forecasters did not have rational expectations. One of them, Douglas Pearce, did a simple experiment to show how irrational the survey forecasts were. Pearce then constructed a forecast of inflation in which the change in the inflation rate from one period to the next depended only on the unexpected change in the inflation rate in the previous period and ignored data on other variables that a forecaster might use to forecast, including the money supply and the strength of the economy. Pearce correctly used only the data that the participants in the Livingston Survey had available to them at the time when they made their forecasts (known as real-time data; see the study that I did with Tom Stark for more on this concept of real-time data analysis). Pearce compared his simple model's forecasts with the forecasts from the Livingston Survey and found that his model had much better forecasts for inflation than the survey. He also showed that the rise in interest rates in the 1970s was better explained by his simple model than by the Livingston Survey.

If a very simple model can provide better forecasts than the forecasters in the survey, it would seem that the survey forecasts aren't that valuable, and professional forecasters are irrational because they could have used Pearce's model and made better forecasts.[10]

After many studies that found fault with the forecasting surveys, many economists began to believe that either people did not have rational expectations or that the surveys did not represent people's true forecasts, or both. Michael Keane and David Runkle sought to disprove both hypotheses, arguing that much of the literature on testing survey forecasts for rationality suffered from three flaws: (1) the use of the average forecast across forecasters was wrong because forecasters may have different information; (2) other research studies failed to adjust properly for data revisions; and (3) other research studies failed to account for the correlation of forecast errors across forecasters. Keane and Runkle avoided these problems by using individual forecasts on the GNP deflator, basing their analysis on real-time data (the first revision of the national income data, which come out one month after the initial release), and developing a statistical method that accounts for the correlation of forecast errors across forecasters. They evaluated current-quarter inflation forecasts from the SPF, finding that they were unbiased and efficient.

Overall, the literature on rational expectations has benefited tremendously from the existence of the SPF and the Livingston Survey. Though the results of tests for rationality have been mixed over time, more recent evaluations generally suggest that the survey forecasts are fairly accurate and pass most, though not all, tests for rationality.

Expectations Formation. Research on how people form expectations has a slightly different goal than the literature on testing rational expectations; it uses the surveys to investigate what information forecasters use to form their forecasts and the properties of their forecasts.

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[9] A related correlation is found in my paper with Laurence Ball.

[10] Later research showed that Pearce's results, though powerful, weakened over time. If you use the same method that Pearce used and the additional data that we have today, you would find that the survey now does better than the simple model that Pearce used. See my 2010 paper for an extensive analysis of the use of Pearce's method.

Alex Cukierman and Paul Wachtel introduced the idea that inflation expectations differ across individuals because people have different information at their disposal. In this situation, an increase in people's uncertainty about inflation leads to more variability in their inflation expectations over time than when inflation is more stable. Cukierman and Wachtel used the Livingston Survey forecasts on CPI inflation to examine the differences in inflation expectations across forecasters. They found that the variability of expected inflation across forecasters is positively related to the variability of the inflation rate and the growth rate of the economy's output. Thus, volatility in the economy translates into uncertainty in people's forecasts.

One branch of this literature is devoted to finding variables that are correlated with the survey forecasts, thus revealing the data that forecasters find important in forming their forecasts. In a 1980 study, Donald Mullineaux used the Livingston Survey forecasts to examine how forecasters form inflation expectations, using real-time data on the money supply (that is, the data known to forecasters when they made their forecasts, rather than revised data). He found that the forecasters used money-growth data in forming their forecasts, not just lagged inflation data, so that inflation forecasting models that are just based on past inflation rates are not efficient. Mullineaux found evidence that the expectations-formation process changed over time, perhaps in response to changes in the way monetary policy was conducted.

This is an important finding, since it provides evidence that is consistent with theoretical research by Nobel Prize winner Robert Lucas, who argued that when the Federal Reserve changes the process by which it sets monetary policy (a process that clearly changed in the 1970s), equations such as those describing the formation of inflation expectations will undergo significant changes. Mullineaux also found evidence that the same model determining inflation expectations also determines actual inflation, so that survey forecasts are rational.

One of the most important papers in this literature is that of Victor Zarnowitz and Louis Lambros, who were the first to combine and compare the SPF point forecasts with the probability distribution forecasts.[11] They considered two concepts: (1) consensus, which is the degree to which the point forecasts are similar across forecasters; and (2) uncertainty, which is the degree to which an individual forecaster thinks a certain outcome is likely and is a measure of how much risk there is to her or his point forecast. Zarnowitz and Lambros found that consensus across forecasters may be very different from the uncertainty that each individual forecaster has about his or her forecast. Previously, most researchers had equated consensus and uncertainty, which had the effect of understating the true degree of uncertainty. Zarnowitz and Lambros also found that higher inflation rates were associated with greater uncertainty about inflation and showed that increased inflation uncertainty was associated with lower real output growth.

Recently, numerous researchers have begun focusing on how households form their own inflation expectations. Gregory Mankiw, Ricardo Reis, and Justin Wolfers noted that professional forecasters disagree with each other in their forecasts of inflation, as do consumers. They showed that the extent to which forecasters disagree changes over time. To explain these disagreements, they developed a "sticky-information" model. The basic idea of sticky information is that collecting and analyzing information involves costs, so that people update their expectations infrequently. They then used the Michigan survey of consumers, the SPF, and the Livingston Survey to verify their model. They found that their model helps to explain the irrationality of inflation expectations, including why forecast errors are persistent and why it takes some time before news is incorporated into the forecasts.

A related paper is that of Christopher Carroll, who developed an interesting hypothesis: Households may not have rational expectations, but rather form their expectations by reading professional forecasts, which are rational. (See *How Would You Forecast?*) Households' expectations may not be rational because they only occasionally read the forecasts of professional forecasters and don't always pay attention to them. To test this view, Carroll examined whether the forecasts in the Michigan survey of consumers incorporate information from the SPF, or vice versa. By examining the relationship between the actual inflation rate, the Michigan consumer survey forecasts, and the SPF forecasts of inflation, he was able to show that the Michigan forecast contains no additional information that is not already in the SPF, but the SPF does contain additional information that is not in the Michigan survey. He also found evidence that SPF forecasts affected

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[11] The difference between a point forecast and a probability distribution forecast can be illustrated by an example. The survey's point forecast for inflation in the next year could be 2.5 percent. The probability distribution forecast might be a 25 percent chance that inflation will be 1.0 to 1.9 percent, a 50 percent chance that inflation will be 2.0 to 2.9 percent, and a 25 percent chance that inflation will be 3.0 to 3.9 percent.

How Would You Forecast?

I f you were asked to forecast the economy, how would you do it? You might say, "I am not in the business of forecasting, so I don't know how I would construct forecasts of the economy!" But it turns out that most of us have some intuition about how the economy is going to fare in the future. For example, the Michigan survey of consumers asks people who are not economists what they think the inflation rate will be over the coming year, and the consumers answer the question very well, in some periods forecasting inflation better than the professional economists in the Livingston Survey and the SPF.

One thing you could do is to look at recent values and assume that the future will be just like today. Or you might take a class at your local university and learn techniques of time-series forecasting, which would be far more sophisticated than assuming the future is like today and would give you much better forecasts. But most of us do not want to spend that much time to forecast for three good reasons: (1) the costs of forecasting are high because

most of us do not know much about forecasting; (2) the benefits of forecasting are low because our lives are not strongly affected by being able to forecast better; and (3) we can read the newspaper or surf the web and easily learn about the forecasts of experts, so why should we bother to make our own?

As our discussion in the text of Christopher Carroll's research suggests, most people do not spend much time forecasting, but they do read about forecasts in the media and on the Internet. As a result, the forecasts of experts are distributed around the country gradually over time. Thus, even though only a few economic experts take the time to work out their own forecasts, their views influence the forecasts of many citizens and thus affect economic activity. A further reason to turn to a survey like the Survey of Professional Forecasters or the Livingston is that the surveys combine the efforts of a number of forecasters who often look at the economy from different perspectives. As a result, a forecast that averages all of the projections (using the mean or the median) is often superior to any individual forecast.*

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*There is a substantial amount of research in the area of forecast combination, which shows that simple averages of many forecasts often perform better than nearly all individual forecasts. See Alan Timmermann's article for an overview.

later Michigan surveys but that the Michigan survey did not affect later SPF forecasts. This result suggests that, over time, households come to incorporate the SPF forecasts. Carroll's results are also supported by the fact that when news coverage of inflation is high, Michigan forecasts get closer to SPF forecasts. Similar results occur when Carroll uses the unemployment rate in his empirical work, rather than the inflation rate.

Empirical Macroeconomics.
One puzzle that survey forecasts helped solve was the issue of why real (inflation-adjusted) interest rates declined so much in the 1970s. James Wilcox used the Livingston Survey forecasts of inflation in an attempt to

determine the main factors affecting nominal and real interest rates. He discovered that much of the decline in real interest rates in the 1970s (though not all) was due to increases in expected inflation rates. He argued that previous models failed to include a supply-shock variable representing the prices on inputs, such as oil prices. Once he included such a variable and used the Livingston Survey forecasts to represent expected inflation in calculating the real interest rate, his model fit the data well. In a related paper, Kajal Lahiri, Christie Tiegland, and Mark Zaporowski found that uncertainty about inflation (measured using the probability variables in the SPF) also affected real interest rates.

Their main result was that increased uncertainty about inflation causes the real interest rate to decline, with investment spending declining more than saving.

One of the most famous papers that empirically tests macroeconomic theory was that of Robert Hall, who found evidence supporting economists' major theory of consumption, which is that income in a given year has less impact on consumption spending than households' long-run average income, a theory known as the life-cycle/permanent-income hypothesis. Hall used the Livingston Survey to calculate the expected inflation rate and the expected return to the stock market. He also found that changes in

the real interest rate have little effect on consumption spending, much less than some economists had thought before Hall's research.

This discussion only touches on some of the main studies in the empirical macroeconomics literature that have benefited from the Philadelphia Fed's surveys.

Monetary Policy. One of the main mechanisms by which monetary policy affects the economy is by affecting people's inflation expectations. Researchers have suggested that the Federal Reserve bases monetary policy on inflation and the degree to which output in the economy is above or below trend (known as the output gap). The equation relating the federal funds interest rate (which measures monetary policy) to inflation and the output gap is known as the Taylor rule, named after John Taylor of Stanford University, who developed the idea. Most of the research done in this area suggests that the Fed looks at past inflation and the past output gap. But Athanasios Orphanides used the SPF to obtain forecasts of inflation and output to use in the Taylor rule and found that this produced better estimates of what the Fed did than using past data. Thus, the Fed appears to follow a forward-looking Taylor rule rather than a backward-looking rule.

