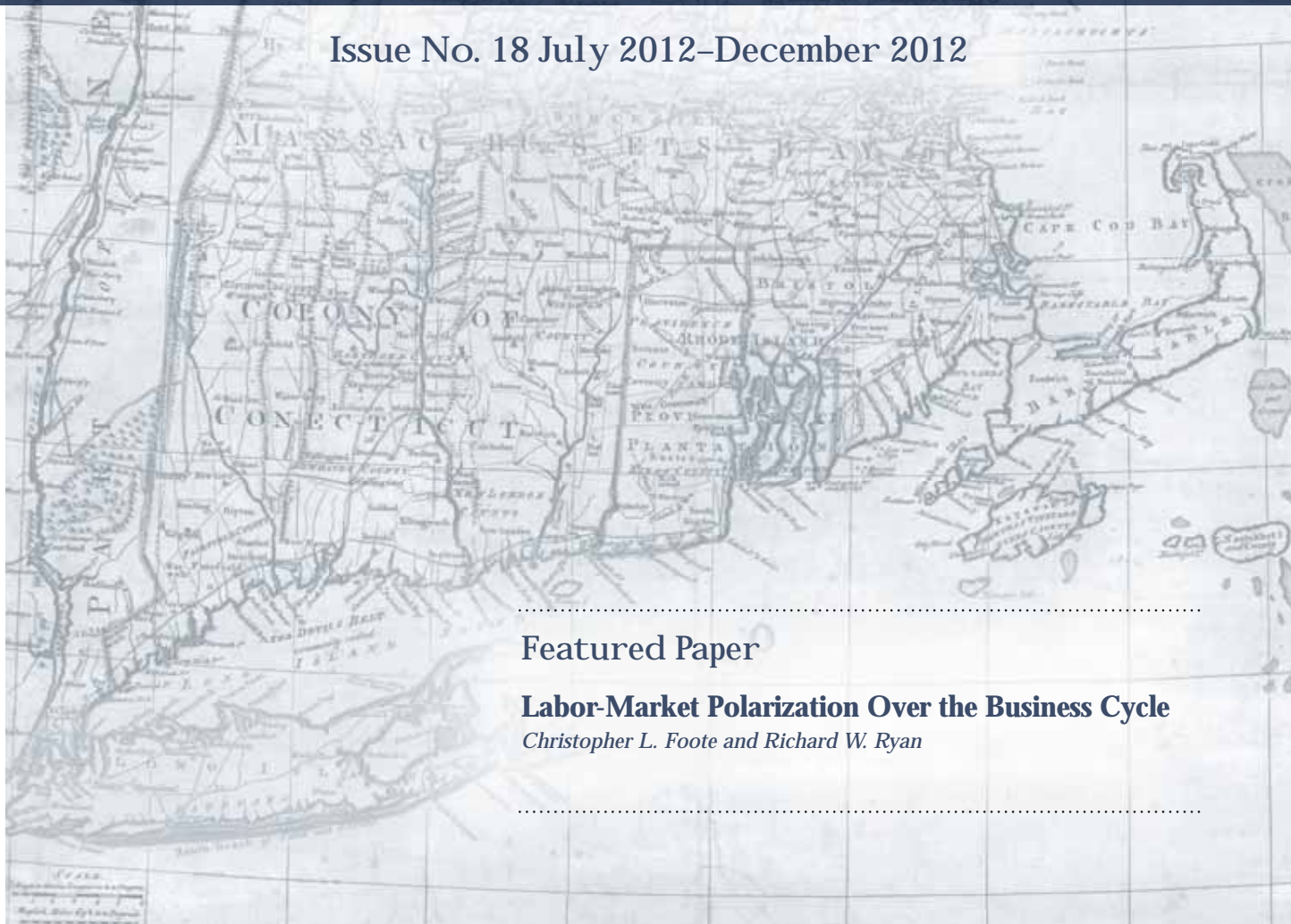Federal Reserve Bank of Boston

Research Review

Issue No. 18 July 2012–December 2012

Featured Paper

Labor-Market Polarization Over the Business Cycle
Christopher L. Foote and Richard W. Ryan

**FEDERAL RESERVE
BANK OF BOSTON™**

Federal Reserve Bank of Boston

Research Review

Issue no. 18 July 2012–December 2012

Research Review provides an overview of recent research by economists and policy analysts of the research department of the Federal Reserve Bank of Boston.

