



Economic Insights

Fifty Years of the Survey of
Professional Forecasters

Regional Spotlight

Kitchen Conversations: How
Households Make Economic
Choices

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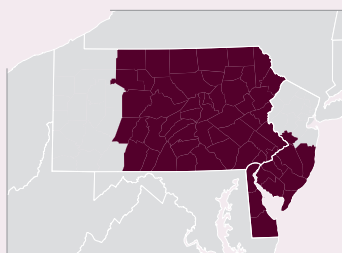
Fourth Quarter 2019 Volume 4, Issue 4

Economic Insights

A publication of the Research Department of the Federal Reserve Bank of Philadelphia

The views expressed by the authors are not necessarily those of the Federal Reserve.

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ISSN 0007-7011

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About the Cover

Philadelphia's most famous citizen, Benjamin Franklin, has graced the \$100 bill since the newly created Federal Reserve began issuing "Federal Reserve Notes" in 1914. This particular image is taken from H.B. Hall's engraving of Joseph-Siffred Duplessis's 1785 portrait of Franklin, which is currently on view at the National Portrait Gallery in Washington, D.C. In the background are details from the 2009 redesign of the \$100 bill, including a reproduction of the Declaration of Independence. Franklin served on the "Committee of Five" that drafted the Declaration and presented it to the Second Continental Congress, then meeting at the Pennsylvania State House, on July 4, 1776. The State House still stands today, just two blocks from the Federal Reserve Bank of Philadelphia, and is now known as Independence Hall.

Photo by Rich Wood.



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Fifty Years of the Survey of Professional Forecasters

Over the past half-century, the Survey of Professional Forecasters has asked—and helped answer—some of the most important questions about our economy.

BY DEAN CROUSHORE AND TOM STARK

Dean Croushore is a visiting scholar at the Federal Reserve Bank of Philadelphia and a professor of economics and Rigsby Fellow at the Robins School of Business, University of Richmond. **Tom Stark** is the assistant director and research officer, Real-Time Data Research Center, at the Federal Reserve Bank of Philadelphia.

The Survey of Professional Forecasters (SPF) was created 50 years ago and provides a long track record of macroeconomic forecasts. Over many decades, the survey has not only provided timely information for policymakers and other economic analysts but also helped answer numerous research questions. This article describes the survey's structure, provides a short history of the survey, highlights some of the major ways in which the survey has been used by researchers, and discusses the relationship between the survey and the Real-Time Data Set for Macroeconomists (RTDSM).

The Survey's Structure

The staff of the Real-Time Data Research Center at the Federal Reserve Bank of

Philadelphia sends surveys to professional forecasters around the country once each quarter, immediately after the U.S. Bureau of Economic Analysis (BEA) releases data on the previous quarter's value of gross domestic product (GDP). Currently, the forecasters are given just over a week to send in their forecasts. The survey staff then quickly compiles the results and generally releases the results to the press and the public immediately. For example, the survey staff released the First Quarter 2018 survey results just 14 days after the BEA released GDP for the second quarter of 2019 and just three days after the survey deadline (Figure 1).

The respondents forecast a rich set of variables. These forecasts are for the values the variables will take in the upcoming quarters and the upcoming years.

The forecasts for these variables are all point forecasts, which means they are the forecasters' projections of the variable for a given date. The forecasters provide these point forecasts for the current quarter and each of the next four quarters. They also provide point forecasts for the annual average for the current year and the next year. For some variables, the annual forecasts cover the following two years, as well. For example, forecasters responding to the Third Quarter 2019 survey provided point forecasts for the unemployment rates in the third and fourth quarters of 2019 and the first, second, and third quarters of 2020, and for the annual average unemployment rates in 2019, 2020, 2021, and 2022 (Figure 2).

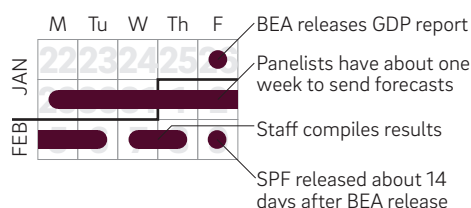
Forecasters also provide a variety of other forecasts. One is a probability

FIGURE 1

The SPF's Fast Turnaround

Currently, the Fed releases the SPF two weeks after the BEA releases its first GDP report for each quarter.

Representative Example: 2018 Q1



The timeline typically straddles two months

FIGURE 2

Forecast Horizon in a First-Quarter Survey

Forecasters provide point forecasts for current quarter as well as upcoming quarters and years.



forecast, which, unlike a point forecast, refers to the possibility that a variable falls within a given range. For example, Figure 3 shows a probability forecast for real GDP growth for the year 2020 from the Third Quarter 2019 survey. The numbers on the horizontal axis are the ranges, which vary from less than -3 percent to greater than 5.9 percent. Each forecaster supplies a probability for each range. For example, a forecaster might give a 30 percent probability that GDP growth will be between 2.0 percent and 2.9 percent. Then, the survey staff averages those probabilities across forecasters to get the graph shown in Figure 3. The blue bars show the average probabilities across forecasters in the Third Quarter 2019 survey, while the red bars show the probabilities from the Second Quarter 2019 survey three months earlier. A comparison of the red and blue bars gives the reader insight into how the forecasts have changed from one quarter to the next. In Figure 3, the probabilities from some of the higher ranges have declined, while those for some of the lower ranges have increased, suggesting an increased probability that GDP growth will be lower than was forecast in the previous survey. The forecasters provide probability forecasts

for real GDP growth, the unemployment rate, and the inflation rate.

Forecasters also provide long-term forecasts for various variables. These forecasts cover many more periods in the future than just the next few years. For example, in every survey, forecasters provide a 10-year-ahead forecast for inflation. Figure 4 shows what those forecasts have looked like since 1991. The red line shows, at each date, the forecast for the average annual inflation rate for the following 10 years. The shaded area shows where the middle 50 percent of the forecasts lie. The graph shows the general decline in the forecasted long-term inflation rate, from about 4 percent in the early 1990s to just over 2 percent in more recent years. The shaded area also generally narrows over time, showing that disagreement among forecasters about the long-term rate of inflation has also declined.

In each survey, forecasters also estimate the probability that real GDP will decline in the current quarter and in each of the following four quarters. For example, a forecaster who thinks a recession is coming later in the year might report a probability of a decline in real GDP of 20 percent in the current quarter, 40 percent next quarter, 60 percent two quarters

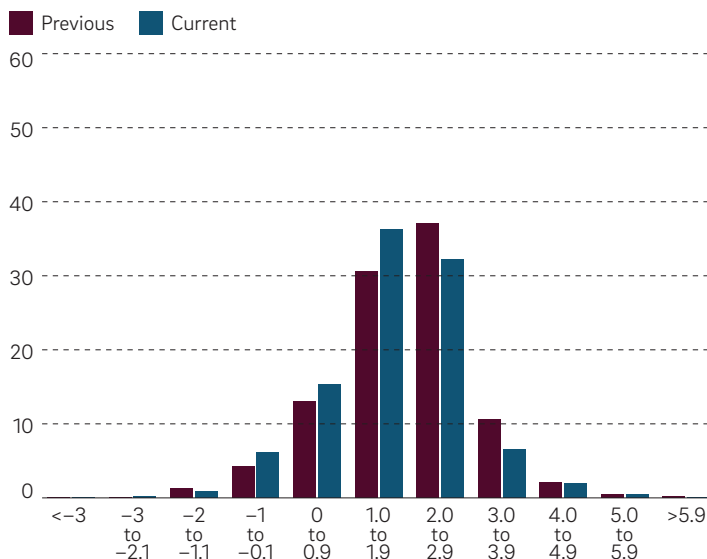
ahead, 80 percent three quarters ahead, and 90 percent four quarters from now. The survey reports the average of those probabilities across forecasters. This information can be used to explore the likelihood of a future recession. In one enterprising use of the data, David Leonhardt of the *New York Times*, in a 2002 article, created the Anxious Index, which plots the average probability for a decline in real GDP across the SPF forecasters in the first quarter after the survey was taken. Figure 5 shows the value of the Anxious Index from 1968 to 2019. The gray bars indicate periods of recession. Clearly, the Anxious Index typically rises during recessions and sometimes even signals a coming recession.

The four types of forecasts described so far—point forecasts, probability forecasts, long-term forecasts, and GDP decline forecasts—are reported in each survey. In addition, the survey asks a number of special questions—some during one survey each year and others on an occasional basis depending on the current economic situation. There are two regular questions asked once each year about the following: 10-year annual-average forecasts for 1) real GDP growth, 2) productivity growth, 3) returns to the S&P 500 stock index, and 4)

FIGURE 3

Probability Forecasts from Two Consecutive Surveys

Between second and third quarters of 2019, forecasters raised the probability of GDP growth at the lower ranges. Mean probabilities, percent, for real GDP growth range (year over year) in 2020, Second Quarter 2019 and Third Quarter 2019 surveys



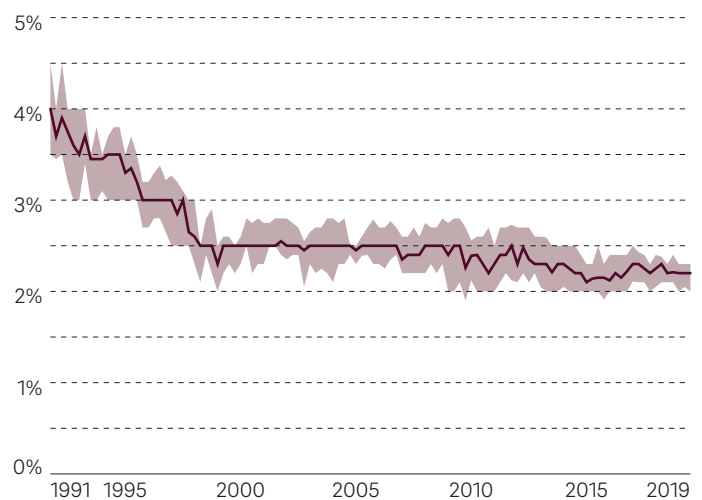
Source: Real-Time Data Research Center, Federal Reserve Bank of Philadelphia.

FIGURE 4

Ten-Year Forecasts of Inflation

Long-term inflation forecasts have declined, and so has disagreement among forecasters.

Projections for the 10-year annual-average rate of CPI inflation (median and inter-quartile range), quarterly survey dates fourth-quarter 1991 to third-quarter 2019



Source: Real-Time Data Research Center, Federal Reserve Bank of Philadelphia.

interest rates on three-month Treasury bills and 10-year Treasury bonds; and estimates of the natural rate of unemployment, or what the unemployment rate would be in the absence of major shocks to the economy, such as those that cause recessions.

The survey also asks questions relevant to current developments in the economy. Particularly notable special questions have included: (1) forecasts of housing prices, initially asked in the first-quarter survey in 2010; and (2) how the Fed's inflation target affects the forecasters' inflation forecasts, asked in the second-quarter survey of 2012.

The responses to the 2012 question about inflation targeting were particularly timely (and informative) because the question closely followed the Board of Governors' January 25, 2012, press release stating that the Federal Open Market Committee (FOMC) had reached broad agreement on some principles regarding its longer-run goals and monetary policy strategy: "The Committee judges that inflation at the rate of 2 percent, as measured by the annual change in the price index for personal consumption expenditures, is most consistent over the longer run with the Federal Reserve's statutory mandate." Almost three-fourths of the SPF panelists indicated that their long-run inflation forecasts did not differ in an economically meaningful way from the FOMC's goal of 2 percent. However, eight panelists indicated that they did not believe the FOMC would achieve its goal and wrote down long-run inflation forecasts in excess of 2 percent.

Value of the SPF

The SPF has a large audience, as judged by statistics on how often the survey results are viewed on the Federal Reserve Bank of Philadelphia's website. In 2018, the survey generated more than

45,000 unique hits to the Philadelphia Fed's external webpages. The audience consists of academic researchers who use the SPF data to measure people's expectations about the future movements of economic variables, policymakers (such as those in government or at the Federal Reserve Board) whose policy choices depend on what people expect to happen in the future, and businesspeople whose plans depend on how they think the economy is likely to evolve. Former Federal Reserve Governor Daniel K. Tarullo put it best in his February 12, 2010, testimony before the U.S. Senate Subcommittee on Security and International Trade and Finance when he said, "The Federal Reserve added questions to the Survey of Professional Forecasters to elicit from private-sector forecasters their subjective probabilities of forecasts of key macroeconomic variables, which provides to us, and to the public, better assessments of the likelihood of severe macroeconomic outcomes."

The survey staff maintains a database of each participant's forecasts in each survey. Each quarterly survey includes a list of the participants in recent surveys, so that readers will know who the participants are. But in the publicly available database of survey results, no forecast is linked to a person's name. This preserves the forecaster's anonymity. Research findings suggest that in surveys in which forecasts are linked to the forecasters' names, some forecasters are much more likely to seek publicity by providing extreme forecasts to stand out from the pack.¹ The SPF has always tried to gather forecasters' true forecasts and prevent any motive for publicity-seeking.