How does the Fed respond to changes in expected inflation? Sylvain Leduc, Keith Sill, and Tom Stark investigated this issue, using the Livingston Survey as a source for the economy's expected inflation rate. They found that before 1979, the Fed responded to increases in expected

inflation by increasing the federal funds interest rate. But because the Fed did not increase the interest rate by as much as expected inflation increased, the real interest rate declined. This more accommodative monetary policy was followed by higher inflation, and the authors concluded that monetary policy contributed to the rise in inflation in the 1970s. However, after 1979, the Fed did the opposite, tightening monetary policy

percentage-point rise in the long-term expected inflation rate implies a 20 percent reduction in stock prices. Sean Campbell and Frank Diebold showed that the Livingston Survey could be used to predict stock returns, with stronger economic growth related to lower stock returns, and vice versa.

The surveys have also been used to investigate optimal methods of forecasting. Andrew Ang, Geert Bekaert, and Min Wei compared

> One key question about the data that are issued by government statistical agencies is whether data revisions are forecastable or not.

when expected inflation increased, thus raising the real interest rate and reducing future inflation.

Other Important Research Results. One key question about the data that are issued by government statistical agencies is whether data revisions are forecastable or not. Knut Mork sought to answer that question using the SPF survey as a measure of information known at the time the government releases its initial GDP data. He found that GDP revisions were correlated with the SPF forecast of GDP, and thus the revisions were forecastable, which means that the government's initial data releases are not efficient and could be improved.

Some economists have also used the Philadelphia Fed surveys to investigate a hypothesis in financial economics. Steven Sharpe related the SPF forecasts of one-year inflation rates and 10-year inflation rates to stock returns, finding that a one-

inflation forecasts from the Livingston Survey, SPF, and the Michigan survey of consumers. They found that the surveys forecast inflation better than do a number of other forecasting models that economists use. They also found that the Michigan forecasts are only slightly worse than the SPF and Livingston forecasts but still do better than the other forecasting methods.

SUMMARY

There can be little doubt that the Philadelphia Fed's surveys of forecasters have played an instrumental role in economic research in the past 40 years. The surveys have been used to test rational-expectations theory, to analyze the formation of inflation expectations, to conduct empirical research in macroeconomics, and to investigate the formation and impact of monetary policy, and they have been used in a variety of other studies as well. **ⓑⓡ**

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Because I'm Worth It?
CEO Pay and Corporate Governance*

BY ROCCO HUANG

Over the past few years, there has been strong public outrage against current pay practices for corporate CEOs. To deal with this issue, the Dodd-Frank Wall Street Reform and Consumer Protection Act signed into law by President Obama on July 21, 2010 will allow shareholders to vote on executive pay packages and federal regulators to oversee executive compensation at financial firms. Are there problems with CEO pay? According to a recent survey, 98 percent of respondents from major financial institutions "believe that compensation structures were a factor underlying the crisis." In this article, Rocco Huang outlines what we know about how CEOs are paid, how the pay is set, how CEO compensation affects CEOs' incentives and actions and their firms' performance, and how government regulations affect CEO pay.

Recently, there has been strong public outrage against current pay practices for corporate CEOs, regarding both their high level relative to that of ordinary workers and their perceived insensitivity to poor performance. A search of the key words "executive compensation" in the *New York Times* returns 168 articles for the first six months of 2009 and only 23 during the same months in 2008 — a sevenfold increase. In June 2009, President Obama appointed Kenneth Feinberg as the special master for executive compensation (known in the media as the "pay czar") to oversee the compensation of top executives at companies that have received federal bailout assistance. To deal with this issue, the Dodd-Frank Wall Street Reform and Consumer Protection Act signed into law by President Obama on July 21, 2010 will allow shareholders to vote on executive pay packages and federal regulators to oversee executive compensation at financial firms.

Are there problems with CEO pay? According to a recent survey by the Institute of International Finance (IIF), 98 percent of respondents from major financial institutions "believe that compensation structures were a factor underlying the crisis." By analyzing executive compensation data, financial economists have improved their understanding of CEO pay. We know a lot about how CEOs are paid, how the pay is set, how CEO compensation affects CEOs' incentives and actions and firm performance, and how government regulations affect CEO pay.

HOW ARE CEOs PAID?

The structure of CEO pay is more complicated than just a base salary plus bonus. Their pay packages are not just bigger; they are also very different from those of ordinary workers. We need to understand the special structure of CEOs' packages before we can say anything about whether they are paid too much. Unless otherwise stated, we will focus on CEO pay practices in the United States because they have been much better researched.

Cash bonuses account for, on av-

Rocco Huang is an assistant professor of finance at the Eli Broad College of Business, Michigan State University. When he wrote this article, he was an economist in the Research Department of the Philadelphia Fed. This article is available free of charge at www.philadelphiafed.org/research-and-data/publications/.

*The views expressed here are those of the author and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

erage, half of a CEO's total compensation. We may think that a CEO is paid a bonus for better performance. But the evidence suggests otherwise. Kevin Murphy has combed through the research of his fellow economists and finds no evidence of a significant relationship between the size of a CEO's cash bonus and the firm's performance, measured as return on equity or stock returns. And indeed, Yaniv Grinstein and Paul Hribar find that CEOs were as likely to receive bonuses for making acquisitions that negatively affected shareholder wealth (as measured by negative stock returns upon announcement of the acquisition news) as well as for acquisitions that increased shareholder wealth.[1] Thus, CEOs receive a bonus for an acquisition whether or not shareholders believe the acquisition increases their wealth.[2]

If cash bonuses are not much different from base salaries except that they are paid at the end of the year instead of every month, what motivates CEOs to work harder and to make better decisions for the company? Equity-based compensation such as stock options plays an important role.

An option is a contract that gives the owner the right, but not the obligation, to buy or sell an underlying asset at a specific price on or before a certain date. CEOs are typically awarded options allowing them to purchase company stock on a future date but at the stock price prevailing at the time the option is granted, thus allowing CEOs to benefit from future

stock-price appreciation if the company performs well. Naturally, stock options reward CEOs for better performance if better performance leads to higher future stock prices. Indeed, Brian Hall and Jeffrey Liebman's study finds that, unlike cash bonuses, stock options make CEO pay very sensitive to company performance.

For example, in their sample, Hall and Liebman find that, for a moderate change in firm performance (moving from a median stock-price performance to a 70th percentile performance), a CEO's compensation increases more than 50 percent, which represents an increase in CEO wealth of about $1.8 million. Most of the increase comes from appreciation in the value of stock options. That's a large reward for improving a company's performance from middle of the pack to better than 70 percent of its peers.

Lucian Bebchuk and Yaniv Grinstein show that the level of CEO compensation in the United States had been increasing in the decade before the stock market downturn in 2001, and the lion's share of the increases resulted from equity-based compensation such as stock options (see the figure).[3]

Finally, another important source of compensation for CEOs is their

pensions. CEOs stay in their positions for six years, on average. According to Lucian Bebchuk and Robert Jackson, the executives' pension plans had a median actuarial value of $15 million. The ratio of the executives' pension value to the executives' total compensation during their service as CEO had a median value of 34 percent. That is, more than a quarter of the money the CEO receives from the company comes after his or her retirement.

They also find that, in contrast to

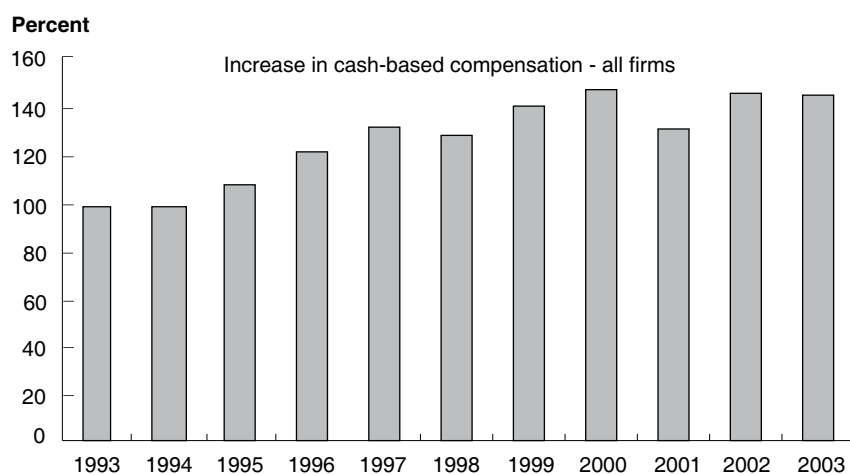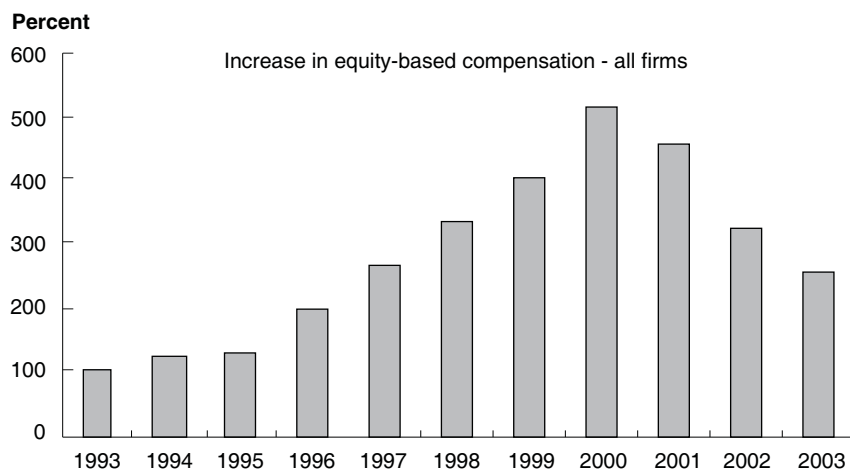## Another important source of compensation for CEOs is their pensions.

stock options, CEOs' pensions do not depend much on their performance on the job. Poorly performing CEOs do not get less pension money after retirement. After a CEO retires, he is seldom in the media spotlight, and few people bother to look into the paycheck of a retired CEO. Bebchuk and Jackson's research, however, illustrates that the omission of pension plan values by researchers and the media leads to significant overestimation of the extent to which executive pay is linked to performance.

Finally, the composition of CEO compensation is somewhat different in commercial banks. (See *What's Different About Compensation for Commercial Bank CEOs?*)

Compensation Practices Outside the U.S. There are relatively few academic studies on CEO pay practices outside the United States. The several studies that have been conducted suggest that, in other countries, CEO pay is much lower and stock options play a much less important role. A study by Martin J. Conyon, John E. Core, and Wayne R. Guay compares the largest 250 British companies with about 1,200 U.S. firms of similar size and

[1] The change in stock price after the announcement reflects how shareholders believe the acquisition is affecting their financial interests. The stock price declines if shareholders believe that the announcement is bad news.

[2] Note that it is certainly possible that the CEOs may be right and the shareholders may be wrong about the acquisition's eventual benefits and costs.

[3] Taxation and accounting considerations partly contributed to the popularity of equity-based compensation. Section 162(m) of the Internal Revenue Code, enacted in 1993, places a $1 million limit on the deductibility (against corporate profits) of non-performance-related executive compensation, giving rise to a tax advantage for equity-based compensation. Furthermore, until 2006 when it became mandatory, firms were not required to count stock option grants to executives as expenses on their income statement, allowing them to report higher earnings.

Percent

Increase in equity-based compensation - all firms

Percent

Increase in cash-based compensation - all firms

Source: Bebchuk, Lucian A., and Grinstein, Yaniv. "The Growth of Executive Pay," *Oxford Review of Economic Policy*, 21 (2005), pp. 283-303.

ests of shareholders, and in some other countries, other stakeholders as well) supervises a CEO and sets his pay. It has become more common for the full board to delegate a compensation committee to set a CEO's pay. Normally, the human resources department makes an initial recommendation. Then the compensation committee reviews the recommendation and, if necessary, revises it, sometimes with input from compensation consulting firms such as Towers Perrin. Finally, the full board of directors votes on the CEO pay proposal.

Strictly speaking, there is no such thing as "CEOs without bosses," unless the CEO happens to be the majority owner of the company, a rarity among large corporations. Let's rephrase the question: Who sets the pay for the CEOs who are effectively their own bosses because they have more power than the board of directors?

A CEO has financial incentives to persuade the board of directors and influence the pay-setting procedure in a direction that enriches him. The outcome of the bargaining depends on the CEO's relative influence vis-à-vis the board of directors'. Below we present some evidence that in firms where the CEOs are more powerful, they are paid more. (For alternative views on how higher CEO pay can better serve the interests of shareholders, see *Maybe It's Really Worth Paying Top Dollar for Managers*.)

A study by John Core, Robert Holthausen, and David Larcker identifies the following corporate board arrangements as potential causes of a weaker board vis-à-vis the CEO. First, having a large number of directors on the board can make the board weaker because it's harder for a large board to coordinate and override the CEO's wishes. Second, more of the outside directors — that is, the directors who are not current or past employees of

finds that, in 1997, the median pay of a U.S. CEO was more than twice the median pay of a British CEO. But the gap is shrinking: In 2003 the median pay of a U.S. CEO was only 30 percent more. However, the personal fortune of U.S. CEOs is tied much more closely to company stock-price movements. In 2003, their equity incentives (the sensitivity of the value of their stock and options holdings to changes in stock prices) were about 4.6 times greater than those of UK CEOs. After adjusting for what is reasonably needed

to compensate U.S. CEOs for bearing the higher risk of equity-based compensation, the researchers find that the risk-adjusted pay for the U.S. CEOs is not consistently higher than that for UK CEOs.

CEOs SET THEIR OWN PAY WHEN THEY CAN

CEO Compensation Is High When the Board Is Weak. Your bosses set your pay, but who sets the pay for the CEO? The board of directors (in the U.S. representing the inter-

What's Different About Compensation for Commercial Bank CEOs?

The structure of CEO compensation at commercial banks differs from that in other industries. According to a study by Kose John and Yiming Qian, based on a sample of 120 commercial banks from 1992 to 2000, CEOs' pay-performance sensitivity is lower in banking firms than in manufacturing firms. In particular, the sensitivity is lower in more highly leveraged banks.

Elijah Brewer, William Hunter, and William Jackson document that equity-based compensation becomes more important after the Riegle-Neal Act of 1994. They find that, after deregulation, the equity-based component of bank CEO compensation increases significantly, on average, for the industry. Riskier banks have significantly higher levels of equity-based compensation, as do banks with more investment opportunities.

After deregulation, the opportunity to acquire other banks opened up. Stronger incentives for CEOs may have become more important after deregulation. For example, Liu Yang, Haluk Unal, and Kristina Minnick find that higher pay-performance sensitivity leads to more value-enhancing acquisitions. Among those banks that acquired another bank, higher-sensitivity banks experienced significantly better announcement returns than lower-sensitivity banks. Announcement returns are stock returns calculated in a three-day window around the announcement of acquisitions. The positive market reaction can be rationalized by better long-term performance. Following acquisitions, banks with high pay-performance sensitivity experience greater improvement in their operating performance as measured by the return on assets.

the firm — have been appointed by the CEO.[4] Third, more of the "outside directors" are borderline insiders; that is, the director or his employer receives payments from the company in excess of his board pay. Examples include a board member who is a partner in a law firm that provides services to the company or one who is a supplier that sells products to the company. Fourth, more of the outside directors are busy; that is, the director serves on three or more other boards. Finally, the CEO is

the chairman of the board and makes himself literally the boss of his supposed bosses.

Core, Holthausen, and Larcker then show that companies with such boards give their CEOs higher pay. However, it is important to note that a correlation between CEO pay and certain firm characteristics, such as board size, does not necessarily equal causality and results should be interpreted with some caution. For example, certain types of complex businesses may require a higher quality CEO (and hence one who earns higher pay), a larger board to provide a broad array of advice, more insider execu-

tives on the board to supply operational information, more outsiders with connections in the industry through board memberships, and a CEO who is also the chairman in order to reduce coordination problems. These correlations do not necessarily prove that, for example, having a larger board results in higher CEO pay.

Pay for Performance or for Good Luck? A study by Marianne Bertrand and Sendhil Mullainathan finds that CEOs are rewarded for good luck.

First, let me explain what I mean by good luck. For a petroleum company with large oil reserves, profits increase with oil prices, but the CEO should take no credit for this windfall. For a company that exports goods to foreign countries, when the U.S. dollar gets cheaper, profits go up. Again, the CEO does nothing to make this happen. These are examples of good luck and have no relationship to the CEO's efforts.

Ideally, CEO pay should not be tied to luck, that is, factors that affect firm performance that are beyond the CEO's control. The effect of good luck should be filtered out when setting CEO pay. However, using several measures of luck, Bertrand and Mullainathan find that CEO pay in fact responds as much to a dollar earned through luck as to a dollar earned through CEO effort. For every one-percentage-point rise in accounting returns due to changes in oil prices or the exchange rate, they find that CEO pay increases by about 2 percent, roughly the same as the response to accounting returns not due to those lucky factors.

Many firms have large shareholders who have a strong incentive to watch over the CEO and who also have the ability to have their voice heard. They are the motivated bosses. They pay their CEOs less for luck. Bertrand and Mullainathan find that

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[4] In a more recent paper, Jeff Coles, Naveen Daniel, and Lalitha Naveen call them "co-option board members."

for each additional large shareholder (defined as a shareholder, other than the CEO, who owns blocks of at least 5 percent of the firm's common shares), the pay-for-luck effect declines by 10 percent. For each additional large shareholder who also has a seat on the board of directors, the pay-for-luck effect declines by 33 percent. And in a firm without any large shareholders, a CEO who has spent nine years in the position has about a 35 percent greater pay-for-luck effect than one who is just starting at the firm. The overall results suggest that CEOs without bosses seem to set their own pay and they set it to their own advantage.

No one can have good luck all the time. Are CEOs punished for bad luck? Gerald Garvey and Todd Milbourn

show that they aren't. They find that luck affects pay less when the luck is bad than when it is good. Their study finds that the average executive loses 25 to 45 percent less pay from bad luck than is gained from good luck.

Backdating: How to Make Your Own Luck. CEOs also seem to be able to influence the timing of stock option awards in their favor. In a recent study, Lucian Bebchuk, Yaniv Grinstein, and Urs Peyer posit that the practice of *option backdating* is more likely when the CEO is more powerful than the board of directors, which is supposed to monitor and discipline him. A backdated option is one in which the grant date of the option is chosen after the date has already passed. It is like buying a lottery ticket after

seeing the wining number. The three researchers identify options granted at the lowest price of the month, which they call "lucky options." Choosing a date when the stock price is low is a direct transfer from stockholders to the executive who exercises the option, since he looks back and sets the exercise price of the option at the lowest possible price.

Many CEOs seem to have more luck than ordinary people. The three researchers find that during the period 1996-2005, 12 percent of firms provided one or more lucky grants due to opportunistic timing. It is not surprising that "CEOs without bosses" are more likely to get lucky. Bebchuk, Grinstein, and Peyer find that lucky grants were more likely when the

Maybe It's Really Worth Paying Top Dollar for Managers

There is plenty of evidence suggesting that CEOs influence their own pay for their own financial interest. However, many questions remain unanswered. For example, it is difficult to explain why compensation has increased so much in the late 20th century compared with earlier periods, solely on the basis of weak corporate governance. Actually, greater pressure from institutional investors should have reduced the power of CEOs in the past two decades. The current corporate governance environment is not perfect, but it is reasonable to say that it was even worse in the early 20th century.

Xavier Gabaix and Augustin Landier developed a theoretical model that attempts to explain why CEO pay has risen so rapidly. They find that a very small dispersion in CEO talent can justify large pay differences. They show that the six-fold increase in U.S. CEO pay between 1980 and 2003 can be fully attributed to the six-fold

increase in market capitalization of large companies during that period. Alex Edmans, a professor of finance at the Wharton School, has argued that "being slightly better can have a huge effect on firm value. It's really worth paying top dollar for the most talented managers."* For example, at a $20 billion company, a half-percent improvement in results would translate into $100 million, which is a huge sum of money relative to an average CEO's annual pay.

Edmans and Gabaix's review paper is a good starting point to read more about the emerging literature that uses optimal contracting theories to explain many seemingly inefficient CEO pay arrangements as efficient outcomes, for example, the recent rapid increase in pay, the low level of incentives and their negative correlation with firm size, pay-for-luck, the widespread use of options (as opposed to stock), severance pay and debt-like compensation such as pensions, and the insensitivity of incentives to risk.

* Interviewed by Knowledge@Wharton: http://www.wharton.universia.net/index.cfm?fa=printArticle&ID=1662&language=english

company did not have a majority of independent directors on the board or the CEO had longer tenure. Both factors are associated with increased influence of the CEO on pay-setting and board decision-making.

However, the size of the gains from this practice is economically small. David Aboody and Ron Kasznik find that the practice increases the CEO's option award value by a mean of $46,700 (the median is $18,500), representing only 2.5 percent of reported total CEO compensation. The puzzle remains: Why do wealthy CEOs backdate options? Christopher Armstrong, an accounting professor at the Wharton School, has speculated that "maybe they underestimated the probability of getting caught, or they thought everyone else was doing it and they were entitled."[5] At this point, we can only speculate on the real reasons.

CEO COMPENSATION STRUCTURE AFFECTS CORPORATE POLICY

All of the evidence I've discussed so far concerns the division of the firm's profits between shareholders and CEOs. But there is also evidence that CEO compensation affects corporate decision-making, including the riskiness of the firm's operating and financial decisions and the firm's accounting policy

Compensation and Firm Risk. Many studies have shown that compensation does affect CEOs' incentives and actions, and the investment, financial, and accounting policies they adopt. The general finding is that option-like compensation arrangements are associated with more risk-taking in the companies these CEOs run. Op-

tions increase in value when the firm's stock price becomes more volatile. The CEO gains when the stock price is very high, but the option is simply not exercised when the price is low. Thus, everything else equal, the holder of the option prefers firm policies that increase stock price volatility.