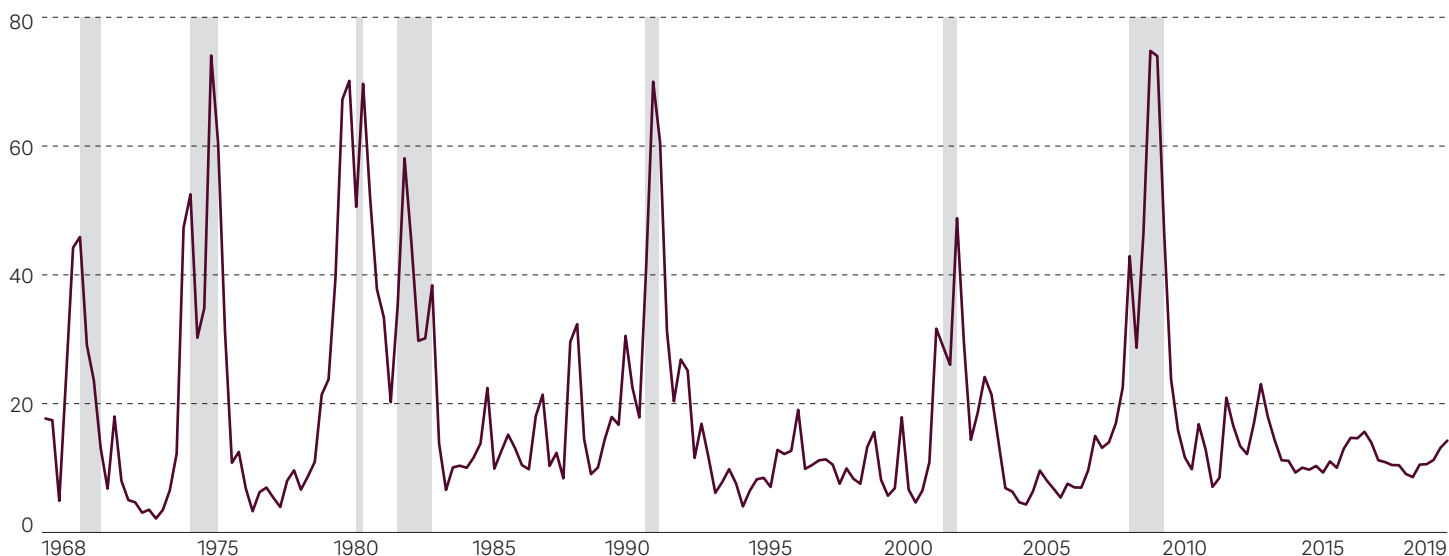
One of the survey's strengths is the documentation provided by the survey staff. Many other surveys of forecasters exist, but they do not match the SPF's level of documentation about the survey's methods and results. A researcher can find the details

FIGURE 5

The Anxious Index

The Anxious Index typically rises during recessions and sometimes even signals a coming recession.

Percent probability of decline in real GDP in the following quarter, surveys conducted in Fourth Quarter 1968 to Third Quarter 2019



Note: Shaded areas indicate recessions.

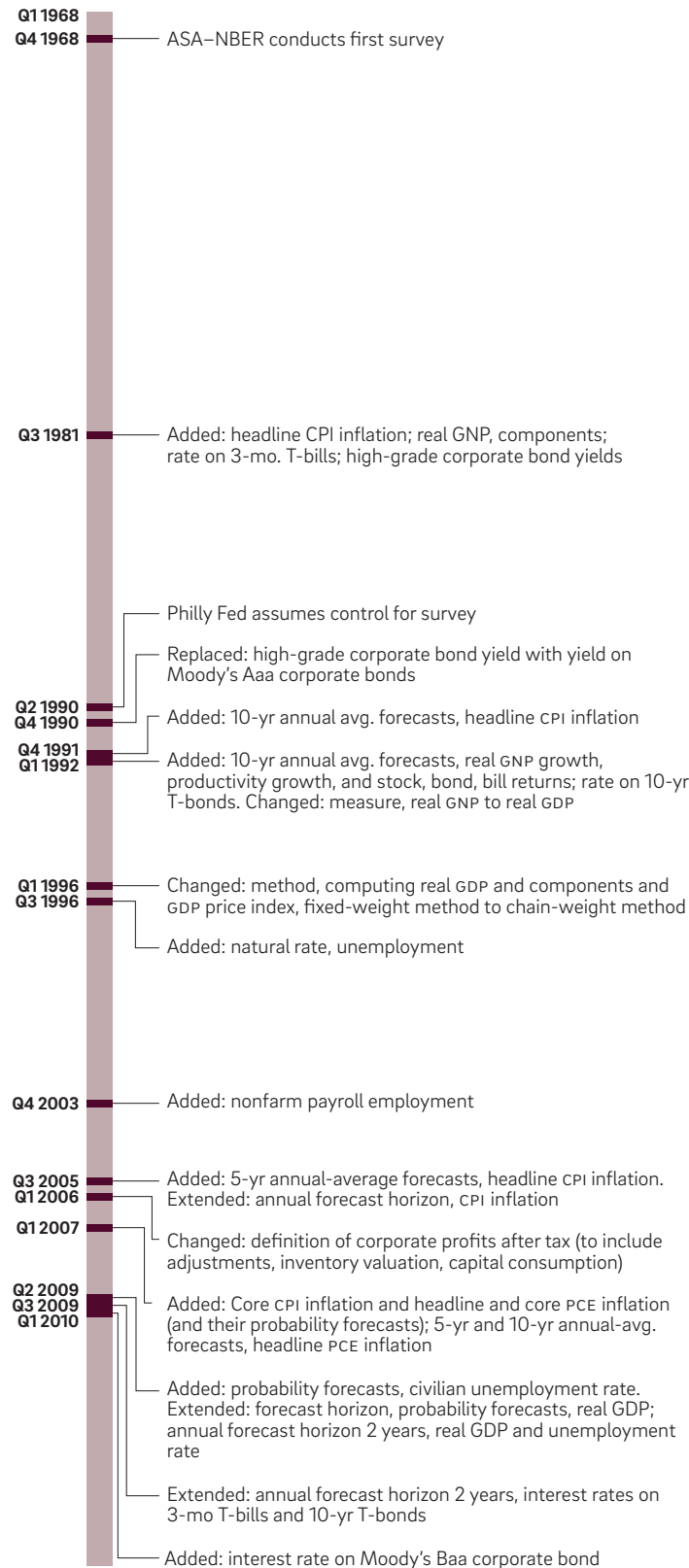
Source: Real-Time Data Research Center, Federal Reserve Bank of Philadelphia.

FIGURE 6

The SPF's Evolution

As the macro economy changes, so too does the SPF.

Major additions/changes to the survey



of every important aspect of the survey posted on the Philadelphia Fed's website.² The documentation makes it easy for a researcher, policymaker, or financial economist to understand exactly what the survey's results are and how to interpret them. It covers all information critical for data users, such as variable definitions and transformations, the survey's timing, and changes to the survey, the last of which should help researchers avoid errors when comparing forecasts from different surveys. The documentation is constantly being updated to reflect new information about the survey as it evolves.

History of the Survey of Professional Forecasters

Fifty years ago, the American Statistical Association (ASA) and the National Bureau of Economic Research (NBER) joined forces to collect professional forecasts for the U.S. economy. They created a survey to ask forecasters to provide detailed forecasts for numerous economic variables and how those variables would change over time. Victor Zarnowitz of the University of Chicago was instrumental in the history of the survey, writing about the survey's results and studying the accuracy of its forecasts. The survey was administered at NBER. Participants in the survey included the members of the Business and Economic Statistics Section of the ASA, and the survey was called the ASA-NBER Economic Outlook Survey.³ Notably, the survey was the first of its kind to offer quarterly updates on forecasts for the U.S. economy. The Livingston survey of forecasters, which at the time was being conducted by the *Philadelphia Inquirer* newspaper, came out just twice each year and was much more limited in scope.⁴ Zarnowitz promoted the ASA-NBER Economic Outlook survey by writing news releases published in various NBER outlets, including the *NBER Reporter*, which was distributed widely to economists, and the *American Statistician*, which was distributed to statisticians. Zarnowitz also wrote a series of academic journal articles to demonstrate the use of the survey in research.⁵

The ASA-NBER Economic Outlook survey began in the fourth quarter of 1968 and survived until the first quarter of 1990. By then, interest by the sponsoring organizations had declined, Zarnowitz had retired from academia, and the survey folded. Dean Croushore (coauthor of this article), who was then working at the Philadelphia Fed, had just used the survey in a research project and recognized its value. He contacted Zarnowitz and Herb Allison, who was the NBER's point person for the survey. Both were delighted to have the Philadelphia Fed take over responsibility for the survey. Croushore teamed up with his colleague Leonard Mills, and the two restarted the survey, filling in the missing survey from the second quarter of 1990 by asking forecasters to send them printed copies of the forecasts they had made at that time. Croushore and Mills renamed the survey the Survey of Professional Forecasters, invited many new forecasters into the survey, and streamlined its production. The most important improvement was to tighten the deadline for forecast submissions. After Mills left the Federal Reserve, Tom Stark (this article's other coauthor) joined the survey team, and, when Croushore left the Fed in 2003, Stark took control of the survey and made numerous further improvements (Figure 7).

FIGURE 7

History of SPF Management



The original ASA-NBER survey in 1968 asked forecasters for their quarterly forecasts of 10 different economic variables, probability forecasts for real output and inflation for the current year, and the probability of a decline in real output in the next five quarters.

The variables included in the survey have changed over the years, often in response to developments in the macro economy (Figure 6). A particularly significant change occurred in the third quarter of 1981, when the NBER added forecasts for real GNP and its components. The survey previously included forecasts only for nominal GNP. The 1981 shift to real GNP allowed analysts to better assess the strength of broad economic conditions. The inclusion of the real GNP components allowed analysts to dissect the sources of the strength.⁶

Another round of significant changes occurred in the early 1990s, when the Philadelphia Fed added long-term forecasts for a handful of variables, including inflation, returns on financial assets, and real GDP growth. The long-term forecasts covered the next 10 years and thus represented a substantial lengthening of the survey's horizon compared with the horizon in previous surveys. This longer horizon was a welcome addition to the survey for readers who were using the forecasts in formulating their long-run planning. Figure 8 shows the median forecast across forecasters in the first-quarter surveys from 1992 to 2019 for the average growth rate of real GDP over the next 10 years from the forecast date.

Another key set of changes to the survey was in measures of inflation. An important mission of the Federal Reserve System is to keep the inflation rate low and stable. Over time, the number of different measures of inflation used by macroeconomists has increased, so the survey has adapted to this change. In the initial surveys, the only inflation measure was for the overall output price measure (the GNP deflator in 1968, for example). In the third quarter of 1981, the survey added the better-known Consumer Price Index (CPI). Then, in 2007, the survey added three additional measures of inflation that allowed policymakers and analysts to better see the future trends in inflation.

The most recent significant change to the survey occurred in the aftermath of the Great Recession of 2007 to 2009, when staff added more questions about the unemployment rate and lengthened the annual forecast horizon for some variables to provide more information about the outlook for the labor market.

How Researchers Use the SPF

The SPF has become the gold standard for evaluating forecasts or comparing forecasting models. Most researchers who seek to model people's expectations use the SPF as their measure. Forecasters attempting to build a better forecasting model will

compare their forecasts to the SPF to see if they can beat it. In this section, we describe some of the major research papers that have used the SPF.

In its early days, the survey had not yet amassed enough data to make its results noteworthy. But once the survey had a longer track record, economists began to use it to test rational expectations, examine how people form expectations, develop optimal forecasts, study monetary policy, and determine the motivations of forecasters.

Rational Expectations

The SPF was developed in the late 1960s and early 1970s, when macroeconomists were working on a new theory of rational expectations, which assumes that people make rational forecasts. Researchers looked at the SPF forecasts and tested them for bias and efficiency. If the forecasts are unbiased, then the forecast errors average to zero over time. If the forecasts are efficient, then the forecasters used all available information to make their forecasts. Unbiasedness and efficiency are consistent with the idea that people have rational expectations. However, a number of early papers found that the SPF's forecasts were either biased or inefficient, or both.

FIGURE 8

Forecasts for Real GDP Growth

Median of forecasts for annualized percent change in real GDP over the next 10 years, first-quarter surveys from 1992 to 2019



Source: Real-Time Data Research Center, Federal Reserve Bank of Philadelphia.

Variables Included in the SPF

and the quarter they were introduced

Business Indicators

Nominal GDP (formerly Nominal GNP)
4Q1968

Price Index, GDP (formerly Price Index,
Nominal GNP) 4Q1968

Corporate Profits After Tax 4Q1968

Civilian Unemployment Rate 4Q1968

Nonfarm Payroll Employment 4Q2003

Industrial Production Index 4Q1968

Housing Starts 4Q1968

Interest Rate, 3-Month Treasury Bills 3Q1981

Interest Rate, Moody's Aaa Corporate
Bonds 4Q1990

Interest Rate, Moody's Baa Corporate
Bonds 1Q2010

Interest Rate, 10-Year Treasury Bonds 1Q1992

Real GDP and Components (formerly Real GNP and Components)

Real GDP (formerly Real GNP) 3Q1981¹²

Real Personal Consumption Expenditures
3Q1981

Real Nonresidential Fixed Investment 3Q1981

Real Residential Fixed Investment 3Q1981

Real Federal Government Consumption
Expenditures & Gross Investment 3Q1981

Real State & Local Government Consump-
tion Expenditures & Gross Investment
3Q1981

Real Change, Private Inventories 3Q1981

Real Net Exports 3Q1981

CPI and PCE Inflation Rates

Headline CPI Inflation Rate 3Q1981

Core CPI Inflation Rate 1Q2007

Headline PCE Inflation Rate 1Q2007

Core PCE Inflation Rate 1Q2007

Long-Term Inflation Rates

5-Year Headline CPI Inflation Rate 3Q2005

5-Year Headline PCE Inflation Rate 1Q2007

10-Year Headline CPI Inflation Rate 4Q1991

10-Year Headline PCE Inflation Rate 1Q2007

Additional Long-Term Rates

10-Year Average, Real GDP Growth 1Q1992

10-Year Average, Productivity Growth 1Q1992

10-Year Average, Return on Stocks 1Q1992

10-Year Average, 10-Year Treasury Bond
Rate 1Q1992

10-Year Average, 3-Month Treasury Bill
1Q1992

Natural Rate, Unemployment 3Q1996

Probabilities

Ranges, Real GDP Growth 4Q1968

Ranges, GDP Price Inflation 4Q1968

Ranges, Core CPI Inflation 1Q2007

Ranges, Core PCE Inflation 1Q2007

Ranges, Civilian Unemployment Rate
2Q2009

Negative Real GDP Growth (Anxious Index)
4Q1968

Implied Forecasts

Introduction varies by alternative measure

Yield Spreads

Forward Inflation Rates

Real Interest Rates

The first researcher to use the SPF to contribute to our understanding of rational expectations was Zarnowitz, who in 1985 found that the SPF's inflation forecasts showed some evidence of bias and thus may not have been consistent with the forecasters having rational expectations.

In 1990 Michael Keane and David Runkle challenged Zarnowitz's results. When using real-time data, Keane and Runkle found no evidence for bias or inefficiency in the SPF forecasts and argued that the forecasts of individual forecasters appear rational.

Then, in 1991, Carl Bonham and Douglas Dacy ran a variety of tests for rational expectations on the SPF and other forecasts of inflation. They found that the SPF forecasts were the best they studied and that the forecasts passed certain key tests for rational expectations but not all tests. So, they concluded that the SPF forecasters do not have "strictly" rational forecasts or "strongly" rational forecasts, but only "sufficiently" rational forecasts—not as rational as the rational-expectations theory implies.

In 2001, Bonham and Richard Cohen followed up on Keane and Runkle's work, finding that the forecasters do not have rational expectations.

How Do People Form Expectations?

In a unique 1987 paper, Zarnowitz and Louis Lambros showed that a rise in SPF panelists' uncertainty about inflation was associated with a decline in their point forecasts for the strength of the economy. Subsequent work on the relationship between forecasters' uncertainty and their point forecasts suggested that forecasters tend to understate uncertainty and that forecasters do not update their estimates of uncertainty as often as they update their point estimates.⁷

In a 2003 paper, Chris Carroll developed a theory about how nonprofessional forecasters—that is, households—form their expectations. Using survey data on households' expectations along with SPF forecasts, Carroll found that households adjust their expectations after they learn about the professionals' forecasts. Carroll called households' expectations "sticky" because they learn what professional forecasters think about the future and update their views accordingly.

The sticky-information idea is also supported by research conducted in 2003 by N. Gregory Mankiw, Ricardo Reis, and Justin Wolfers. Focusing on inflation expectations, they noted that consumers are more uncertain about inflation than are professional forecasters but that the disagreement between the groups moves in similar ways. They also found that the forecasts of both consumers and professionals do not adjust properly to changes in monetary policy or more generally to changes in macroeconomic conditions. The authors then found evidence supporting their sticky-information theory: Because of the high cost of gathering the needed information, people do not update their expectations frequently. Data from the forecast surveys, including the SPF, supports this view.

The sticky-information view suggests that people do not have the information they need to learn about what is happening in the economy. Alternatively the noisy-information theory suggests that people get plenty of information, but it is difficult to interpret the information properly because the information itself is imperfect or “noisy.”

In a 2012 paper, Olivier Coibion and Yuriy Gorodnichenko tried to distinguish these two alternative theories using the SPF along with other surveys of people’s expectations. They found general support for the noisy-information theory over the sticky-information theory. More generally, in their 2018 survey of the economic research on expectations formation, Coibion, Gorodnichenko, and Rupal Kamdar cited the SPF extensively in arguing for improved models of the expectations-formation process and suggested that simple theories of rational expectations were contradicted by the survey data.

Can a country’s central bank change the way people form their expectations? According to Meredith Beechey, Benjamin Johansson, and Andrew Levin in a 2011 paper, central banks can help people form expectations by setting an explicit inflation target. They compared inflation forecasts in the euro area, which adopted an explicit target for inflation in 2003, to those in the United States, which had not adopted an inflation target at the time they wrote their paper. They found that there is less disagreement between forecasters about long-run inflation forecasts in Europe than in the United States, as measured by the SPF. This result reinforced David Johnson’s 2002 finding that countries adopting an explicit inflation target were able to reduce inflation by more than those that did not. Forecasters in inflation-targeting countries also had smaller forecast errors than forecasters in countries that did not target inflation.

Optimal Forecasting

Researchers who are trying to develop better models for forecasting the economy often use the SPF as a benchmark. If a researcher could build a model that forecasts better than the SPF, they would have made a major breakthrough. But no forecasting model has consistently outperformed the SPF.⁸ Although Norman Swanson and Halbert White, in a 1997 paper, showed that a sophisticated artificial neural network forecasting model could outperform the SPF for some variables under certain conditions, the gold standard for comparison is still the SPF, and even Swanson and White’s very sophisticated model had trouble meeting that gold standard.

Studying Monetary Policy

Many researchers have used the SPF to study issues related to monetary policy and how the Federal Reserve operates. In 2000, Christina Romer and David Romer compared the forecasts made by the Federal Reserve staff to forecasts from private-sector forecasters, including the SPF. They showed that Fed staff forecasts of inflation and output are better than SPF forecasts, suggesting that the Fed has an information advantage over other forecasters, owing to the high level of resources that the Fed devotes to economic analysis.⁹ One implication of the Romers’ analysis is that when the Fed raises or lowers short-term interest rates, it reveals information about future inflation to the market, leading private-sector forecasters to change their forecasts and causing long-term interest rates to change.

Modern macroeconomic theory rests upon many economic relationships of interest to monetary policymakers. Two critical relationships are the Phillips curve, which relates today’s inflation rate to the inflation rate expected in the future, and the Taylor rule for guiding the FOMC’s decisions on interest rates. Both relationships depend upon expectations for future inflation, among other factors. Recent research on better understanding the Phillips curve and the Taylor rule uses SPF forecasts for inflation as an important component.¹⁰

What Motivates Forecasters?

It seems natural to think that forecasters want their projections to be as accurate as possible. They would like their projections to closely follow what actually happens in the economy. Indeed, when economists analyze the accuracy of forecasts, they first compute a forecast error, defined as the difference between the projection and the realization, and they almost always assume that smaller errors are better than larger ones. Often the economists will formally test whether the errors are close to zero on average, a condition they call “unbiased.” These economists prefer unbiased forecasts over biased ones.

In an intriguing and thought-provoking 2002 paper, Owen A. Lamont challenged the premise that all forecasters want to produce accurate projections. Some, he argued, might face financial incentives to report inaccurate projections as long as their projections are more extreme than other publicly available projections. One reason for reporting an inaccurate but extreme projection is that a forecaster might be compensated for generating publicity around their extreme projection. As an example, Lamont cited the case of what he described as a “well-known recession-caller,” a prominent professional forecaster who continually predicted recessions throughout the 1980s. Lamont tested his theory using projections from the *Business Week* survey and found evidence supporting his hypothesis. He concluded that forecasters in the *Business Week* survey do not always report projections formulated to achieve accuracy. Lamont’s findings could spell trouble for forecast surveys like the SPF. If the SPF projections reflect the type of strategic behavior found by Lamont in the *Business Week* survey, people who rely upon the SPF forecasts will make incorrect decisions.

In 1997, Stark, after reading an earlier 1995 version of Lamont’s paper, replicated Lamont’s empirical methodology on the SPF

panel of forecasters. He found no evidence to support Lamont's theory in the SPF projections. Taken at face value, Lamont's and Stark's results suggest that the panelists in the SPF and those in the *Business Week* survey faced different incentives in reporting their projections. Evidently, Lamont's forecasters faced an incentive to report distorted projections while Stark's forecasters did not.

Lamont's work nevertheless stands out as an important reminder that users of forecast surveys like the SPF should not necessarily assume the panelists are reporting their best, most accurate projections. Moreover, Lamont's path-breaking idea has had a profound effect on how we have conducted the SPF over the years. The SPF has always been an anonymous survey; we never publish a panelist's name with their projection. In principle, this policy removes the potential for a publicity motive affecting the projections. Over the years, we have faced some pressure from academics and other data users to release the names of the forecasters with their projections. We have fought hard against these requests because of our concerns about how the forecasts might be affected. The bedrock for our strong position has always been Lamont's work.

Real-Time SPF Forecasts, Real-Time Historical Data, and Forecast Accuracy

Like other forecast surveys, the SPF is in real time. That means the panelists submit their projections using only the information on the economy available to them at the time they make their computations. The survey's projections cannot, of

Who Are the Forecasters?

When we use the term professional forecaster, we mean a person for whom forecasting is a major component of their job. Some panelists work at forecasting firms, providing forecasts for their external clients. Others work at banks or other financial institutions and generate forecasts for their internal and external clients. The panel also includes some chief economists for industry trade groups and manufacturers. A few academics who study optimal forecast methods round out the panel. The forecasters use various methods to produce their forecasts. In a special 2009 survey conducted by the survey staff, most of the forecasters reported using a quantitative model to produce their forecasts but modified the projections to reflect the current state of the economy and recent trends.¹³ The major finding of the 2009 survey was that nearly all of the forecasters supplemented their models with their subjective beliefs about the economy. In addition, the 2009 survey found that the forecasters used different methods for different forecast horizons. For example, their model for a forecast of real GDP in the current quarter may be very different from the model they use for the average real GDP growth rate over the next five years.

In early surveys, we did not list the names of the participants even though we published each forecaster's individual projections, identified only by a confidential ID number. After receiving suggestions from several panelists, we began to publish a list of participants along with their professional affiliations, but never next to their projections. We believe strongly in the benefits of keeping the survey results anonymous.

course, reflect economic information not yet available.

Less obvious is that forecasters also cannot know about revisions to the historical data not yet made. It is a well-known feature of most, but not all, macroeconomic data that the U.S. government statistical agencies that produce and disseminate them frequently revise their historical data estimates. The BEA, for example, produces its first estimate of the quarterly data point at the end of the first month of the following quarter but revises that estimate at the end of the second and third months. Annual revisions occurring each July affect the past few years of historical observations, and comprehen-


sive revisions (about every five years) can affect the quarterly historical data values as far back as 1947.

Any scientific study of the accuracy of a real-time forecast survey like the SPF should incorporate the real-time characteristics of the underlying historical data on which the survey's projections rest. Stark undertook such a study in 2010 using historical data from the Philadelphia Fed's Real-Time Data Set for Macroeconomists (RTDSM) and the forecast data from the SPF. Stark used the RTDSM to replicate the exact data environment the SPF panelists confronted when they submitted their projections. Using this data set, he estimated a simple time series model and

used that model to generate comparison—or benchmark—forecasts against which to judge the relative accuracy of the survey’s forecasts. The use of real-time data for this purpose imposes fairness (and scientific integrity) on the comparison between the accuracy of the benchmark projections and the real-time SPF projections. In other words, both sets of projections are in real time and use the same historical data, making the competition fair. Stark also used the RTDSM to choose alternative measures of the realizations (depending on the degree to which the realizations were revised) against which each set of projections, SPF and benchmark, were to be judged for accuracy. The study measured not only how accurate the SPF forecasts were compared with the benchmark forecasts but also how sensitive the comparison was to revisions in the historical data.

Following standard academic research methods, Stark’s findings show that revisions to historical data can have large effects on measured forecast accuracy but little effect on relative forecast accuracy between the SPF and benchmark. A common finding across almost all variables was that the SPF projection was more accurate than the benchmark projection at shorter forecast horizons and equally accurate at the longer horizons. Since Stark’s original study, the staff of the real-time data center has updated Stark’s original analysis following each quarterly survey.¹¹ Notably, Stark’s 2010 findings continue to hold more recently.

Concluding Comments

The Philadelphia Fed’s Survey of Professional Forecasters reached its 50th anniversary with the publication of the fourth-quarter 2018 results. Started by the NBER and the ASA in 1968, the survey has evolved quite a bit over the last 50 years, especially with the Philadelphia Fed’s involvement beginning in 1990. Most prominently, the long historical record of the survey’s private-sector forecasts has encouraged an enormous amount of published economic research on topics of prime interest to policymakers and has contributed significantly to a deeper understanding of such topics as optimal forecasting methods, the formation of macroeconomic expectations, the real-time evaluation of forecast accuracy, and the importance of data revisions for forecasting. The Philadelphia Fed is proud to have played such a significant role in fostering research in these areas and looks forward to another 50 years of the Survey of Professional Forecasters. 

Notes

1 See Laster, Bennett, and Geoum (1999) and Lamont (2002).

2 See <https://www.philadelphiafed.org/-/media/research-and-data/real-time-center/survey-of-professional-forecasters/spf-documentation.pdf?la=en>.

3 See Zarnowitz (1968) for details.

4 The Philadelphia Fed now runs the Livingston survey as well.

5 See this article’s References for his papers about the survey.

6 The Philadelphia Fed’s data files include forecasts for real output in surveys before that of the third quarter of 1981 because we computed them as nominal GNP divided by the GNP deflator, two variables that have always been in the survey.

7 For more details, see Giordani and Söderlind (2003), Rich and Tracy (2010), and Clements (2010).

8 See Ang, Bekaert, and Wei (2007).

9 Even though the Romers showed that the Fed’s forecasts are superior to those of the SPF, Carlos Capistrán showed in a 2008 paper that the SPF forecasts contain some useful information absent from the Fed’s staff forecasts.

10 For examples, see Taylor (1993), Orphanides (2003), Orphanides and Williams (2002, 2007).

11 See www.philadelphiafed.org/research-and-data/real-time-center/survey-of-professional-forecasters/data-files/error-statistics.

12 Real GNP first entered the survey as a distinct variable in the third quarter of 1981. In prior surveys, real GNP projections were computed as the ratio of the projection for nominal GNP to the projection for the GNP price index.

13 See Stark (2013) for details.

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Evaluating Metro Unemployment Rates Throughout the Business Cycle

Not all unemployment is the same, especially when comparing RVs with MDs.

BY ADAM SCAVETTE

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Over 80 percent of the world's recreational vehicle (RV) production occurs in or near Elkhart, IN, so it's no wonder that, for decades, Elkhart has been known as the RV capital of the world.¹ Thanks in part to RVs, Elkhart's unemployment rate was comfortably below the national rate in 2007—but then RV sales plummeted two years in a row, a signal that American consumers could no longer afford high-ticket luxury goods.² By the depths of the Great Recession in mid-2009, nearly one-fifth of Elkhart's labor force was unemployed. However, Elkhart's labor market quickly recovered, with unemployment declining to 2.3 percent in 2018, far lower than the national rate. Elkhart is at the center of a cyclically sensitive regional economy: When the nation does well, Elkhart does even better, but when the nation struggles, Elkhart does even worse. Although other metro areas experience similar swings, most metro areas do not swing as intensely.