Jeffrey Coles, Naveen Daniel, and Lalitha Naveen, for example, confirm that CEO compensation arrangements affect investment policy, debt policy, and firm risk. In firms where a large fraction of CEO pay is in options, CEOs adopt riskier policies. These policy choices include relatively more investment in research and development, more industry focus (that is, less diversified activities), and higher financial leverage (that is, more debt). Chief financial officers' (CFOs) compensation arrangements matter, too. Sudheer Chava and Amiyatosh Purnanandam show that in firms in which the CFO has greater incentive to increase risk because of stock options, firms use more short-term debt, which may create more volatile firm performance.

It is important to note that riskier policies can be both good and bad for the shareholders. In some cases, without the stock options, a senior executive may be too risk averse (because he may be afraid of losing his job) and may fail to maximize shareholders' interests. But shareholders need to recognize that the mix of executive compensation can affect corporate policies and set executive pay according to the risk profile they desire.

Compensation and Dodgy Accounting. Changing long-term policies may not have as direct and as fast an impact as changing short-term earnings numbers in financial reports. On average, stock prices respond positively to unexpectedly better earnings numbers and negatively to unexpectedly worse ones, so CEOs have an incentive to manipulate reported earnings.

Economists have shown that equity-based compensation is related to "earnings management": activities that may raise short-term earnings in financial reports.

Daniel Bergstresser and Thomas Philippon find that the use of accrual accounting to manipulate reported earnings is more pronounced at firms where the CEO's compensation is more closely tied to the value of his stock and option holdings. Accrual accounting allows a firm to recognize revenues and costs at the time of sale rather than when payment is received or at the time of purchase rather than when payment is made. This gives accountants some discretion in timing revenues and costs opportunistically, for example, increasing short-term reported earnings by booking revenue earlier.[6]

Bergstresser and Philippon identify such "discretionary" accruals and show that they are more likely to be observed when CEOs' compensation is more closely tied to the value of stock and option holdings. They also find that CEOs do benefit financially through such manipulations. During years of high accruals (that is, revenues and reported earnings are increased by accrual accounting), CEOs exercise

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[5] Interviewed by Knowledge@Wharton: http://www.wharton.universia.net/index.cfm?fa=print Article&ID=1662&language=english

[6] Consider the following simple example. It is December, and the fiscal year for a boating company ends on December 31. A new client has just reserved 12 fishing trips for the next 12 months. In principle, revenues should be matched with corresponding expenses and booked as each trip is actually taken. However, the accountant using accrual accounting can take a more aggressive approach and book the revenue now, in December, by arguing that the company is already incurring some costs in preparing for those trips. As a result, the boating company sharply increases its revenue for the fiscal year, but it also records an equally large accounts receivable number on its balance sheet because payments for the trips have not been received (but are expected) from the client. The accounting choice makes the reported income look better for the current fiscal year, but it reduces future income.

an unusually large number of options. In addition, CEOs and other insiders sell large quantities of shares. The selling of shares by insiders is often interpreted as evidence that they expect the stock price to fall in the future, as would happen if they expected future reported revenues to be low due to discretionary accruals.

Some CEOs push the envelope even further. Natasha Burns and Simi Kedia find that CEO stock options are related to incidences of accounting misreporting. A firm has misreported if it later restates its financial statements because the original financial statements were not in accordance with generally accepted accounting principles (GAAP). They identify 215 misreporting firms among the S&P 1500 firms (excluding financial firms). These are likely to be a small subset of total misreporting firms because many others may go uncaught.

Burns and Kedia find that a firm with a CEO whose stock option portfolio value is more sensitive to stock price is more likely to misreport. They also find that the sensitivity of other compensation components (equity, restricted stock, etc.) does not matter. This is a sensible result, because, relative to other components of compensation, stock options are associated with stronger incentives to misreport. Through stock options, CEOs can benefit from higher short-term accounting performance (and higher stock price) but relatively limited downside risk, for example, the risk of getting caught and having to restate earnings downward. For instance, if a CEO owns out-of-money stock options with the strike price of $25 but the current stock price is $20, an increase in stock price to $26 will greatly increase the value of his options, but a decline in the stock price to $15 will not make him much worse off.

GOVERNMENT REGULATIONS CAN AFFECT COMPENSATION

CEO compensation contracts are private agreements between the shareholders and the CEOs. Nevertheless, government regulations can affect executive compensation through empowering shareholders, to whom the CEO is ultimately answerable.

In response to the corporate scandals in 2001-02, by 2003 the major U.S. stock exchanges had revised their listing standards and imposed new requirements for directors' and committees' independence, requirements intended to enhance board oversight.[7] The rules require that all firms have a majority of independent directors and that the compensation, nominating, and audit committees shall consist of independent directors.

Although firms were not required to comply with the rules until 2004, Vidhi Chhaochharia and Yaniv Grinstein find that many firms already adhered to the rules even before the rules became mandatory. However, in 2000 about 12 percent of firms in their sample did not comply with any of the requirements regarding independent directors. Chhaochharia and Grinstein find a significant decrease in CEO compensation when those firms finally appointed a majority of independent directors to their boards and removed all insiders from their compensation, nominating, and audit committees. They also note that the significant decrease in compensation is due to a decrease in the option-based portion of the compensation. The cash portion of compensation shows no significant drop. Their results suggest that board structure is a significant determinant of the size and structure of CEO compensation. Note that the rules do not

dictate directly how much the CEOs should be paid but, instead, influence it through making the board of directors more accountable to shareholders.

The United Kingdom experimented with another law that has been incorporated into the Dodd-Frank Wall Street Reform and Consumer Protection Act in the U.S. In the UK, nonbinding advisory votes by shareholders on executive compensation packages have been required for all listed firms since 2002; that is, shareholders have a direct say in executive pay. Mary Ellen Carter and Valentina Zamora find that shareholders express their anger through voting. Their analysis indicates that shareholders disapprove of higher salaries, weak pay-for-performance sensitivity in bonus pay, and greater potential dilution in stock-based compensation, particularly stock-option pay.

Shareholders' disapproval does not have a binding power on the company, and disapproval rates rarely exceed 50 percent. However, the board of directors does listen and react. When shareholder disapproval is stronger, boards respond and subsequently decrease grants of stock-option compensation to CEOs, without increasing base salary or the pay-for-performance sensitivity of bonus pay accordingly.

WHAT DO WE KNOW AND NOT KNOW?

What can we take away from economists' collective knowledge about CEO pay? First, there seems to be a disconnect between CEO compensation and CEO performance, but the problems are concentrated in firms where the board of directors is weak and large shareholders are not present. Second, stock options are an important component of CEO compensation, and they seem to correlate with more risk-taking. Third, government policies can indeed

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[7] See Securities and Exchange Commission Release No. 34-48745.

influence how CEOs are paid by empowering the shareholders and the board of directors.

Many questions, however, remain unanswered. Bengt Holmstrom, a scholar of compensation and incentives and himself a board member of a large family company with a billion dollars in revenue, believes that most existing theories do not explain the following two puzzles. First, if the strong influence of CEOs on their own pay-setting process explains why they are paid so much, why has CEO compensation increased so much in the late 20th century, exactly when pressure from large institutional investors arguably should have reduced the influence of CEOs vis-à-vis the shareholders?[8] Second, why do executive pay patterns in closely held companies such as family firms (where CEOs are closely monitored by well-motivated owners) resemble those in publicly held companies? These and other questions pose a challenge for researchers seeking to explain the causes and effects of executive compensation practices. **BR**

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[8] Institutional investors held only about 10 percent of U.S. equities in 1953 but over 70 percent by the end of 2006.

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American Dream or American Obsession?*
The Economic Benefits and Costs of Homeownership

BY WENLI LI AND FANG YANG

Homeownership is an integral part of the American culture. Over the past 70 years, the U.S. government has devoted significant public resources to encouraging and promoting homeownership. The recent financial crisis has prompted the government to spend even more on preserving homeownership, despite the fact that the financial crisis itself was led by the meltdown of the U.S. housing market. Now, an increasing number of academicians and media reporters are questioning the previously unquestionable: Has the American dream turned into an American obsession? In this article, Wenli Li and Fang Yang analyze the economic benefits and costs associated with owning one's residence. They re-examine a variety of rationales that have been put forward in support of homeownership and examine the evidence for an economic cost associated with homeownership.

The strength of the nation lies in the homes of its people. — Abraham Lincoln

A nation of homeowners is unconquerable. — Franklin D. Roosevelt

Wenli Li is an economic advisor and economist in the Philadelphia Fed's Research Department. This article is available free of charge at www.philadelphiafed.org/research-and-data/publications/.

Homeownership, like baseball and hotdogs, is an integral part of the American culture. Over the past 70 years, the U.S. government has devoted significant public resources to encouraging and promoting homeownership. (See *Housing Policies That Promote Homeownership* for a summary of the various programs.) The percentage of households that

live in housing units they own has risen from around 40 percent before World War II to close to 70 percent today. The financial crisis that started in 2008 has prompted the government to spend even more on preserving homeownership, despite the fact that the financial crisis itself was led by the meltdown of the U.S. housing market. In light of these developments, an increasing number of academicians and media reporters are now questioning the previously unquestionable: Has the American dream turned into an American obsession?[1]

In this article, we analyze the economic benefits and costs associated with owning one's residence. We re-examine a variety of rationales that have been put forward in support of homeownership, namely, housing as a means of saving and a means

[1]For media reports, see, among many others, "Shelter, or Burden?" (*The Economist*, April 16, 2009); "Building Castles of Sand" (*The Economist*, June 18, 2009); National Public Radio reporter Kai Ryssdal's interview with 2006 Nobel Prize winner Edmund Phelps (March 26, 2009); columnist Robert Samuelson's "The Homeownership Obsession" (*Washington Post*, July 30, 2008); and the 2008 Nobel Prize winner Paul Krugman's column in the *New York Times* ("Home Not-So-Sweet Home," June 23, 2008).

Fang Yang is an assistant professor, University at Albany, State University of New York.

Housing Policies That Promote Homeownership

A large variety of government programs have served over the years to increase homeownership in the United States. Most of these policies work by reducing the cost of homeownership or by increasing the flow of capital to the housing market.

The oldest and perhaps most powerful of these policy tools lies in the federal income tax code formed in 1913. Homeowners can deduct interest on mortgages of up to $1 million on their taxes; they can also deduct local property taxes. Profits (capital gains) from house sales are also shielded from taxation for up to $250,000 ($500,000 for a married couple filing jointly) if the owner used the property as a primary residence for two of the five years before the date of sale.

Finally, as Satyajit Chatterjee explained in his 1996 *Business Review* article, if we lease our housing unit to another household, our rental income as a landlord would be taxed. However, if we own the house we live in, we are effectively paying ourselves rent, and the associated rental income is not taxed, according to the current tax law. In 2008, according to the Office of Management and Budget, these tax breaks are both about $145 billion. Note that this calculation does not count the possible taxation of rental income in an owner-occupied unit.

The government also funnels cheap credit into government housing agencies, including the Federal Home Loan Banks and Fannie Mae and Freddie Mac.[a] These agencies borrow at preferential rates and were long perceived as backed by the U.S. Treasury. In July 2008, right before the Federal Housing Finance Agency (FHFA) was formed, Fannie Mae and Freddie Mac held or guaranteed $5.2 trillion worth of mortgages, two-fifths of the national total.[b]

The Federal Housing Administration (FHA) insures mortgages for low- and moderate-income families that require only a 3 percent down payment. Created by the National Housing Act of 1934, the FHA insures private mortgage lenders against borrower default on residential real estate loans. These are the borrowers who typically have no credit history, a history of credit problems, or not enough cash to cover the down payment and closing costs and who almost certainly wouldn't qualify for a conventional home mortgage. The FHA has quadrupled its insurance guarantees on mortgages in just the last three years. Currently, the FHA insures $560 billion of mortgages.

of investment. We argue that both rationales are no longer valid. We also examine the evidence for an economic cost associated with homeownership, that is, the reduced mobility rate. In a nutshell, while owning one's own residence carries economic benefits for many households, it is not for everyone, at least not on economic grounds. As the quotes from Lincoln and Roosevelt suggest, not all arguments for supporting homeownership are economic in nature. We do not explore in detail some of the noneconomic arguments that have been offered as reasons to subsidize homeownership. These noneconomic benefits are typically termed social benefits. (See *The Social Benefits of Homeownership.*)

HOMEOWNERSHIP AND SAVING

The main economic argument for homeownership is that it is the most important way in which the majority of families accumulate wealth, since houses give households a means of saving as they pay off their mortgages and increase their home equity. This mechanism effectively forces households to save more than they otherwise would. While there have been some historical merits to this argument,[2] the changing economic environment has rendered it flawed.

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[a] According to its website, the FHFA was "formed by a legislative merger of the Office of Federal Housing Enterprise Oversight (OFHEO), the Federal Housing Finance Board (FHFB), and the U.S. Department of Housing and Urban Development (HUD) government-sponsored enterprise mission team. The FHFA regulates Fannie Mae, Freddie Mac, and the 12 Federal Home Loan Banks."

[b] Office of Federal Housing Oversight 2008 Annual Report to Congress.

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[2] The study by Donald Haurin, Patric Hendershott, and Susan Wachter explores the wealth accumulation and housing choices of young households and confirms the joint nature of the decision of house tenure and wealth accumulation. On the one hand, homeownership is an important component of total wealth. On the other hand, households need a minimum amount of wealth to purchase their first house. Other authors, including Louise Schneier and Gary Engelhardt, have analyzed savings in response to differentiating housing prices. Although results in some studies are contradictory, in general, young households in more expensive areas tend to save more.

Why Don't People Save Enough? The idea of using housing as a commitment to save rests on the observation that people lack self-control. The typical real-life examples of this behavioral problem include people postponing their decision to go on a diet, to exercise, or to quit smoking. In the case of economic decisions, numerous surveys have found that households often report that they ought to be saving at a higher rate than they are actually doing now. Therefore, it is not surprising that households will not achieve their desired level of "targeted" saving, since short-run preferences for instant gratification undermine their efforts to implement long-run plans that require patience.[3]

Economists have formalized this lack of self-control using the idea of *hyperbolic discounting*. A household with hyperbolic preferences would say the following: "Next Christmas, I will buy modest gifts and use the savings for my retirement. But this Christmas, I'll splurge." Of course, when next Christmas comes around, the household splurges again! In effect, the household is really two households: a patient household when it thinks about its long-term preferences and an impatient household whenever it actually confronts an immediate choice.[4] These preferences induce what economists call a *dynamic inconsistency*.

A direct implication of the hyperbolic discounting model is that households with these types of preferences will try to pre-commit themselves to a scheme that will be costly to break. In our earlier examples, that amounts to going on a for-fee diet plan, buying a health club membership, or buying cigarettes by the pack instead of by the carton because having a carton of cigarettes at hand increases the temptation to smoke more, even though buying cigarettes by the carton costs less.[5] In the case of savings decisions, households will hold their wealth in an illiquid form, such as housing, since such assets are costly to liquidate and thus relatively better protected from splurges on consumption.

Does Owning a House Help Households Save More? The effectiveness of using one's house as a means of forced savings has weakened substantially in recent years. For the majority of households, housing is indeed the most important asset in their portfolio. With the exception of the stock market boom in the late 1990s, housing as a share of total household assets has been trending up for the past four decades (Figure 1).

Unfortunately, households are not necessarily accumulating more wealth by buying up more housing assets.

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[3] Richard Thaler's article was one of the first to point out several "anomalies" in households' saving behavior.

[4] The article by George-Marios Angeletos, David Laibson, Andrea Repetto, Jeremy Tobacman, and Stephen Weinberg provides a good review of this literature.

[5] Not all attempts to pre-commit are successful, as Stefano DellaVigna and Ulrike Malmendier show in their study of individuals who take out expensive long-term gym memberships, but seldom go to the gym.

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The Social Benefits of Homeownership

There is no hard and fast distinction between economic and social benefits. In this article, we call the benefits of homeownership that accrue to the individual household "economic." But homeowners may also confer benefits on their neighbors and communities, or on the nation; we term these benefits "social." The basic argument for the social benefits of homeownership is that homeownership improves homeowners' incentives in a number of ways. Because of transaction costs, homeowners are less likely to move and hence remain more embedded in their communities for a longer time. This may promote civic involvement. Homeowners are also residual claimants of their property: When it comes time to sell, they reap the profits and suffer the losses. Thus, they tend to maintain their properties and are better neighbors than renters.

According to Edward Coulson's *Business Review*, the empirical evidence for the social benefits of homeownership includes the following. First, owner-occupants maintain their dwellings to a greater extent than renters (or landlords) maintain theirs: More money is spent on maintaining owner-occupied housing than is spent on maintaining rental property; homeowners spend more time gardening than renters; and rental property depreciates faster than owner-occupied property. Second, homeowners' children are more successful, measured by such factors as lower teenage pregnancy rates and higher educational attainment, than kids from non-owner-occupied dwellings. Third, homeowners socialize more with their neighbors.[*]

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[*] However, in a recent study, Grace Wong Bucchianeri finds little evidence that homeowners are happier by any of the following measures: life satisfaction, overall mood, overall feeling, and general moment-to-moment emotions.

FIGURE 1

Housing Asset as a Share of Households' Total Assets
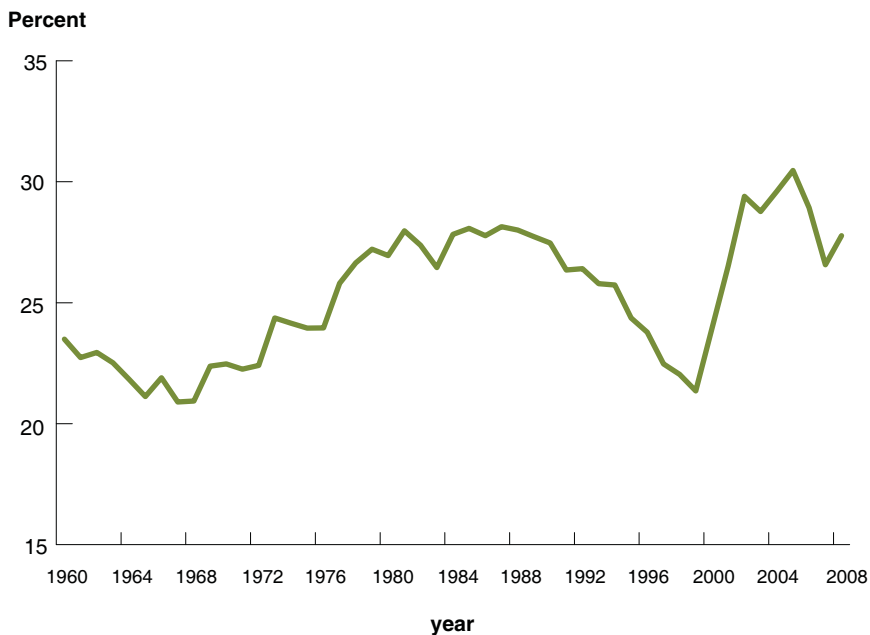
Data source: Federal Reserve Board, Flow of Funds (annual); last point plotted: 2008

Thanks to financial developments over the past several decades, more and more households with limited means are able to borrow, and those who are borrowing are also increasingly borrowing more. During the housing boom years, it was not uncommon for many households to purchase their houses with less than 20 percent down or even a zero down payment. For example, combo loans have been used to reduce the down payment requirement while avoiding mortgage insurance. The "80-20" combo loan program corresponds to the traditional loan-to-value ratio of 80 percent, using a second loan for the 20 percent down payment. The "80-15-5" program requires a 5 percent down payment provided by the homebuyer with the remaining 15 percent coming from a second loan.

There are many other new mortgage products, such as interest-only mortgage contracts, that allow households to pay only the interest part of the payment for a number of years. The result is that households don't accumulate any home equity during those years.

Even after households have accumulated some home equity, because of the declining cost of mortgage refinancing or home equity lines of credit, many households are now so easily able to tap their home equity to pay pressing bills that they simply do not accumulate wealth.[6] A popular

[6] We have seen a continued decline in average points and fees on conventional loans closed — from 2.5 percent of the average loan amount in 1983 to around 1 percent at the end of 1995 and 0.5 percent in 2004. (See Wenli Li's 2005 *Business Review* articles for more details.)

phrase used to describe this phenomenon during the housing boom years was "treating the house as an ATM." Economists have estimated that households' marginal propensity to consume out of increased housing wealth ranges from 3 to 4 cents on a dollar to over 10 cents, comparable to or even exceeding the marginal propensity to consume out of increases in financial wealth.[7] In other words, for every dollar of house-price appreciation, homeowners take out 3, 4, or even 10 cents of their home equity for other consumption purposes, such as making home improvements, buying new cars or appliances, or even taking vacations.[8] Owning a house is no more a means of forced savings than putting money into stock mutual funds is. Back in 1997, David Laibson pointed out that financial innovation may have reduced households' savings rate by providing too much "liquidity," weakening forced savings in previously illiquid assets.

Indeed, economic data show that the mortgage leverage ratio has been consistently rising since the mid 1980s. Home equity as a share of households' net worth has not changed much and even declined from the mid 1980s to the late 1990s and during the current crisis (Figure 2). The increase in the mortgage leverage ratio — the ratio of the amount of the mortgage to the value of the house — is prevalent among homeowners of all ages.[9] The cash-out mortgage refinancing rate

[7] See the article by Wenli Li and Rui Yao.