In any month, regional labor market conditions vary greatly across the nation. In April 2019, the U.S. unemployment rate fell to 3.6 percent, the lowest rate since December 1969, but among the 50 states in that same month, unemployment ranged from a low of 2.2 percent in Vermont to a high of 6.5 percent in Alaska. Of the 389 metropolitan statistical areas (MSAs) tracked by the Bureau of Labor Statistics (BLS), there is even more variation, from a low of 1.3 percent in Ames, IA, to a high of 16.2 percent in El Centro, CA (Figure 1).³ Although slight differences in methodology partly account for these differences in unemployment rates, these rates accurately depict a multitude of labor markets, each shaped by local industry makeup,

labor skill supply, and the interaction of institutions in the marketplace for labor.⁴

By studying unemployment trends across metro areas, regional economists gain key insights about local conditions. However, regional economists don't have access to the same information that macroeconomists use to study the nation's overall economic health. For example, macroeconomists use quarterly GDP estimates, monthly inflation estimates, and industrial production data, but those numbers are absent or infrequent at the state and MSA levels. Therefore, economists who study local areas often rely on employment data to assess local economic activity.

This article explores metropolitan employment rates to understand why they differ and what makes them more or less sensitive across business cycles. With this knowledge, we can better understand both what to expect from local labor markets and how policymakers think about differences between these markets.

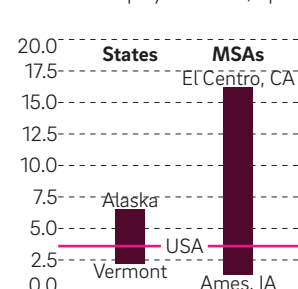
What the Unemployment Rate Tells Us

The official unemployment rate⁵ calculated by the BLS and quoted in the media is known as U-3,⁶ or the total unemployed as a percent of the civilian labor force. Under U-3, unemployed persons are willing and able to work and have actively looked for employment within the past four weeks. Employed persons must have completed at least some work for pay during the week the BLS conducted its survey. This measure includes full-time, part-time, and temporary work. The labor force is the total number of employed and unemployed persons in an economy.⁷

Economists use the unemployment rate to gauge the strength of the labor market. Although economists typically seasonally adjust the rate to account for predicted dynamics throughout the year, such as an increase in hiring during certain holiday seasons, the unemployment rate is trendless, unlike variables such as payroll employment and gross domestic product. Economists also use the unemployment rate to assess business cycles. The National Bureau of Economic Research (NBER) notes that the

FIGURE 1
Unemployment Varies Widely by State & Metro

Percent unemployment rate, April 2019



Source: Bureau of Labor Statistics.

unemployment rate often begins to rise before the peak of economic activity, signaling the end of an economic expansion, but continues to rise after economic activity has fallen to its trough, making it a lagging indicator of an economic recovery.⁸ So the unemployment rate, even though it leads and then lags, reflects cyclical economic activity. Economic activity somewhat affects the labor force (the denominator of the unemployment rate), but so too do demographic trends unrelated to the business cycle.⁹ For example, when population growth slows or the population ages, there will be downward pressure on the labor force, which increases the unemployment rate.¹⁰

Economists tend to categorize unemployed persons by their type of unemployment. Frictional unemployment typically occurs voluntarily and temporarily when individuals transition between jobs. Examples include seasonal employment, voluntary quitting, or during the transition from full-time education to a first-time job. Structural unemployment results from a mismatch between the skill levels of the unemployed and the jobs available (economists sometimes refer to this as a “skills gap”), perhaps due to changes in the jobs’ technological skill requirements or the changing industrial makeup of an economy. Cyclical unemployment occurs when economic output declines as a result of the fluctuating business cycle.

Because the first two categories persist through good economic times, economists generally refer to them as “natural unemployment.” It is cyclical unemployment that policymakers typically use to gauge the health of the labor market. According to policymakers, in the absence of economic shocks the U.S. economy can sustain a natural rate of unemployment between 3.75 and 4.5 percent.¹¹ However, estimates of the natural rate of unemployment are often imprecise and, because of demographic differences, vary by region.

Exploring these regional variations, Parker (2015) finds that states with a larger proportion of people aged 16 to 24 tend to have a higher natural rate of unemployment, and states with a higher average level of education have a lower natural rate of unemployment. While the causality of the relationship between

demographic factors and subnational unemployment rates is unclear, it is helpful to keep these and other unique demographic factors in mind when evaluating a region’s labor market conditions.

There is even more volatility in unemployment rates among metro areas. Although the middle 50 percent of metro areas closely tracked the U.S. unemployment rate during the past 30 years, there is considerable variation outside of that range, and the unemployment rates in certain MSAs differ greatly from the nation’s unemployment rate.

Analyzing Cyclical Sensitivity

One way to analyze metro unemployment rates is to determine how cyclically sensitive they are compared with the nation’s unemployment rate—that is, how responsive a specific metro area’s unemployment rate is to the national business cycle. For example, if the national economy is in recession, then a cyclically sensitive metro area might have a higher unemployment rate than the nation overall. Similarly, during a boom in economic activity a cyclically sensitive metro area might have a lower unemployment rate. Conversely, a cyclically insensitive metro area would resist these national trends and swing less than the nation.

In order to quantify a metro area’s cyclical sensitivity, we use a formula that compares its unemployment rate to the nation’s across recessionary periods, which we refer to as “business cycle turning points.” A metro area with a cyclical sensitivity value close to 1 would be as sensitive to the business cycle as is the nation, while a metro area with a value

less than 1 would be less sensitive, and a metro area with a value greater than 1 would be more sensitive. We calculate these values across all MSAs over the last three turning points in the U.S. business cycle and report the mean of the three turning-point measures for each metro area. To define our turning points, we use the troughs and peaks of the U.S. unemployment rate instead of the official NBER recession dates (Figure 2).

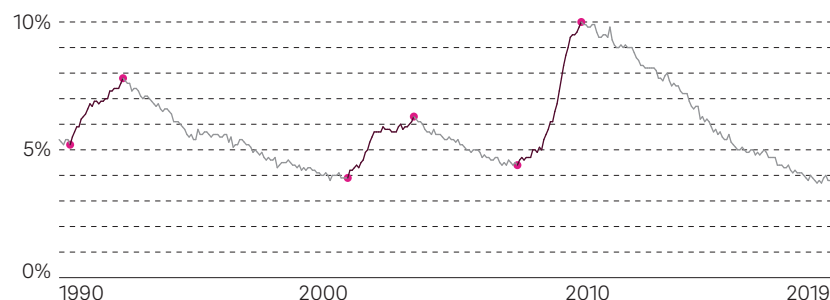
Why are some metro areas more cyclically sensitive or volatile than others (Figure 3)? Domazlicky (1980) points out that regional cyclical amplitudes differ due to industrial structure and trade relations.¹² Regional industrial structure refers to the differences in the composition of output produced by an area. This is important because consumption output (for example, purchases of food and clothes) is typically more stable and less cyclically sensitive than investment output (for example, buying machinery and buildings), so the balance between these two categories of consumption should affect that region’s sensitivity. Regional trade relations refer to the extent and stability of regional ties through trade (self-sustaining vs. exported structure); trade refers to any exchange of goods and services outside of the metro area, not just international exchanges.

Interregional models of business cycles¹³ show that regions with a relatively large proportion of investment or exportable goods in its output mix tend to lead national cycles and experience cycles of larger amplitude. Manufactured durable goods (like RVs) and construction are examples of investment goods that are sensitive to cyclical fluctuations. Peterson and Manson (1982) point out that durable

FIGURE 2

Business Cycle Turning Points

Percent U.S. unemployment rate, 1990–2019



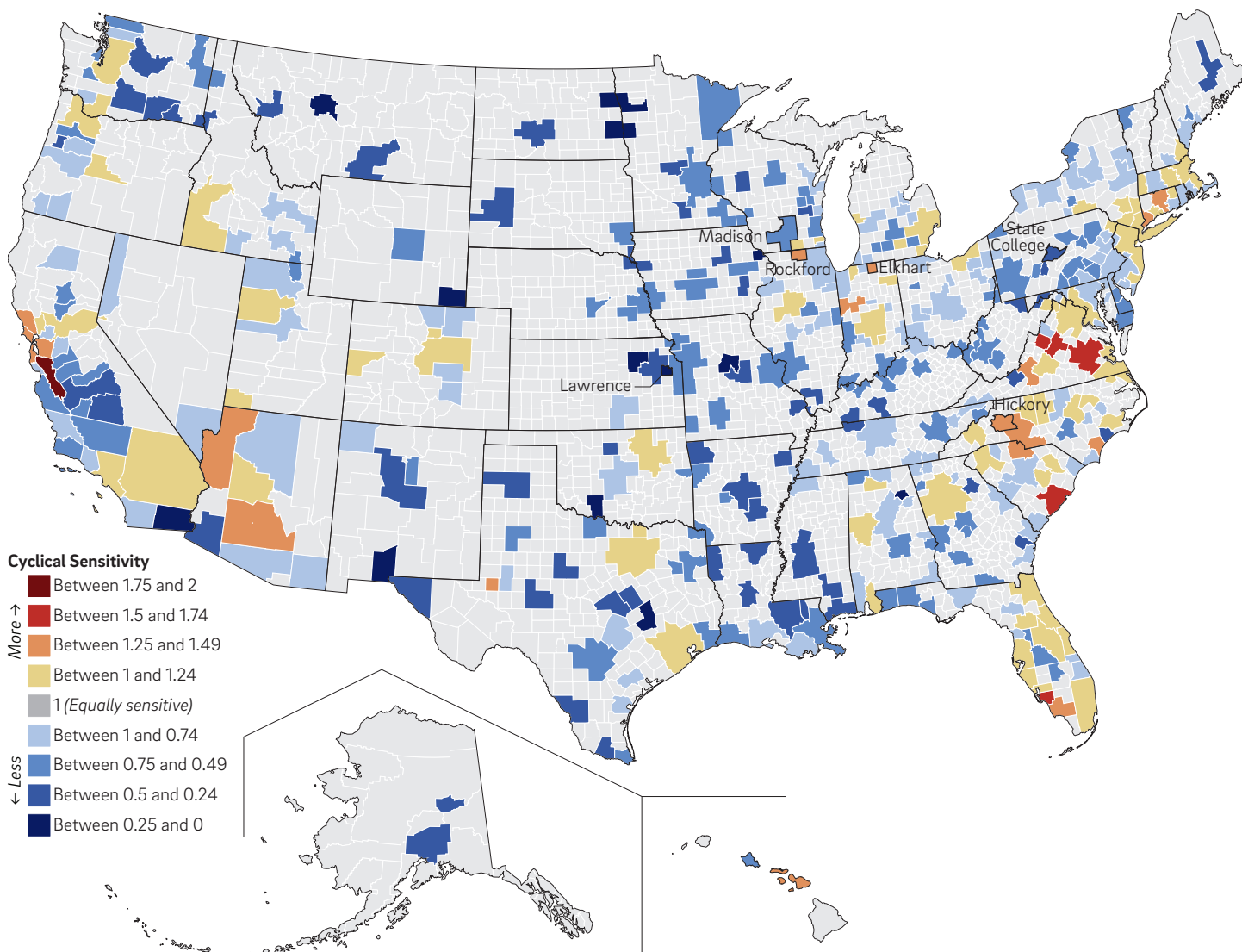
Source: Bureau of Labor Statistics.

FIGURE 3

Cyclical Sensitivity Index

There is significant variation in the cyclical sensitivity of metro area unemployment rates across the nation.

Average over three business cycle turning points from 1990–2019; see Figure 2



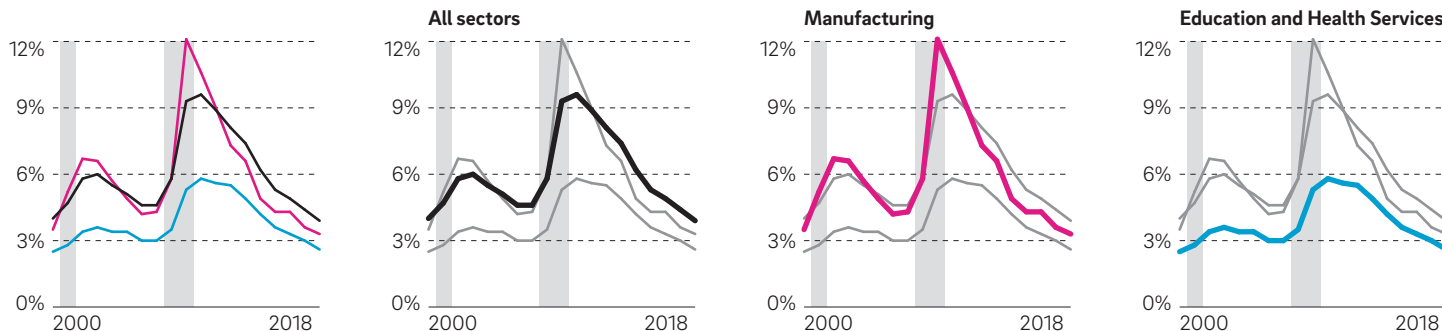
Source: Bureau of Labor Statistics, author's calculations.

FIGURE 4

Not All Sectors Experience the Same Unemployment

During recessions, manufacturing does worse than the U.S. overall, while "eds and meds" does better.

Percent U.S. unemployment rate for select sectors, 2000–2018



Source: Bureau of Labor Statistics.

goods and construction are associated with major expenditures for items that remain in service for many years. Often, these items replace older items whose serviceable lives can be stretched, so businesses may be tempted to delay these major expenditures in uncertain times. That makes durable goods and construction particularly sensitive to cyclical fluctuations. We might observe this highly cyclical effect in manufacturing employment, as manufactured goods are typically exports for a region (as opposed to local services such as restaurants and healthcare services).

The manufacturing unemployment rate is highly cyclically sensitive, in that it tends to be higher than the overall unemployment rate during recessions and lower than the overall unemployment rate during expansions. However, the unemployment rate for educational and health services (often called “eds and meds” by economists) does not appear very cyclically sensitive: Its rate lies below the overall unemployment rate for the entire length of the series and experiences minimal fluctuations (Figure 4).