[8] In some instances, homeowners use cashed-out funds for home improvements, which potentially raise the value of the house and thus can be viewed as wealth building. We do not have updated statistics on the extent of such activity, but early studies by the Federal Reserve Board indicate that about 40 percent of homeowners who took out cash claimed to have used part of their cashed-out funds for home improvements during refinancing in 1998 and early 1999.

[9] See Wenli Li's 2005 *Business Review* article.

Mortgage Leverage and Home Equity Share
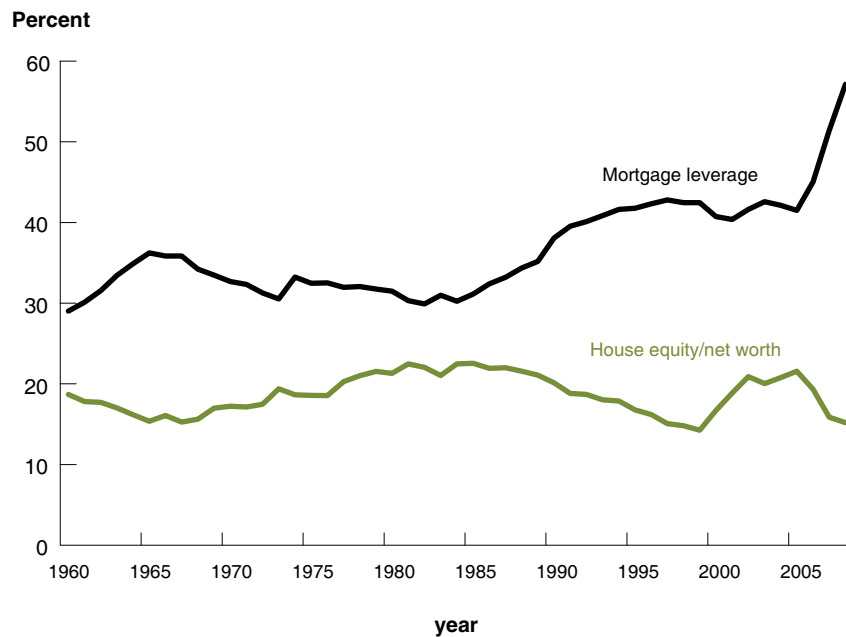
Percent

Data source: Federal Reserve Board, Flow of Funds (annual); last point plotted: 2008

Share of Cash-Out Mortgage Refinance in Total Refinances (number of loans)

Percent
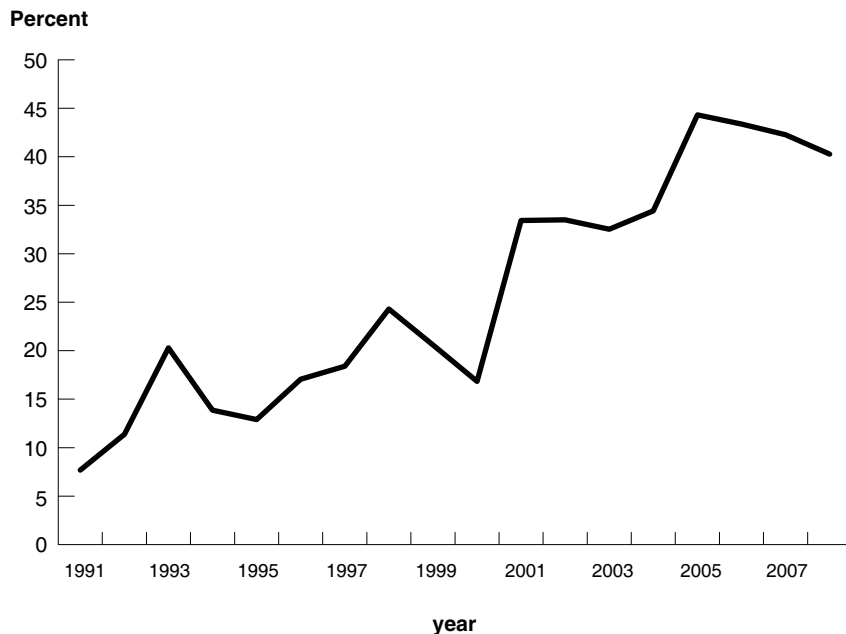
Data source: Federal Housing Finance Agency (annual); last point plotted: 2008

— the share of mortgage refinancings (number of loans) in which borrowers took out larger loans than they owed in relation to total mortgage refinancings — also trended up from as early as 1991 until 2006 (Figure 3).

Second Homes and Investment Properties. Not all housing combines consumption and investment decisions; vacation homes and investment properties have become increasingly important. According to Home Mortgage Disclosure Act data (HMDA), after a drop from the early 1990s to the late 1990s, the percent of mortgage loan applications for non-owner-occupied dwellings started to increase in 1999 and reached a peak of 13 percent in 2006 (Figure 4) that exceeded its previous peak in 1993. More recent data from LPS Analytics indicate a similar pattern. Starting from January 2005, the share of second homes and investment properties in all mortgages has been consistently increasing, flattening out in 2007, while the share of loans for primary residences has been declining (Figure 5).[10] In 2009, about 8 percent of total mortgages in the LPS database are for second homes and investment properties. The increasing share in investment properties is especially noticeable.

While combining a consumption good and an investment good tends to increase saving (at some cost, e.g., illiquidity, lack of diversification), vacation homes, compared with primary residences, generate much less consumption value to owners, on average, especially for working families.[11] In most cases, investment properties have

[10] Notice the discrepancy between the charts derived from HMDA data and those derived from LPS data. This discrepancy arises because the HMDA chart is based on all mortgage applications, while the LPS chart is based on approved loans.

[11] A working individual typically starts with two weeks of vacation time annually.

no consumption value to their owners. Furthermore, owners often expect to flip investment properties fairly quickly. This makes the purchase of investment properties more of a short- to medium-term investment strategy, similar to buying stocks. Therefore, buying second and investment homes is more susceptible to fluctuations in income and house prices than buying primary residences. In other words, owners are more likely to be constrained or have more incentives to walk away from their investment properties in times of difficulty, and this further weakens the argument that second and investment homes force households to save. Not surprisingly, during the current crisis, the foreclosure rates of investment properties have risen at a much faster rate than that of loans for primary residences. Even for second homes, foreclosure rates have also exceeded those for primary homes in recent months (Figure 6).

Nonetheless, second homes or vacation homes enjoy tax benefits similar to those for primary homes, provided that households stay in their second homes at least 14 days a year or that for at least 10 percent of the time the property is rented out. Investment property owners can deduct their operating losses, repair expenses, and depreciation from their income taxes. Taken together, all of the government programs to subsidize housing also increase investment in second homes and flipping (investment properties).
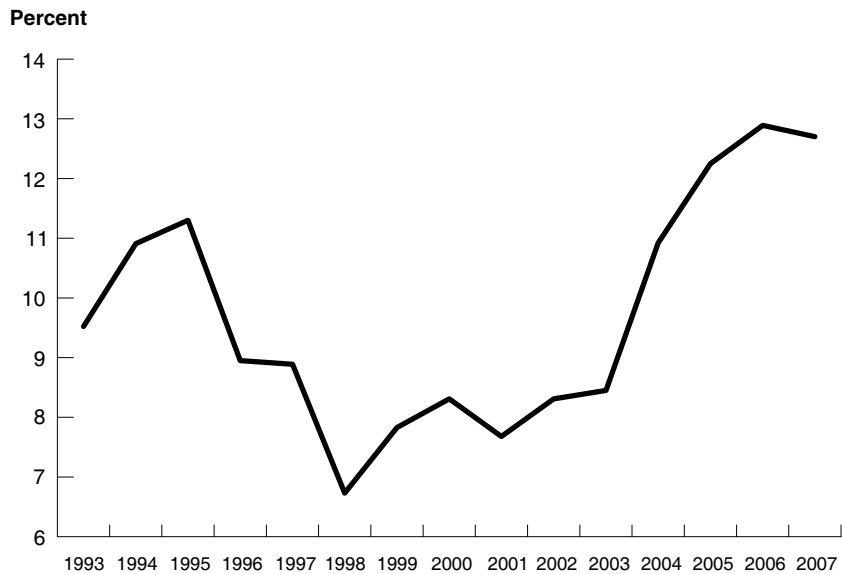
HOMEOWNERSHIP AND INVESTMENT

Another argument for homeownership often heard is that housing is a relatively safe asset that pays off in the long run. This argument turns out to be a myth as well.

The Returns to Investing in Housing. Similar to returns to individual stocks, the return and volatility
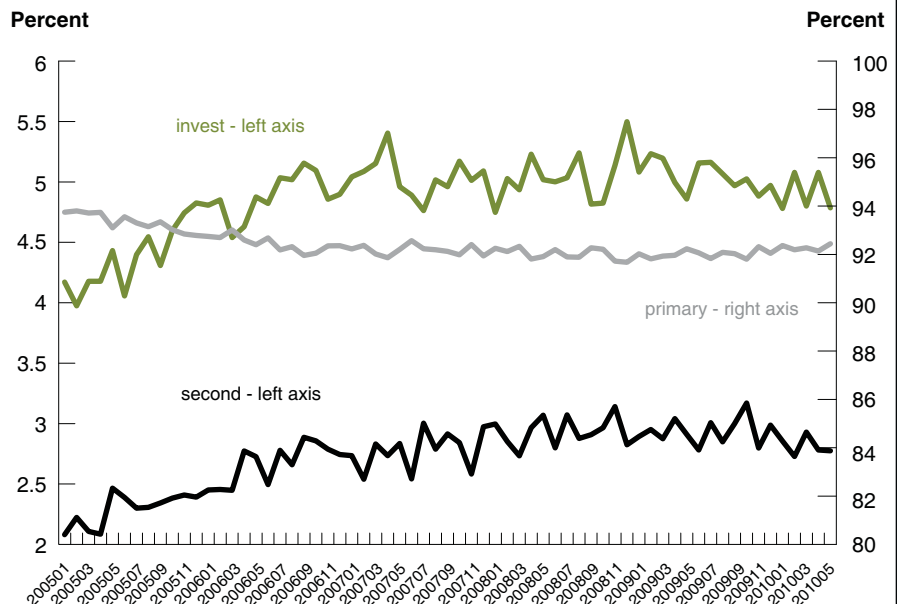
FIGURE 4

Percent of Non-Owner-Occupied Home Purchases

Percent

Data source: Home Mortgage Disclosure Act (HMDA) data (annual); last point plotted: 2008

FIGURE 5

Share of Primary, Second, and Investment Homes

Percent   **Percent**

Data source: LPS Applied Analytics, Inc. (monthly); last point plotted: July 2009

of investing in housing vary across time and depend importantly on market conditions in particular locations. Over the past three decades, in the aggregate, house prices have indeed fluctuated much less than the prices of stocks. Housing overall has also fared better in crises than other assets. Even during this crisis, the S&P/Case-Shiller home price index (Composite 10)[12] adjusted by the consumer price index (shelter) indicates that house prices as of the second quarter of 2009 have fallen to only a tad below their 2004 levels (Figure 7).