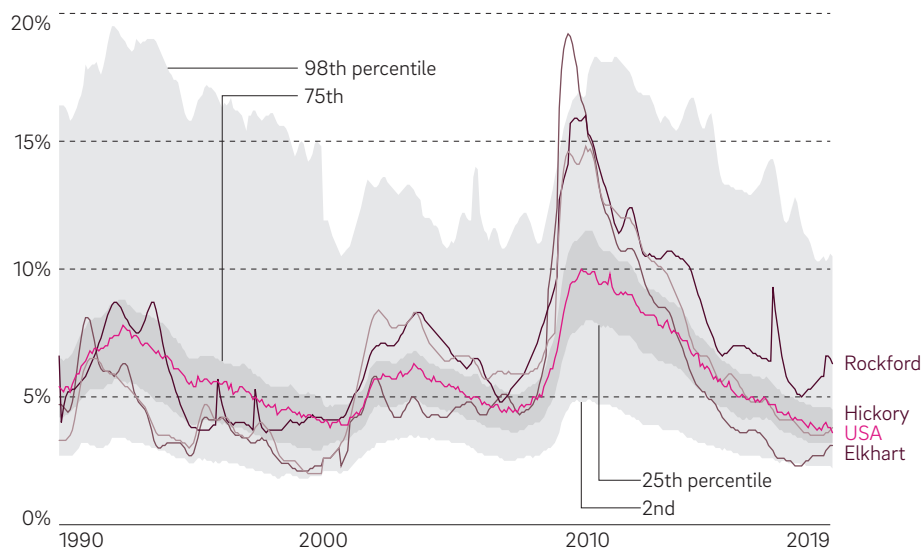
These differences in cyclicity become clear when we examine some MSAs that are heavily focused in these industries. In the U.S., 8.5 percent of employment is concentrated in manufacturing, but in Hickory, NC, it is 28 percent, in Rockford, IL, it is 22 percent, and in Elkhart, IN, it is 50 percent. Unemployment rates are far more volatile and cyclically sensitive in these three regions, with the highest sensitivity in Elkhart, which boasts the highest concentration in manufacturing of these three metro areas (Figure 5).

In contrast, three metro areas heavily focused in education tend to be cyclically insensitive. All three metro areas are home to major state flagship universities: State College, PA, is home to Pennsylvania State University; Lawrence, KS, to the University of Kansas; and Madison, WI, to the University of Wisconsin-Madison.¹⁴ The unemployment rates of these three “college town” metro areas are typically below the 25th percentile of metro areas and are not very volatile or cyclically sensitive, barely rising above 5 percent even during recessions (Figure 6).

FIGURE 5

Unemployment Rates for Manufacturing-Focused Metro Areas

MSAs with lots of manufacturing jobs are more sensitive to economic cycles. 98th, 75th, 25th, and 2nd percentiles of nearly 400 metro unemployment rates from January 1990 through April 2019, tracked monthly

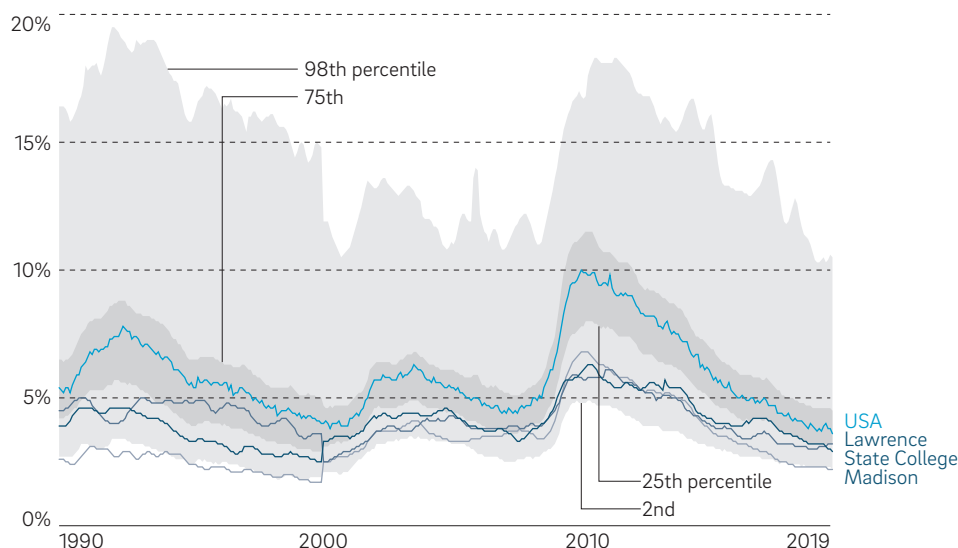


Source: Bureau of Labor Statistics.

FIGURE 6

Unemployment Rates for "College Town" Metro Areas

MSAs with lots of education jobs are more insensitive to economic cycles. 98th, 75th, 25th, and 2nd percentiles of nearly 400 metro unemployment rates from January 1990 through April 2019, tracked monthly



Source: Bureau of Labor Statistics.

Spotlight on the Third District

Aside from three metro areas in Southern New Jersey (Atlantic City-Hammonton, Ocean City, and Vineland-Bridgeton), the means and ranges of unemployment rates in the Third District's major metro areas are close to those of the U.S. as a whole (Figure 7). The Atlantic City and Ocean City metro areas both have a heavy concentration of employment in the hospitality and tourism sector related to the "Jersey Shore" economy.¹⁵ Since tourism is an exportable service, as it is consumed largely by nonlocals, it will be cyclically sensitive to the national economy. As well, like dining out, it is one of the goods that consumers economize on in downturns. Overall, the Third District's metro areas

are not very cyclically sensitive, as all but one of the metro areas lie below the 1 value (Figure 8).

Related Literature and Policy Implications

The cyclical sensitivity of a metro area is largely determined by its industry mix and the extent to which a locality relies on exports. However, some metro areas have features that might make their unemployment rates persistently high or low regardless of the current state of the national business cycle. Rappaport (2012) examines various factors that affect these persistent features of metro area unemployment rates, including place-based

characteristics (such as weather and topography), labor force characteristics (such as education and industry mix), and high moving costs for households and firms.

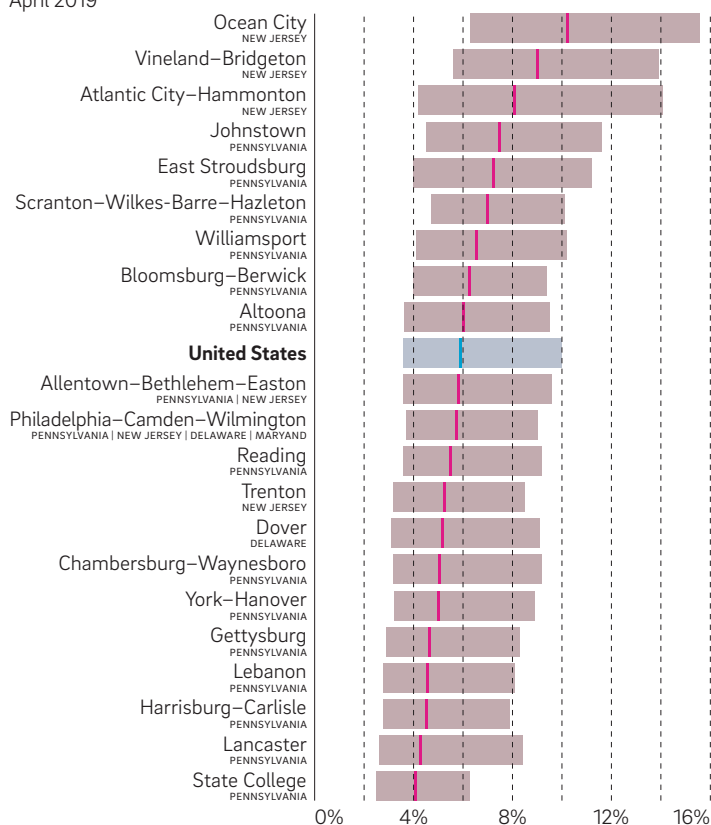
Mangum and Coate (2018) explore declining internal migration throughout the U.S. since the early 1990s with an eye on the implications for local labor market adjustments. The authors note that low-performing regions (for example, the Rust Belt and Appalachia) have long had low mobility, and this has not changed in recent years. But they also note that, as Americans become more attached to their hometowns, the rest of the nation is seeing a decline in mobility, too. Particularly in formerly high-migration areas such as California and Texas, residents are becoming

FIGURE 7

During Recessions, the Third District Mirrors the Nation

With three exceptions, Third District MSA unemployment rates are close to the U.S. as a whole.

Mean and ranges of unemployment rates in Third District MSAs, January 1990 to April 2019



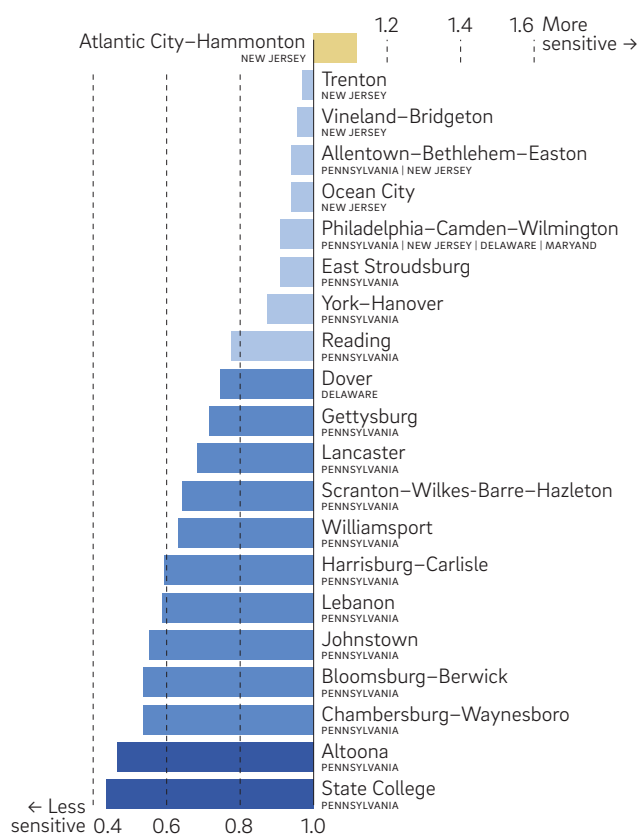
Source: Bureau of Labor Statistics, author's calculations.

FIGURE 8

Most Third District MSAs Are Less Sensitive to Business Cycle

With one tourism-dependent exception, Third District MSAs are relatively insensitive to U.S. business cycle turning points.

Average cyclical sensitivity of Third District MSAs over past three business cycles




Note: A metro area with a cyclical sensitivity value close to 1 would be as sensitive to the business cycle as is the nation, while a metro area with a value less than 1 would be less sensitive, and a metro area with a value greater than 1 would be more sensitive.

Source: Bureau of Labor Statistics, author's calculations.

more rooted over generations and less likely to move to better-matching jobs in other areas.

By better understanding the characteristics of their local labor markets, policymakers might be able to mitigate some of the effects economic downturns have on their cyclically sensitive or persistently high-unemployment metro areas. For instance, public funds to retrain workers in persistently high-unemployment metro areas could help narrow any skills gap between the local labor force and available jobs. Francis (2013) surveys the literature on this skills gap and on various workforce development programs, including youth programs, employer-focused programs, and community college education. Public funds could also mitigate worker shortages and gluts by relocating workers from high-unemployment areas to low-unemployment areas across different MSAs. This might lead to a better outcome for workers and communities as workers are better matched to jobs that need their skills. Lastly, improved public transportation planning in certain areas could make it easier for workers to reach jobs within their own labor markets. DeMaria and Sanchez (2018) explore medium-size labor markets in the Third District and find that transportation “poses a barrier to employment for workers unable to afford a car because it limits one’s job search radius and makes access to jobs in certain locations infeasible.”

Final Thoughts

Even though all Americans experience the nation’s recessions and booms, the experience as a worker will vary dramatically across regions over these cycles. Regional economists pay attention to industry mix, demographics, and other place-based characteristics in order to fully understand local labor markets. Policymakers at various levels of government might pay attention to this variation across metro areas, too. Doing so helps them assess which potential policies might mitigate the negative impact of persistently high or overly cyclically sensitive unemployment rates. Furthermore, although monetary policy cannot vary at the regional level, its effects might be assessed by looking at specific areas with a high concentration of industries sensitive to changes in interest rates, such as durable goods manufacturing and construction. 

Notes

1 See Hesselbart (2016).

2 See RV Industry Association (2018).

3 U.S. federal agencies use the metropolitan statistical area (MSA) to define and measure statistical and economic metropolitan units. An MSA is a grouping of counties (or one county) representing the social and economic linkages between an urban core and its outlying areas. For more information, see Flora (2015).

4 For more information on the survey methodology used to estimate these respective unemployment rates, see Waddell (2015).

5 The national unemployment rate is calculated using labor market data from the Current Population Survey (CPS), a survey of roughly 60,000 households (or 110,000 individuals). The CPS has been conducted in the United States every month since 1940, and its state-based design represents each state and the District of Columbia to ensure broad coverage.

6 The BLS provides alternative measures of unemployment each month. See Bureau of Labor Statistics (2019).

7 For a more comprehensive definition of employed persons, unemployed persons, and the labor force, see Bureau of Labor Statistics (2015).

8 See National Bureau of Economic Research (2010).

9 For example, individuals seeking employment for a long time during economic slowdowns may get discouraged and leave the labor force altogether instead of remaining in the “unemployed” category set by the BLS.

10 See Toossi (2015).

11 See Board of Governors of the Federal Reserve System (2019).

12 While some of the variation in the cyclical sensitivities of MSAs can be explained by industry mix, many MSAs’ sensitivities will vary due to more idiosyncratic reasons, such as one-time shocks during particular business cycle turning points. For example, San Jose-Sunnyvale-Santa Clara, CA, experienced a highly negative shock to employment in response to the bursting of the dot-com bubble in the early-2000s, making it the most cyclically sensitive MSA in the nation in this analysis.

13 See Domazlicky (1980).

14 Madison is also the state capital of Wisconsin. The interaction of state government employment and university employment should make this metro area particularly cyclically insensitive.

15 In April 2019, Ocean City and Atlantic City had 26 percent and 32 percent employment concentrations in hospitality and tourism, respectively, compared to a U.S. concentration of 11 percent.

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Kitchen Conversations: How Households Make Economic Choices

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Economists have studied decision-making for centuries, but how do households, as opposed to individuals, make decisions? The future of personal finance may rest on the answers.

BY ANDREW HERTZBERG

How do households decide how much to spend, what to buy, and how much to work at any moment in time? Anyone who has taken Microeconomics 101 knows that economists have been studying these questions for centuries. Your typical economics textbook will carefully describe how decisions are determined by household preferences, the household budget, and the prices of goods and services (or the wages paid to labor). This analysis forms the basis for understanding many of the key questions in economics. How does demand change in response to a price increase? How does a change in income affect consumption? How does a change in wages affect how much people want to work? How does a tax on goods or income affect the economy? Do people save enough for retirement?

However, this analysis sets aside how household decisions are actually made. Households often comprise more than one person. As a result, household decisions are often made by a group of people instead of by a single person with a clear and unique objective. To understand decision-making in a multi-person household, we need to understand whether choices are made cooperatively or noncooperatively and whether households can commit to their agreed-upon choices. We also need to understand each household member's influence, which can change over time. For example, when a head of household loses their job, the household loses income *and* the balance of control within the household shifts. Treating the household as a single decision maker leaves out these other effects. We need to understand these other effects if we are to identify which government policies and financial products will produce the best outcomes for households.

In this article I review the ideas and evidence that economists have recently used to study how decisions are made in multi-person households.¹ I also discuss how interactions among household members affects our understanding of future-facing decisions, such as how much to save. I conclude by briefly describing how the structure of some financial products (e.g., joint versus separate control of assets) could alter household choices.

Why Study Households

Studying how households, as opposed to individuals, make decisions is only important if the members of a household have different preferences and objectives. A simple example: Suppose that a household comprises two people, A and B, who between them have \$10 to spend at a grocery store. If A and B both like to consume only apples (and derive no utility from anything else), then they will buy \$10 worth of apples, just as if they were a single individual. So studying the combined household is only interesting if A and B differ in the utility they derive from some goods or services. For example, if A likes only apples and B likes only bananas, then what they buy depends in part on how much control each has.

For household decision-making to matter, household members must also be at least somewhat selfish. If person A liked to consume only apples and B liked to consume only bananas, but each person cared equally about their own happiness and that of the other household member, they would agree to spend \$5 on apples and \$5 on bananas. No matter who was given control over the household consumption decision or whether members make decisions together or on their own, the same choice would be made. As a result, we could treat the household as a single individual. Put differently, the members of the household would have different individual preferences but would have the same objective. If, however, members were selfish, so that they each placed more weight on their own utility than their partner's and had different preferences, then the consumption choice of the household depends on how this disagreement is resolved.

So it is important to review the evidence on whether household members have different preferences and are selfish. This is easier said than done. When studying households, a researcher will typically have data on available resources (wealth, income) and the choices the household makes (consumption, savings). From observing these items alone, it is not obvious whether or not the members of the household disagreed over their ideal choices. Detecting disagreement requires more work. Thankfully,

some economists have done research that detects this kind of disagreement.

A Change in the UK Child Benefit

In 1977, the UK changed a portion of the child allowance from an income tax deduction to an equivalent child benefit paid weekly to the mother in the family.² Crucially, the only thing the policy changed was *who* received the money, not the amount the household received. Therefore, if household members agreed on how resources should be spent, nothing would change.

That is not what researchers found. Using family expenditure survey data, Lundberg, Pollack, and Wales (1997) show that expenditures on women's and children's clothing increased relative to men's clothing after the policy change. When the mother was given increased control over household resources, consumption choices were apparently redirected toward her preferences. This supports two fundamental concepts that any realistic account of household decision-making must take into account. First, household members often have different preferences. Second, although household members may care for each other, this altruism is imperfect—they care more for themselves than for other members of the household. If both partners cared about each other equally, they would agree on the amount of household wealth to spend on clothing for each member, and changing the balance of control wouldn't change anything. But it did.³

How Households Decide

So the research suggests that multiperson households often have differing preferences and household members are often at least somewhat selfish, but how do household members resolve their disagreements? Most economists who have addressed this question start with the premise, named for Italian economist Vilfredo Pareto (1848-1923), that household decision-making is Pareto efficient.⁴

Assuming that household decisions are Pareto efficient simply rules out the possibility that the household would choose one outcome when another outcome

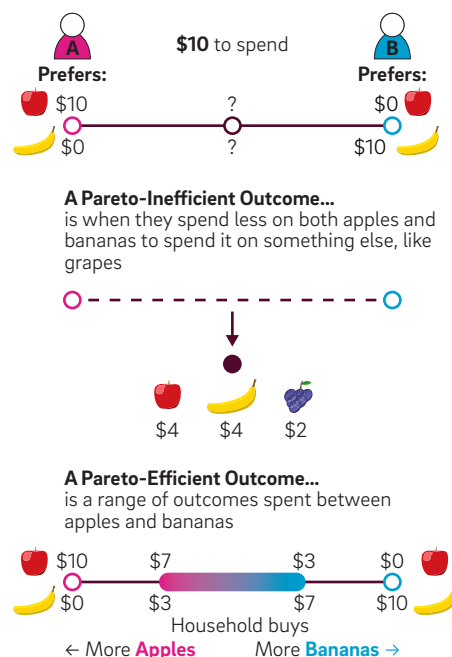
would make every member of the household better off. That seems entirely reasonable. Returning to our hypothetical example, when A and B visit the store and decide how to spend their combined wealth of \$10, Pareto efficiency rules out two things. First, the household doesn't buy anything else (e.g., grapes). Second, the household doesn't buy so many apples (or bananas) that both members would be happier if the mix was shifted toward more bananas (or apples). This idea, however, faces two challenges.

First, Pareto efficiency doesn't make a specific prediction for what the household members will choose. When studying one person, economists predict exactly what that person will choose. But predictions are vaguer even when economists know all about the preferences and budget of a two-person household. In our example, there are many combinations of apples and bananas that will be Pareto efficient. The best we can say is something like: The household will spend between \$3 and \$7 on apples, with the balance going to bananas (Figure 1).

FIGURE 1

Pareto-Efficient Grocery Shopping

A and B go shopping. A wants to spend all \$10 on apples. B wants to spend it on bananas. What is the most efficient outcome?



This ambiguity makes it very difficult to test the theory with data, since the data is consistent with so many choices, and it has the potential to undo many basic features of microeconomics. A basic claim in microeconomics is that if the price of bananas goes up, a household will buy fewer bananas. However, if we rely only on Pareto efficiency, this is no longer true in a multiperson household: A wide range of choices are Pareto efficient no matter the price of bananas. We can't even be sure that the household wouldn't buy more bananas when they get more expensive.

The second challenge is that households also purchase shared goods, such as housing and child care, that provide a direct benefit to multiple members. To see why this complicates the assumption that households make Pareto-efficient decisions, suppose that it is Pareto optimal for the household to spend \$3 on apples, \$3 on bananas, and the remaining \$4 on child care. In many cases each household member would actually prefer to alter this decision in favor of themselves. For example, left to make the choice on their own, household member A might spend \$4 on apples, preferring that their partner bear most of the cost of child care. In the same way, B might spend \$4 on bananas. In combination, the household would spend only \$2 on child care, half the amount that A and B collectively agree is ideal. Put differently, the household is vulnerable to a classic "tragedy of the commons" problem where public goods within the household are underprovided (Figure 2). Although household members may value allocating money to child care, they'd prefer not to sacrifice their own consumption to do so. So unless the household has a way of preventing each member from making unilateral decisions (e.g., spending schoolbook money at a bar on the way home from work), household decisions might end up being Pareto inefficient. What, if anything, keeps household decision-making Pareto efficient? And can economists make precise predictions about household choices?

Most economists who have studied household decision-making answer these questions by making an additional assumption: Household members bargain with each other in order to make decisions. This means that a decision is made only

if everyone in the household agrees to it. Despite having different preferences and being selfish, members are willing to compromise in order to avoid the alternative. Positing that households make decisions by bargaining addresses each challenge in the following way.

Challenge 1: Many Choices Are Compatible with Pareto Efficiency

If we assume that households bargain, then each member's relative bargaining power determines Pareto-efficient allocation. If A and B have equal bargaining power, then the household will spend as much money on apples as it does on bananas—a much more precise prediction. This also restores many of the ideas that everyone learned in Microeconomics 101.

Bargaining not only gets us back to a theory of household choice that makes a specific prediction but also makes a new testable prediction: Changes in the relative power of each member will alter the decisions the household makes. For example, if B's bargaining power is increased, the household will buy more bananas, even if nothing else (preferences, prices, budget) changes. Most of the empirical work that has tested this approach to household decision-making is devoted to showing that changes in relative bargaining power, holding all else equal, alter household choices.

Challenge 2: Households May Underprovide for Shared Goods

Bargaining also helps us overcome the tragedy of the commons problem, because it rules out the possibility that any household member can unilaterally deviate from an agreed-upon plan. Nobody can spend money earmarked for schools at a bar on the way home from work, unless everyone has given their agreement.

Is this a realistic description of the world? Economists who have advanced the idea that households bargain to make decisions support this idea by arguing that the household is a long-lived relationship where deviations from agreed-upon plans can be punished. Punishment might take the form of uncooperative behavior or household dissolution. If we return to the example of A and B above, a Pareto allocation can be obtained by first agreeing and committing to spend \$4 on child care (perhaps by prepaying school fees) and dividing the remaining household budget between A and B to spend on themselves. Under this framing, both members have an agreed-upon personal budget they can spend any way they like. To achieve Pareto efficiency, consumption decisions regarding shared goods (child care, housing) are made together and cannot be undone without the approval of both household members.

Where Does Bargaining Power Come From?

Most researchers agree that bargaining power comes from each member's outside option, which refers to how well off the household member would be if bargaining broke down and the members did what they wanted. The better a member's outside option, the more bargaining power they will have, because their threat to act independently is more credible. But what does it mean for household members to act independently? Two answers have been proposed to this question: household dissolution and uncooperative behavior.

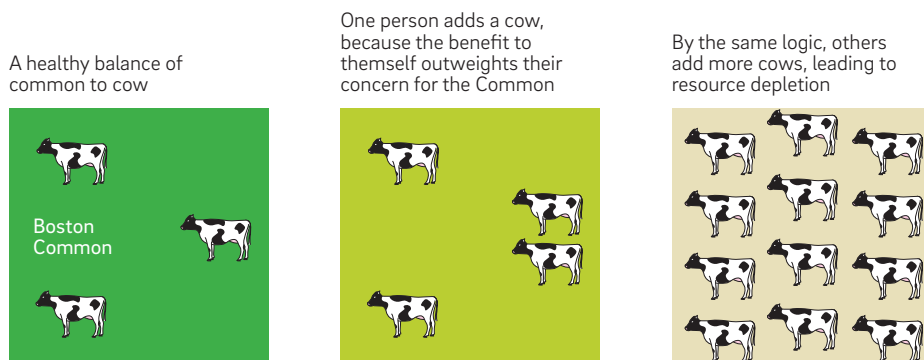
One possibility is that household members bargain using the threat of dissolving the household as an outside option. Anything that makes it easier or harder to divorce, or that alters the conditions a member will enjoy outside of the household, will affect the power of this threat. According to this view, factors external to the household determine the relative bargaining power within a household and hence indirectly influence decisions. For example, an increase in the general level of women's wages (relative to men) has the potential to make divorce more attractive to women and thereby increase their power within the marriage.

Some economists have advanced another possibility: The threat of uncooperative behavior may determine bargaining power. Such behavior, which Lundberg and Pollak (1993) referred to as "separate spheres," might amount to punishing each other by spending less on shared consumption (child care, housing, etc.). It can also refer to household members refusing to share their income with each other, working less and thereby contributing less income for household expenditures, spending less time with each other, or treating each other less kindly. Under this view, factors internal to the household determine bargaining power. For example, imagine a household member who isn't satisfied with their household's choices. If they change jobs, this might alter their ability to "threaten" to spend more time working late at work, thus raising their bargaining power. Or more perversely, if one member begins to feel less affection for the other, this increases their ability to credibly threaten

FIGURE 2

What Is the Tragedy of the Commons?

In colonial times, Boston Common was a pasture for cows, free for anyone to use, but it couldn't survive the subsequent overgrazing. Economists later used this example to explain why a resource provided to everyone for free may end up being underprovided.



to treat the other poorly and hence raises their bargaining power.

Although this idea has intuitive appeal, it is usually more complicated to measure these internal threats. As a result, the evidence suggesting that this is an important source of bargaining power in households is scarce and more indirect.⁵ One example supporting this idea is the 1970s change in the UK Child Benefit. Its effect is most consistent with the notion that internal threats alter bargaining power. Note that the way the benefit was paid would not have affected either partner in the event of divorce. Instead, it would have improved the mother's bargaining position by empowering her to withhold funds from her partner in the event that bargaining broke down.

Several studies, by contrast, have shown that factors external to the household appear to influence bargaining power. For example, Knowles (2013) applies this idea to understanding the effect of the increase in hourly wages paid to women relative to men that has occurred in the U.S. since the 1970s. Most economic theory predicts that women would respond by working more hours per week relative to men. While this has occurred, the change has been far smaller than economists expected. Knowles argues that this logic leaves out the fact that the change in wages has given women more bargaining power at home. With their increased power, women have bargained for less work and more leisure.⁶

Although most work on household decision-making has adopted the Pareto-efficient bargaining framework, economists have considered other accounts. Household members may make decisions independently, in accordance with their own objectives, giving consideration to what they expect other household members to do. This is usually referred to as noncooperative decision-making—because decisions are made unilaterally (Figure 3). This generally leads to inefficient household decision-making in the sense that shared consumption (such as investments in child health care) is underprovided as per the tragedy of the commons.