But for most people, the volatility of their local housing market is more relevant than the volatility of the national market. And volatility in individual housing markets, like that of individual company stocks, can be a lot larger. For example, the standard deviation of real annual house price changes between 1975 and 2008 was 3.4 for the nation, 1.5 percent or less in Cleveland, Indianapolis, and Louisville, but 11.6 percent in Boston, 9.9 percent in Honolulu, and 9.7 percent in San Jose. This high volatility in local housing markets implies that, like owning individual stocks, households can lose big as well as win big when buying and selling houses. And the opportunities for diversification are fewer in housing markets than in stock markets. While someone can buy individual stocks or an overall stock index such as the S&P 500 market index offered by most mutual fund companies, the market for trading such price indexes for housing at the national and local level remains very thin. (We will talk about this again in the next section.)

[12] The 10 cities are Boston, Chicago, Denver, Las Vegas, Los Angeles, Miami, New York, San Diego, San Francisco, and Washington, D.C.
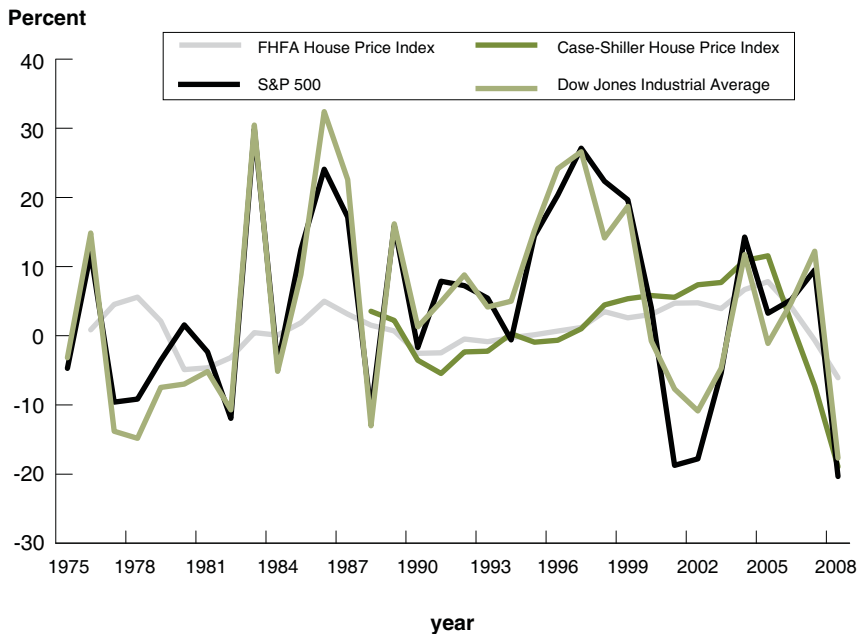
FIGURE 6

Mortgage Foreclosure Rates
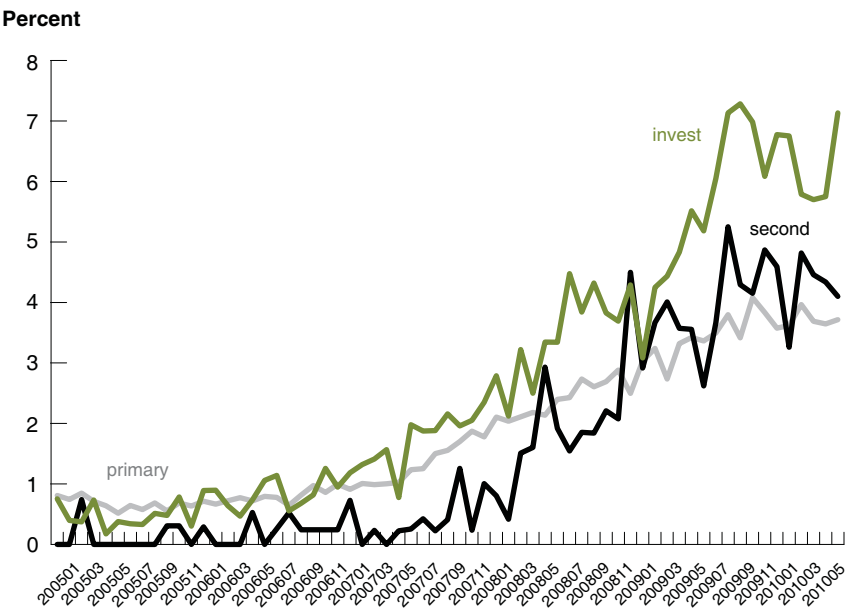
Data source: LPS Applied Analytics, Inc. (monthly); last point plotted: July 2009

FIGURE 7

Real Rate of Return for Housing and Stock Indexes
(adjusted by headline consumer price index)

Data source: Federal Housing Finance Agency; S&P; Dow Jones (annual); last point plotted: 2008

Comparing the rate of return on housing with that of other assets such as stocks is a tricky business. Ignoring leverage and tax concerns, it is not obvious that owning housing as an asset pays off in the long run. We construct Sharpe ratios for the 10 cities included in the Case-Shiller house price index and the nation. A Sharpe ratio is a measure of an asset's reward per unit of risk and helps us compare risk-adjusted returns across assets. We find that between 1976 and 2008, of the 10 cities, Denver, Chicago, Los Angeles, and Las Vegas all have much lower Sharpe ratios than the S&P 500 stock index. In other words, in risk-adjusted terms, the return to housing in these areas is lower than the return to holding stocks. The Sharpe ratios for Miami and Washington, D.C. are also a tad below that of the S&P 500. Although the Sharpe ratio for the overall house price index is somewhat higher, as we argued earlier, it is not clear that households have access to this market.

Some Complications in Calculating the Returns to Housing. Of course, this calculation is incomplete because leverage can magnify even modest returns. Given that houses are usually bought with big loans (as a matter of fact, a house is the only asset a family with limited means can buy with a big loan), they can bring in returns much higher than the house-price appreciation rate. Here is an example. Suppose a family bought a house for $200,000 with a $40,000 down payment (equity). In one year, the house's price appreciated 2 percent. The rate of return for the family for that year was actually a whopping 10 percent (= ($200,000 * 2 percent)/$40,000). But leverage also increases risk. In that sense, buying houses with a large mortgage loan is similar to buying stocks on margin. It is great in a favorable (bull) market,

but it works against the owner in an unfavorable (bear) market. Let's say that the $200,000 house a family purchased with a $160,000 mortgage falls in value to $150,000. The outstanding debt of $160,000 exceeds the value of the property. Because the family owes more than it owns, it has negative net worth. Leverage is therefore a double-edged sword.

There are also other complications in calculating the effective rates of return on housing because of additional costs associated with owning one's own residence and the various government subsidies. Homeowners must pay taxes on their properties in addition to maintenance fees. Effective property tax rates range anywhere from 0.17 percent to 2.77 percent of the house value, according to the National Association of Home Builders, and maintenance fees are typically 1 to 2 percent of the house value. Mortgage interest payments and property taxes, however, are deductible from federal income taxes. Assuming an annual depreciation rate of 2.5 percent, a property tax rate of 1.5 percent, a mortgage interest rate of 7 percent, and a marginal income tax rate of 25 percent for a typical taxpayer, the adjusted real rate of return on housing actually falls below zero $(1.3-2.5-1.5+0.25(7+1.5))=-0.575$ percent! Remember that 1.3 percent is the real rate of return of the national house-price index between 1975 and 2009.[13] Meantime, under the 25 percent marginal income tax rate for a typical taxpayer, the rate of return on stocks during the same period falls only to $4.5*(1-0.25)=3.375$ percent.

It is worth reiterating that the effective rate of return we just calculated

is for an average homeowner. For many moderate- to low-income homeowners, the effective rate of return from investing in housing may be smaller. The reason is as follows. Lower-income homeowners benefit less from deductions of property tax and mortgage interest payments because of the progressive nature of the federal income tax and the fact that property tax is calculated solely on the value of the property. To claim the mortgage interest deduction, taxpayers must itemize when filing federal tax returns, rather than taking the standard deduction. Because of the progressive nature of the federal income tax, the value of itemized deductions rises as income rises. Those facing the highest marginal tax rates — high-income taxpayers — receive a much more powerful tax benefit from tax deductions than low-income taxpayers receive. As a result, low-income taxpayers are less likely to itemize, placing the benefits of the home mortgage interest deduction out of reach. In addition, high-income earners tend to have more valuable houses. In general, the greater the house value, the greater the interest payment on the associated mortgage. The table on page 28 illustrates the regressive nature of the deduction for home mortgage interest. Those in lower-income groups claim few deductions, while those earning over $75,000 in adjusted gross income claim the vast majority.

Housing as a Hedge Against Other Assets. Although investing in housing may not be as attractive an investment strategy as conventional wisdom claims, owning one's own residence can be used as a hedge against ownership of other assets. Standard portfolio theory predicts that owning one's house, especially the build-up of home equity, helps diversify risks households face that are not positively correlated with house-

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[13] Note that we didn't take out the mortgage interest from the rate of return on the grounds that a stock bought on margin would have required paying interest on the borrowed funds as well.

Home Mortgage Interest Deduction Disproportionately Benefits Upper-Income Taxpayers, 2003

Adjusted Gross Income	Percentage of Returns Claiming Mortgage Interest Deduction	Percentage of All Tax Returns in Income Group	Average Mortgage Interest Deduction per Return
Under $20,000	4.0%	37.8%	$278
$20,000 - $29,999	13.1%	14.1%	$910
$30,000 - $39,999	24.2%	10.7%	$1,674
$40,000 - $49,999	35.2%	8.0%	$2,462
$50,000 - $74,999	50.9%	13.3%	$4,068
$75,000 - $99,999	69.0%	7.3%	$6,210
$100,000 - $199,999	78.9%	6.8%	$8,928
$200,000 and over	75.7%	1.9%	$14,374

Source: Internal Revenue Service, Tax Foundation calculations.

price movement. For instance, between January 1998 and December 2007, the correlation coefficients of the S&P/Case-Shiller house price index with the Lehman aggregate bond index and the S&P 500 stock index are, respectively, -0.056, and -0.086. This means that when financial assets fall in value, house prices typically rise, and vice versa. Thus, housing potentially can be used to hedge against shocks to investment in stocks, at least during the period in question.[14]

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[14] Given the low correlation coefficients, we do not wish to emphasize the potential benefits of homeownership as a hedging instrument, especially since only 40 percent of households participate in the stock market, while nearly two-thirds of Americans own their primary residences.

One question naturally arises: Is owning one's residence the most efficient way to make a portfolio investment in housing? Remember, owning a home subjects a household's wealth to shocks to local housing markets, which are much more volatile than the housing market as a whole. In principle and ideally, one should be able to take advantage of movements in house prices without having to own one's residence. Furthermore, one should even be able to hedge against house-price movements in the local market by owning shares of other housing markets. While such markets exist, they are as yet not feasible for most households.

Housing derivatives first appeared in 2006 as futures contracts (S&P/

Case-Shiller house-price index futures and options) on the Chicago Mercantile Exchange. However, in the euphoria of the housing boom of the past decade, they attracted little attention from builders and developers. Investors prefer to make bearish bets via more customized instruments. In June 2009, Karl Case and Robert Shiller, the namesakes of the Case-Shiller house-price index, launched a product called MacroShares to open up the market in order to retain investors. MacroShares are securities that reflect the value of the S&P/Case-Shiller house-price indexes in 10 large urban centers. The securities are issued in pairs: one for investors who wish to bet on the upward movement of house prices, and one for those who think

prices will fall. Unlike actual houses, MacroShares are traded on public exchanges and are therefore liquid. Trading in MacroShares has been light so far, but there are hopes that investors will participate in this market more after their experience during the current crisis.[15]

HOMEOWNERSHIP AND MOBILITY

Owning one's home may also have important implications for households' mobility. A mobile society is important for an efficient labor market. If households cannot move to gain access to better jobs in alternative labor markets, the quality of the match in the labor market will suffer. People will be stuck in jobs they hate and for which they are not suited, and employers will have less-productive employees. Furthermore, when local economies decline, unemployed homeowners may find it difficult to search for new jobs. Ten years ago, British economist Andrew Oswald argued that homeownership was positively correlated with unemployment: that is, the higher a country's rate of homeownership, the higher its long-term unemployment rate. This claim is still controversial, but economists have begun to explore the connections between mobility and homeownership more rigorously.

Homeowners may be reluctant to move for several reasons. First, in addition to a range of social concerns such as schools, friends, and families, homeowners may be reluctant to move because of the added financial burden. Selling and buying a house incurs substantial transaction costs (typically 6 to 8 percent of the house value). Having negative home equity also requires households to put up additional cash beyond standard closing costs to be able to move. Of course, households can also walk away from their houses by defaulting or filing for bankruptcy.[16] But such actions have a derogatory impact on their ability to borrow in the future.

Second, even when households are not financially constrained and have the funds to sell the house and move, they may still be reluctant to move if doing so means selling their house at a loss. Economists have termed this reluctance "an aversion to loss." Using data from downtown Boston in the 1990s, David Genesove and Chris Mayer find that condominium owners are averse to realizing losses. Those owners that have higher loan-to-value ratios (and, thus, are more likely to experience a nominal loss and have to pay the bank) tended to set higher asking prices and were much less likely to sell than other sellers, after controlling for other observables, including owner type (resident owner or investor), estimated price index at the time of entry, estimated value at last sale, and so forth.[17]

The United States is generally a mobile society. Around 12 percent of American homeowners typically move in any two-year period, yet families with negative equity are around half as likely to relocate. Those facing higher mortgage rates are 25 percent less likely to move, according to a recent study by Fernando Ferreira, Joseph Gyourko, and Joseph Tracy that used data from the American Housing Survey from 1985 to 2005.

Lower mobility by definition can be observed only over time, so it will take a few years to know how the impact of negative equity will play out in this cycle.

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CONCLUSION

Our review of the economic benefits and costs of homeownership suggests that the economic case for subsidizing homeownership has, at the minimum, been oversold. And we have not addressed the offsetting costs. Indeed, economists have found that government subsidies incur a cost to the general economy. For example, in his article, Martin Gervais studied the welfare consequences of the preferential tax treatment of housing capital and found that the current tax structure crowds out business capital and leads to a loss in consumption of over 1 percent. Separately, Karsten Jeske and Dirk Krueger have studied the role of implicit guarantees for government-sponsored enterprises and found that they reduce aggregate welfare, as measured by changes in consumption, by 0.32 percent.

The net dollar value of owning one's home remains a question for economists and policymakers to consider. One thing that is certain is that homeownership is not for everyone, and thus, based on the economic benefits, the case for trying to achieve a nation of homeowners needs to be rethought. ⓑⓡ

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[15] Another potential way to diversify housing risk is through the purchase of securitized real estate, or equity real estate investment trusts (EREITs). However, EREITs, especially those on residential housing, remain a very small share of the aggregate real estate investment available. As pointed out in Elul (2008), the most important limit on hedging housing price risk through the use of an aggregate index is that the majority of movements in individual house prices are due to idiosyncratic factors, rather than resulting from aggregate volatility.

[16] See Wenli Li's 2009 *Business Review* article.

[17] Despite all the controls, it is still highly likely that leverage ratios proxy for other important household financial characteristics such as income and liquid wealth. Thus, readers should take this argument with a grain of salt.

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BANKRUPTCY REFORM'S ROLE IN THE MORTGAGE CRISIS

This paper argues that the U.S. bankruptcy reform of 2005 played an important role in the mortgage crisis and the current recession. When debtors file for bankruptcy, credit card debt and other types of debt are discharged — thus loosening debtors' budget constraints. Homeowners in financial distress can therefore use bankruptcy to avoid losing their homes, since filing allows them to shift funds from paying other debts to paying their mortgages. But a major reform of U.S. bankruptcy law in 2005 raised the cost of filing and reduced the amount of debt that is discharged. The authors argue that an unintended consequence of the reform was to cause mortgage default rates to rise. Using a large data set of individual mortgages, they estimate a hazard model to test whether the 2005 bankruptcy reform caused mortgage default rates to rise. Their major result is that prime and subprime mortgage default rates rose by 14 percent and 16 percent, respectively, after bankruptcy reform. The authors also use difference-in-difference to examine the effects of three provisions of bankruptcy reform that particularly harmed homeowners with high incomes and/or high assets and find that the default rates of affected homeowners rose even more. Overall, they calculate that bankruptcy reform caused the number of mortgage defaults to increase by around 200,000 per year even before the start of the financial crisis, suggesting that the reform increased the severity of the crisis when it came.

Working Paper 10-16, "Did Bankruptcy Reform Cause Mortgage Default Rates to Rise?"

Wenli Li, Federal Reserve Bank of Philadelphia; Michelle J. White, University of California-San Diego; and Ning Zhu, University of California-Davis

BASEL II AND CAPITAL TO SUPPORT MORTGAGE PORTFOLIOS

The recent mortgage crisis has resulted in several bank failures as the number of mortgage defaults increased. The current Basel I capital framework does not require banks to hold sufficient amounts of capital to support their mortgage lending activities. The new Basel II capital rules are intended to correct this problem. However, Basel II models could become too complex and too costly to implement, often resulting in a trade-off between complexity and model accuracy. In addition, the variation of the model, particularly how mortgage portfolios are segmented, could have a significant impact on the default and loss estimated and thus could affect the amount of capital that banks are required to hold. This paper finds that the calculated Basel II capital varies considerably across the default prediction model and segmentation schemes, thus providing banks with an incentive to choose an approach that results in the least required capital for them. The authors also find that a more granular segmentation model produces smaller required capital, regardless of the economic environment. In addition, while borrowers' credit risk factors are consistently superior, economic factors have also played a role in mortgage default during the financial crisis.

Working Paper 10-17, "Can Banks Circumvent Minimum Capital Requirements?

The Case of Mortgage Portfolios under Basel II," Christopher Henderson, Federal Reserve Bank of Philadelphia, and Julapa Jagtiani, Federal Reserve Bank of Philadelphia

THE ROLE OF INVENTORIES IN THE ECONOMIC CRISIS

This paper examines the role of inventories in the decline of production, trade, and expenditures in the U.S. in the economic crisis of late 2008 and 2009. Empirically, the authors show that international trade declined more drastically than trade-weighted production or absorption and there was a sizeable inventory adjustment. This is most clearly evident for autos, the industry with the largest drop in trade. However, relative to the magnitude of the U.S. downturn, these movements in trade are quite typical. The authors develop a two-country general equilibrium model with endogenous inventory holdings in response to frictions in domestic and foreign transactions costs. With more severe frictions on international transactions, in a downturn, the calibrated model shows a larger decline in output and an even larger decline in international trade, relative to a more standard model without inventories. The magnitudes of production, trade, and inventory responses are quantitatively similar to those observed in the current and previous U.S. recessions.

Working Paper 10-18, "The Great Trade Collapse of 2008-09: An Inventory Adjustment?" George Alessandria, Federal Reserve Bank of Philadelphia; Joseph P. Kaboski, Notre Dame University; and Virgiliu Midrigan, New York University

BAYESIAN FORECASTING USING A DEMOCRATIC PRIOR

This paper proposes Bayesian forecasting in a vector autoregression using a democratic prior. This prior is chosen to match the predictions of survey respondents. In particular, the unconditional mean for each series in the vector autoregression is centered around long-horizon survey forecasts. Heavy shrinkage toward the democratic prior is found to give good real-time predictions of a range of macroeconomic variables, as these survey projections are good at quickly capturing end-point shifts.

Working Paper 10-19, "Evaluating Real-Time VAR Forecasts with an Informative Democratic Prior," Jonathan H. Wright, Johns Hopkins University, and Visiting Scholar, Federal Reserve Bank of Philadelphia

SHORT-TERM NOMINAL INTEREST RATE AND INFLATION EXPECTATIONS

The author shows that the short-term nominal interest rate can anchor private-sector expectations into low inflation, more precisely, into the best equilibrium reputation can sustain. He introduces nominal asset markets in an infinite horizon version of the Barro-Gordon model. The author then analyzes the subset of sustainable policies compatible with any given asset price system at date t=0. While there are usually many sustainable inflation paths associated with a given set of asset prices, the best sustainable inflation path is implemented if and only if the short-term nominal bond is priced at a certain discount rate. His results suggest that policy frameworks must also be evaluated on their ability to coordinate expectations.

Working Paper 10-20, "Sustainable Monetary Policy and Inflation Expectations," Roc Armenter, Federal Reserve Bank of Philadelphia

ASSESSING THE PERFORMANCE OF CREDIT RATING SYSTEMS

In this paper, the authors use credit rating data from two Swedish banks to elicit evidence on banks' loan monitoring ability. They test the banks' ability to forecast credit bureau ratings, and vice versa, and show that bank ratings are able to predict future credit bureau ratings. This is evidence that bank credit ratings, consistent with theory, contain valuable private information. However, the authors also find that public ratings have an ability to predict future bank ratings, implying that internal bank ratings do not fully or efficiently incorporate all publicly available information. This suggests that risk analyses by banks or regulators should be based on both internal bank ratings and public ratings. They also document that the credit bureau ratings add information to the bank ratings in predicting bankruptcy and loan default. The methods the authors use represent a new basket of straightforward techniques that enable both financial institutions and regulators to assess the performance of credit rating systems.

Working Paper 10-21, "Credit Ratings and Bank Monitoring Ability," Leonard I. Nakamura, Federal Reserve Bank of Philadelphia, and Kasper Roszbach, Sveriges Riksbank, University of Gronigen, and Visiting Scholar, Federal Reserve Bank of Philadelphia