Household Savings Decisions

Most economic research into household

FIGURE 3

Prisoners Dilemma: Noncooperative Decision-Making



Police arrest two suspected bank robbers, but lack the evidence for a full conviction.



The suspects are separated for interrogation. Will they snitch on each other (noncooperative decision-making) or keep silent (cooperative decision making)?

How Many Years Will They Each Serve?

		Suspect B	
		Silence	Snitch
Suspect A	Silence	1 1	3 0
	Snitch	0 3	2 2

Collectively, both suspects are better off if they remain silent. But, no matter what the other does, each suspect has an individual incentive to snitch.

decision-making has focused on a fixed moment in time. However, most household choices are concerned with planning for the future through saving and borrowing. One approach is to treat the choice to save or borrow like any other shared good and assume that Pareto-efficient bargaining applies. Just as A and B agree on an amount to spend on child care, they also mutually decide how much to save for the future (or how much to borrow). Crucially, this requires that neither member can unilaterally alter that choice.

In practice, assuming that household consumption and savings decisions are made by bargaining means that both members agree on a personal discretionary spending budget for each member. No one in the household is able to exceed that budget at any moment in time (for example, by buying a new phone or pair of shoes) without first getting spousal approval. This may stretch the bounds of plausibility for how many households actually decide to spend, save, and borrow. This distinction isn't a mere theoretical curiosity. Hertzberg (forthcoming) demonstrates that if people are able to spend or borrow without the approval of their spouse, and if their behavior is to some extent noncooperative, then savings will be subject to a classic tragedy of the commons problem and the household will systematically save too little as a result.

Most of the evidence on how households interact to make financial decisions adopts the cooperative bargaining framework described above. These papers ask: Do changes in proxies for relative bargaining power alter savings or investment decisions? There is considerable evidence that the answer is yes.

For example, consumption by two-person, male-female U.S. households drops 9 percent when men retire. We don't see the same phenomenon in comparable scenarios. There is no drop in consumption when single men or single women retire. This suggests that the drop in consumption can't simply reflect a reduced demand or ability to consume upon retirement by men or women. What's more, there is no drop in consumption when women from two-person households retire, even when the woman is the higher earner. How can bargaining explain this? Lundberg et al. (2003) argue that women, who typically live longer than men, prefer to save more than their partners. At retirement the man's bargaining power drops and so the savings rate readjusts to give more weight to the woman's more patient preferences. Consistent with this hypothesis, the consumption drop is larger where the woman is younger and hence expects to live longer than her spouse.⁷

Although this evidence is consistent with Pareto-efficient bargaining, it might also be explained by noncooperative decision-making. For example, suppose that household members unilaterally decide how much to save and how to invest those savings. It could be that when men earn less, they automatically lose some influence over the household's savings and portfolio choices. So while these studies show that intrahousehold interactions matter for financial decision-making, they don't provide a definitive answer as to how they matter. There is no definitive proxy for bargaining power that is not also compatible with noncooperative behavior. Addressing this issue is far more challenging, and, to date, the evidence is inconclusive.

The best evidence that how households interact matters for financial decision-making comes from Aura (2005), who looked at the effect of the Retirement Equity Act of 1984, which required that decisions regarding employer-sponsored survivor annuities and life insurance be made with the consent of both spouses. Prior to the act the employed person could unilaterally opt out of an employer-sponsored survivor annuity (an obvious benefit to the employee's spouse). The same act required that early withdrawals and loans taken against tax-protected retirement savings must have approval of both spouses. These requirements changed the choices made. For example, the selection of survivor annuities increased 7 percentage points as a result of the law. Life insurance holdings also increased. This provides particularly clear evidence that the way multiperson households make decisions matters for financial choices: Mandating joint approval changes behavior.

One interpretation of this evidence is that many financial choices are normally made unilaterally, and hence forcing mutual approval changes their outcome. If so, bargaining is not the right way to think about household financial decision-making, because it presumes all decisions are made jointly with mutual agreement, regardless of whether the government mandates it.

Alternatively, it is possible to reconcile this evidence using the logic of separate spheres. By this account it is possible that forcing the employed person to obtain the permission of their spouse reduced their bargaining power by limiting what they could threaten with uncooperative behavior. This helps illustrate why, even with such a unique policy experiment, it is so difficult to provide definitive evidence of how households make financial choices.

Pareto-Efficient Financial Choices

Just as researchers so far have struggled to provide direct evidence of how financial decisions are made, they have also wrestled with a related and equally difficult question: Are the financial decisions that households make Pareto efficient? If evidence supports the idea that interactions among household members may produce suboptimal choices, such as too little savings or too much risk taking, that could present an opportunity for government policies or the creation of financial products to counteract these problems.

The best evidence supporting this idea comes from economists studying developing countries. Udry (1996) uses data from Burkina Faso to look at the way that labor is allocated across plots of land controlled by different household members. The allocation of labor to land should be thought of as the primary investment decision these households make each year (akin to an annual readjustment of a financial portfolio in the U.S.). Udry finds that the allocation is inefficient, because total household income could increase if the household allocated more labor to farming the plots controlled by women. Put differently, these families are systematically worse off because of the way they make decisions. This further calls into question the premise that optimality and efficiency, as assumed by bargaining, are adequate descriptions of the world.

In a similar vein, Duflo and Udry (2004) take advantage of the fact that men and women in Côte d'Ivoire typically farm different

crops on different plots of land. In an efficient household, household members would insure each other against shocks to their individual plots: If one year's rain pattern happened to favor the women's crops, the women would share some of their profits with the men, and vice versa, to lower the total risk each faced. Contrary to this hypothesis, they find that shocks to the plots farmed by women due to variation in rainfall affect spending on education and food but have no impact on private goods typically consumed by men (alcohol and tobacco). In short, there is no evidence that the men insure the women against rainfall shocks, even though it is easy to observe that the women's plots are less productive because of rainfall (over which they have no control) rather than inefficient or negligent farming practices (in which case the men might blame them for their low productivity and thus see no reason to "insure" them for their losses). Robinson (2012) finds similar evidence using experimental data on households in Kenya.

There's another explanation for why households might not be Pareto efficient: Its members might not have the same information at each moment in time. If one partner knows they have received a pay increase but chooses to hide this from their partner, the two cannot bargain over how to spend the additional money. Ashraf (2009) shows that how information is shared within the household affects financial decisions. In her experiment, which she conducted in the Philippines, when men receive money without their wife's knowledge, they typically deposit it into their own personal account and spend it on personal consumption. But when the wife learns that her husband is about to receive money and she is able to communicate with her husband about what he will do with it, the money is typically deposited into the wife's account and saved.


It is not clear whether the evidence from developing countries applies to households in developed countries like the U.S. Many aspects of economic life and household structure, and the traditions surrounding marriage, are different in these countries. This remains an important open question that is waiting for more careful research.

Conclusion

Although traditional economic theory has mostly glossed over the inner workings of household decision-making, a flourishing field of new research is beginning to show that how household members interact matters for many economic choices. Exactly how decisions are made within a household remains an open question. There is considerable evidence consistent with the Pareto-efficient bargaining paradigm when looking at choices made at a particular moment in time. Put differently, bargaining appears to work well to explain how a household efficiently allocates \$10 between apples and bananas at a grocery store.

But the evidence also suggests that bargaining may not be an adequate characterization for how households decide to save, invest, or borrow. There is currently no satisfying answer as to why a savings choice isn't made in the same way as the choice of apples and bananas. One possibility is that bargaining about saving and borrowing requires ongoing commitment. If a household agrees to save \$100 each month, each member potentially

has access to \$100 at every moment in time and must refrain from drawing on those funds in order to buy something for themselves. Commitment to an agreed savings goal is complicated by the need for flexibility. Perhaps the money is needed right away for a new and important expenditure. Perhaps it is hard for members to know how crucial a surprise expenditure is for their partner.

It is possible that households arrange their finances in ways designed to limit these problems. One example in line with this theory is provided by a creative series of experiments run by Schaner (2015) in rural Kenya. She studies the choice of households to save either in a joint account that both members can access or in individual accounts. She shows that couples who differ in their patience are far more likely to opt for separate savings accounts. The implication is that households actively choose financial products based on their ability to make Pareto-efficient decisions through bargaining. This idea might help explain many other choices regarding the financial products households use. For example, the choice to have a joint credit card versus two separate individual cards, or the decision to save when the home is owned and controlled by both household members. It is also possible that some financial products have a deleterious effect on household outcomes because they aggravate problems with the way households make decisions. For example, the availability of high-interest payday loans may allow one member of a household to access future income before other members can weigh in on how that money should be spent. More innovative research is needed to assess these conjectures. 

Notes

1 Outside of economics a wide range of researchers have also considered these questions. For example, Bennett (2013) provides a survey of the work by sociologists on household economic decision-making. Research in these fields generally considers a richer set of forces (e.g., gender politics, psychological interaction, social norms) that might affect household choices. The drawback is that these theories are difficult to test and, as a result, the evidence presented to support these theories has many other plausible interpretations.

2 See Lundberg, Pollak, and Wales (1997).

3 Several studies have confirmed this basic finding in different settings. See, for example, Phipps and Burton (1998) and Ashraf (2009).

4 See for example Chiappori (1988, 1992) and Browning and Chiappori (1998).

5 See also Chiappori, Fortin, and Lacroix (2002).

6 For more examples showing that external factors appear to influence bargaining power within the household, see Browning et al. (1994), Dufló (2000), and Thomas (1994).

7 See also Addoum (2017) and Olafsson and Thornquist (2018).

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Research Update

These papers by Philadelphia Fed economists, analysts, and visiting scholars represent preliminary research that is being circulated for discussion purposes.

The views expressed in these papers are solely those of the authors and should not be interpreted as reflecting the views of the Federal Reserve Bank of Philadelphia or Federal Reserve System.

The Consequences of Student Loan Credit Expansions: Evidence from Three Decades of Default Cycles

This paper studies the link between credit availability and student loan repayment using administrative federal student loan data. We demonstrate that expansions and contractions in federal student loan credit to institutions with high default rates explain most of the time series variation in student loan defaults between 1980 and 2010. Expansions in loan eligibility between 1976 and 1988 led to the entry of new, high-risk institutions and to default rates exceeding 30 percent in the late 1980s. Credit access was subsequently tightened through strict institutional and student accountability measures. This contracted credit availability at the highest default rate institutions, which in turn caused an exodus of institutions with high default rates, resulting in lower default rates on student loans. After 1992, the cycle was repeated, with credit access gradually loosened by unwinding many of the pre-1992 reforms. We confirm this time series narrative by examining discrete policy changes governing access to credit to show that tightening credit supply led to the closure of high-default schools and that the relaxation of accountability rules resulted in their expansion. Our estimates imply that 85 percent of the increase in default between 1980 and 1990, and 95 percent of the decrease in default between 1990 and 2000 is driven by schools entering and exiting loan programs. One-third of the recent increase in default is associated with the entry of online programs following the relaxation of rules for lending to online schools, and another third is associated with the abolition of rules limiting the share of revenue coming from federal programs.

Working Paper 19-32. Adam Looney, The Brookings Institution; Constantine Yannelis, University of Chicago Booth School of Business and Federal Reserve Bank of Philadelphia Consumer Finance Institute Visiting Scholar.

How Important Are Local Community Banks to Small-Business Lending? Evidence from Mergers and Acquisitions

The authors investigate the shrinking community-banking sector and the impact on local small-business lending (SBL) in the context of mergers and acquisitions. From all mergers that involved community banks, they examine the varying impact on SBL depending on the local presence of the acquirers' and the targets' operations prior to acquisitions. Our results indicate that, relative to counties where the acquirer had operations before the merger, local SBL declined significantly more in counties where only the target had operations before the merger. This result holds even after controlling for the general local SBL market or local economic trends. These findings are consistent with an argument that SBL funding has been directed (after the mergers) toward the acquirers' counties. The authors find even stronger evidence during and after the financial crisis. Overall, the authors find evidence that local community banks have continued to play an important role in providing funding to local small businesses. The absence of local community banks that became a target of a merger or acquisition by nonlocal acquirers has, on average, led to local SBL credit gaps that were not filled by the rest of the banking sector.

Working Paper 18-18 Revised. Julapa Jagtiani, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Raman Quinn Maingi, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

The Well-Being of Nations: Estimating Welfare from International Migration

The limitations of GDP as a measure of welfare are well known. We propose a new method of estimating the well-being of nations. Using gross bilateral international migration flows and a discrete choice model in which everyone in the world chooses a country in which to live, we estimate each country's overall quality of life. Our estimates, by relying on revealed preference, complement previous estimates of economic well-being that consider only income or a small number of factors, or rely on structural assumptions about how these factors contribute to well-being.

Working Paper 19-33. Sanghoon Lee, University of British Columbia; Seung Hoon Lee, Georgia Institute of Technology; Jeffrey Lin, Federal Reserve Bank of Philadelphia Research Department.

Cyclical Labor Income Risk

We investigate cyclicity of variance and skewness of household labor income risk using PSID data. There are five main findings. First, we find that heads' labor income exhibits countercyclical variance and procyclical skewness. Second, the cyclicity of hourly wages is muted, suggesting that heads' labor income risk is mainly coming from the volatility of hours. Third, younger households face stronger cyclicity of income volatility than older ones, although the level of volatility is lower for the younger ones. Fourth, while a second earner helps lower the level of skewness, it does not mitigate the volatility of household labor income risk. Meanwhile, government taxes and transfers are found to mitigate the level and cyclicity of labor income risk volatility. Finally, among heads with strong labor market attachment, the cyclicity of labor income volatility becomes weaker, while the cyclicity of skewness remains.

Working Paper 19-34. Makoto Nakajima, Federal Reserve Bank of Philadelphia Research Department; Vladimir Smirnyagin, University of Minnesota.

Formative Experiences and the Price of Gasoline

An individual's initial experiences with a common good, such as gasoline, can shape their behavior for decades. We first show that the 1979 oil crisis had a persistent negative effect on the likelihood that individuals that came of driving age during this time drove to work in the year 2000 (i.e., in their mid-30s). The effect is stronger for those with lower incomes and those in cities. Combining data on many cohorts, we then show that large increases in gasoline prices between the ages of 15 and 18 significantly reduce both (i) the likelihood of driving a private automobile to work and (ii) total annual vehicle miles traveled later in life, while also increasing public transit use. Differences in driver license age requirements generate additional variation in the formative window. These effects cannot be explained by contemporaneous income and do not appear to be only due to increased costs from delayed driving skill acquisition. Instead, they seem to reflect the formation of preferences for driving or persistent changes in the perceived costs of driving.

Working Paper 19-35. Christopher Severen, Federal Reserve Bank of Philadelphia Research Department; Arthur A. van Benthem, University of Pennsylvania and NBER.

The Paper Trail of Knowledge Spillovers: Evidence from Patent Interferences

We show evidence of localized knowledge spillovers using a new database of U.S. patent interferences terminated between 1998 and 2014. Interferences resulted when two or more independent parties submitted identical claims of invention nearly simultaneously. Following the idea that inventors of identical inventions share common knowledge inputs, interferences provide a new method for measuring knowledge spillovers. Interfering inventors are 1.4 to 4 times more likely to live in the same local area than matched control pairs of inventors. They are also more geographically concentrated than citation-linked inventors. Our results emphasize geographic distance as a barrier to tacit knowledge flows.

Working Paper 17-44 Revised. Ina Ganguli, University of Massachusetts–Amherst; Jeffrey Lin, Federal Reserve Bank of Philadelphia Research Department; Nicholas Reynolds, Brown University.

The Community Reinvestment Act (CRA) and Bank Branching Patterns

This paper examines the relationship between the Community Reinvestment Act (CRA) and bank branching patterns, measured by the risk of branch closure and the net loss of branches at the neighborhood level, in the aftermath of Great Recession. Between 2009 and 2017, there was a larger decline in the number of bank branches in lower-income neighborhoods than in more affluent ones, raising concerns about access to mainstream financial services. However, once we control for supply and demand factors that influence bank branching decisions, we find generally consistent evidence that the CRA is associated with a lower risk of branch closure, and the effects are stronger for neighborhoods with fewer branches, for larger banks, and for major metro areas. The CRA also reduces the risk of net bank losses in lower-income neighborhoods. The evidence from our analysis is consistent with the notion that the CRA helps banks meet the credit needs of underserved communities and populations by ensuring the continued presence of brick-and-mortar branches.

Working Paper 19-36. Lei Ding, Federal Reserve Bank of Philadelphia; Carolina K. Reid, University of California, Berkeley.

How Wide Is the Firm Border?

We examine the within- and across-firm shipment decisions of tens of thousands of goods-producing and goods-distributing establishments. This allows us to quantify the normally unobservable forces that determine firm boundaries; that is, which transactions are mediated by ownership control, as opposed to contracts or markets. We find firm boundaries to be an economically significant barrier to trade: Having an additional vertically integrated establishment in a given destination zip code has the same effect on shipment volumes as a 40 percent reduction in distance. These effects are larger for high value-to-weight products, for faraway destinations, for differentiated products, and for IT-intensive industries.

Working Paper 19-37. Enghin Atalay, Federal Reserve Bank of Philadelphia Research Department; Ali Hortaçsu, University of Chicago; Mary Jialin Li, Compass Lexecon; Chad Syverson, University of Chicago.

Competition and Health-Care Spending: Theory and Application to Certificate of Need Laws

Hospitals and other health-care providers in 34 states must obtain a Certificate of Need (CON) from a state board before opening or expanding, leading to reduced competition. We develop a theoretical model of how market concentration affects health-care spending. Our theoretical model shows that increases in concentration, such as those brought about by CON, can either increase or decrease spending. Our model predicts that CON is more likely to increase spending in markets in which costs are low and patients are sicker. We test our model using spending data from the Household Component of the Medical Expenditure Panel Survey (MEPS).

Working Paper 19-38. James Bailey, Providence College and Federal Reserve Bank of Philadelphia Consumer Finance Institute Visiting Scholar; Tom Hamami, Ripon College.

The Mortgage Prepayment Decision: Are There Other Motivations Beyond Refinance and Move?

Borrowers terminate residential mortgages for a variety of reasons. Prepayments and defaults have always been distinguishable, and researchers have recently distinguished between prepayments involving a move and other prepayments. But these categories still combine distinct decisions. For example, a borrower may refinance to obtain a lower interest rate or to borrow a larger amount. By matching mortgage servicing and credit bureau records, we are able to distinguish among several motivations for prepayment: simple refinancing, cash-out refinancing, mortgage payoff, and move. Using multinomial logit to estimate a competing hazard model for these types of prepayments plus default, we demonstrate that these outcomes are distinct, with some outcomes showing quite different relationships to standard predictive variables, such as refinance incentive, credit score, and loan-to-value ratio, than in models that combine outcomes. The implication of these findings is that models that aggregate prepayment types do not adequately describe borrower motivations.

Working Paper 19-39. Arden Hall, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Raman Quinn Maingi, New York University.

Policy Inertia, Election Uncertainty and Incumbency Disadvantage of Political Parties

We document that postwar U.S. elections show a strong pattern of “incumbency disadvantage”: If a party has held the presidency of the country or the governorship of a state for some time, that party tends to lose popularity in the subsequent election. We show that this fact can be explained by a combination of policy inertia and unpredictability in election outcomes. A quantitative analysis shows that the observed magnitude of incumbency disadvantage can arise in several different models of policy inertia. Normative and positive implications of policy inertia leading to incumbency disadvantage are explored.

Working Paper 19-40. Satyajit Chatterjee, Federal Reserve Bank of Philadelphia Research Department; Burcu Eyigungor, Federal Reserve Bank of Philadelphia Research Department.

Concentration of Control Rights in Leveraged Loan Syndicates

We find that corporate loan contracts frequently concentrate control rights with a subset of lenders. Despite the rise in term loans without financial covenants—so-called covenant-lite loans—borrowing firms’ revolving lines of credit almost always retain traditional financial covenants. This split structure gives revolving lenders the exclusive right and ability to monitor and to renegotiate the financial covenants, and we confirm that loans with split control rights are still subject to the discipline of financial covenants. We provide evidence that split control rights are designed to mitigate bargaining frictions that have arisen with the entry of nonbank lenders and became apparent during the financial crisis.

Working Paper 19-41. Mitchell Berlin, Federal Reserve Bank of Philadelphia Research Department; Greg Nini, Drexel University and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Edison G. Yu, Federal Reserve Bank of Philadelphia Research Department.

Localized Knowledge Spillovers: Evidence from the Spatial Clustering of R&D Labs and Patent Citations

Buzard et al. (2017) show that American R&D labs are highly spatially concentrated even within a given metropolitan area. We argue that the geography of their clusters is better suited for studying knowledge spillovers than are states, metropolitan areas, or other political or administrative boundaries that have predominantly been used in previous studies. In this paper, we assign patents and citations to these newly defined clusters of R&D labs. Our tests show that the localization of knowledge spillovers, as measured via patent citations, is strongest at small spatial scales and diminishes with distance. On average, patents within a cluster are about two to four times more likely to cite an inventor in the same cluster than one in a control group. Of import, we find that the degree of localization of knowledge spillovers will be understated in samples based on metropolitan area definitions compared to samples based on the R&D clusters. At the same time, the strength of knowledge spillovers varies widely between clusters. The results are robust to the specification of patent technological categories, the method of citation matching, and alternate cluster definitions.

Working Paper 19-42. Kristy Buzard, Syracuse University and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Gerald A. Carlino, Federal Reserve Bank of Philadelphia Research Department; Robert M. Hunt, Federal Reserve Bank of Philadelphia Consumer Finance Institute; Jake K. Carr, The Ohio State University; Tony E. Smith, University of Pennsylvania and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar.

Relationship Networks in Banking Around a Sovereign Default and Currency Crisis

We study how banks’ exposure to a sovereign crisis gets transmitted onto the corporate sector. To do so, we use data on the universe of banks and firms in Argentina during the crisis of 2001. We build a model characterized by matching frictions in which firms establish (long-term) relationships with banks that are subject to balance sheet disruptions. Credit relationships with banks more exposed to the crisis suffer the most. However, this relationship-level effect overstates the true cost of the crisis since profitable firms (e.g., exporters after a devaluation) might find it optimal to switch lenders, reducing the negative impact on overall credit and activity. Using linked bank-firm and firm-level data we find evidence largely consistent with our theory.

Working Paper 19-43. Pablo D’Erasmus, Federal Reserve Bank of Philadelphia Research Department; Hernán Moscoso Boedo, University of Cincinnati; María Pía Olivero, Drexel University and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Máximo Sangiacomo, Central Bank of Argentina.

Heterogeneity in Decentralized Asset Markets

We study a search and bargaining model of asset markets in which investors' heterogeneous valuations for the asset are drawn from an arbitrary distribution. We present a solution technique that makes the model fully tractable and allows us to provide a complete characterization of the unique equilibrium, in closed form, both in and out of steady state. Using this characterization, we derive several novel implications that highlight the importance of heterogeneity. In particular, we show how some investors endogenously emerge as intermediaries, even though they have no advantage in contacting other agents or holding inventory; and we show how heterogeneity magnifies the impact of search frictions on asset prices, misallocation, and welfare.

Working Paper 19-44. Julien Hugonnier, EPFL, Swiss Finance Institute, and CEPR; Benjamin Lester, Federal Reserve Bank of Philadelphia Research Department; Pierre-Olivier Weill, University of California, Los Angeles, NBER, CEPR, and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar.

Institutional Investors and the U.S. Housing Recovery

We study the house price recovery in the U.S. single-family residential housing market since the outbreak of the mortgage crisis, which, in contrast to the preceding housing boom, was not accompanied by a rise in homeownership rates. Using comprehensive property-level transaction data, we show that this phenomenon is largely explained by the emergence of institutional investors. By exploiting heterogeneity in a county's exposure to local lending conditions and to government programs that affected investors' access to residential properties, we estimate that the increasing presence of institutions in the housing market explains over half of the increase in real house price appreciation rates between 2006 and 2014. We further demonstrate that institutional investors contribute to the improvement of the local housing market by reducing vacancy rates as they shorten the amount of time distressed properties stay in REO. Additionally, institutional investors help lower local unemployment rates by increasing local construction employment. However, institutional investors are responsible for most of the declines in the homeownership rates.

Working Paper 19-45. Lauren Lambie-Hanson, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Wenli Li, Federal Reserve Bank of Philadelphia Research Department; Michael Slonkosky, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department.

Personal Bankruptcy as a Real Option

We provide a novel explanation to the longstanding puzzle of the "missing bankruptcy filings." Even though a household with a negative net worth will receive contemporaneous benefit from bankruptcy, there may be greater insurance value from delaying the filing. Household bankruptcy is thus an American-style put option, which is not necessarily exercised even if the option is "in the money." Based on the value functions in the household's dynamic programming problem, we formulate the value of the bankruptcy option as well as the exercise price. We estimate a life-cycle model in which households choose the optimal time to exercise their bankruptcy option.

Working Paper 19-46. Guozhong Zhu, University of Alberta; Vyacheslav Mikhed, Federal Reserve Bank of Philadelphia Consumer Finance Institute; Barry Scholnick, University of Alberta and Federal Reserve Bank of Philadelphia Consumer Finance Institute Visiting Scholar.

Fintech Lending and Mortgage Credit Access

Following the 2008 financial crisis, mortgage credit tightened and banks lost significant mortgage market share to nonbank lenders, including to fintech firms recently. Have fintech firms expanded credit access, or are their customers similar to those of traditional lenders? Unlike in small-business and unsecured-consumers lending, fintech mortgage lenders do not have the same incentives or flexibility to use alternative data for credit decisions because of stringent mortgage origination requirements. Fintech loans are broadly similar to those made by traditional lenders, despite innovations in the marketing and the application process. However, nonbanks market to consumers with weaker credit scores than do banks, and fintech lenders have greater market shares in areas with lower credit scores and higher mortgage denial rates.

Working Paper 19-47. Julapa Jagtiani, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Lauren Lambie-Hanson, Federal Reserve Bank of Philadelphia Supervision, Regulation, and Credit Department; Timothy Lambie-Hanson, Haverford College.

Credit, Bankruptcy, and Aggregate Fluctuations

We document the cyclical properties of unsecured consumer credit (procyclical and volatile) and of consumer bankruptcies (countercyclical and very volatile). Using a growth model with household heterogeneity in earnings and assets with access to unsecured credit (because of bankruptcy costs) and aggregate shocks, we show that the cyclical behavior of household earnings growth accounts for these properties, albeit not for the large volatility of credit. We find that tilting household consumption toward goods that can be purchased on credit and a slight countercyclicality in the terms of access to credit match the sizes of credit and bankruptcy volatilities. We also find that when the right to file for bankruptcy does not exist, unsecured credit is countercyclical.

Working Paper 19-48. Makoto Nakajima, Federal Reserve Bank of Philadelphia Research Department; José-Víctor Ríos-Rull, University of Pennsylvania and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar.

Fast Locations and Slowing Labor Mobility

Declining internal migration in the United States is driven by increasing home attachment in locations with initially high rates of population turnover. These “fast” locations were the population growth destinations of the 20th century, where home attachments were low but have increased as regional population growth has converged. Using a novel measure of attachment, this paper estimates a structural model of migration that distinguishes moving frictions from home utility. Simulations quantify candidate explanations of the decline. Rising home attachment accounts for most of the decline not attributable to population aging, and its effect is consistent with the observed spatial pattern.

Working Paper 19-49. Patrick Coate, National Council on Compensation Insurance; Kyle Mangum, Federal Reserve Bank of Philadelphia Research Department.



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