Research Review is available on the web at:
http://www.bostonfed.org/economic/ResearchReview/index.htm

Earlier issues of *Research Review* in hard copy (through Issue #11) are available without charge. To order copies of back issues, please contact the Research Library:

Research Library—D
Federal Reserve Bank of Boston
600 Atlantic Avenue
Boston, MA 02210
Phone: 617.973.3397
Fax: 617.973.4221
E-mail: boston.library@bos.frb.org

Views expressed in *Research Review* are those of the individual authors and do not necessarily reflect official positions of the Federal Reserve Bank of Boston or the Federal Reserve System. The authors appreciate receiving comments.

Executive Summaries in This Issue

Public Policy Briefs

Contributing Authors

Federal Reserve Bank of Boston
Research Department Papers Series

Public Policy Discussion Papers present research bearing on policy issues. They are generally written for policymakers, informed business people, academics, and the informed public. Many of these papers present research intended for professional journals.

Working Papers present statistical or technical research. They are generally written for economists and others with strong technical backgrounds, and they are intended for publication in professional journals.

Public Policy Briefs present analysis on topics of current interest concerning the economy. These briefs are written by Boston Fed staff economists, based on briefing materials or presentations prepared by Boston Fed research staff for senior Bank executives or outside audiences.

Research Reports present research on economic and policy issues of concern to New England's state and local policy leaders and others engaged in developing and implementing public policy in the region. These reports are written by Boston Fed economists and policy analysts.

Research department papers are available online.
http://www.bostonfed.org/economic/respubs.htm

Shifting Confidence in Homeownership: The Great Recession

by Anat Bracha and Julian C. Jamison

Motivation for the Research

In this paper the authors examine the relationship between the real estate crisis, individual beliefs, and attitudes toward homeownership. During the Great Recession, American households saw the value of residential real estate fall by over $4 trillion in 2007 and 2008; this loss was in addition to an approximately $8 trillion decline in the total value of U.S. stocks in 2008 alone. In spite of this massive fall in home values, a Pew Research Center survey of over 2,000 U.S. adults in March 2011 found, surprisingly, that 37 percent still strongly agreed that "buying a home is the best long-term investment a person can make," and an even larger percentage of respondents indicated weak agreement with the statement. Moreover, although homeownership has fallen since the crisis, it is nevertheless remarkably stable: the U.S. home-ownership rate fell from 69.2 percent at its apex in mid-2004 to 66.5 percent at the end of 2010 (see Starobin 2011). Given the drop in real estate values, the persistent belief in the value of homeownership seems to reflect attitudes that go beyond financial considerations. This hypothesis is supported by the finding that 37 percent of those surveyed think being able to own a home is an "extremely important long-term financial goal," more than the percentage who said the same for being able to live comfortably in retirement (35 percent) or being able to pay for their children's college education (31 percent). For better or worse, owning a home remains both a long-term driver of the U.S. economy and an important psychological benchmark for many citizens. Hence, it is important to understand whether and how the recent crisis has affected beliefs related to homeownership.

There is good reason to suspect that the crisis affected such beliefs: previous work has shown that macroeconomic shocks experienced at various ages can affect portfolio choice (Malmendier and Nagel 2011) as well as attitudes regarding the role of government and even the degree of personal agency in determining success (Giuliano and Spilimbergo 2009). Other work has studied the relationship between exposure to stressors, such as violent conflict, and underlying economic preferences like risk aversion (for example, Voors et al. forthcoming). All of this literature finds that macroeconomic shocks have significant individual-level consequences, albeit along varying dimensions, leading to the supposition that we may currently be seeing the consequences of an analogous and potentially long-lasting shift in U.S. attitudes toward homeownership.

Research Approach

Using the Michigan Survey of Consumers, a telephone survey that is nationally representative of households that have a landline, 987 individuals aged 18 to 95 years were surveyed. In the authors' experiment, seven questions were added to the existing survey instrument. These questions asked respondents about: 1) their ZIP code as of late 2008, 2) their current

ZIP code, 3) their opinion on whether buying or renting is better financially, 4) whether they or someone close to them was foreclosed on or suffered a large loss in the real estate market, 5) whether they would be willing to increase their commute to reduce housing expenses, 6) how much they think is reasonable to pay on a mortgage given a certain income, and 7) a hypothetical investment decision to measure attitude toward risk. The novel contribution of this dataset is the use of 2008 and current ZIP codes to match each individual's survey responses with the real estate market conditions in his or her residential location. This matching enables the authors to investigate whether confidence in homeownership systematically changes with the real estate market conditions in one's location.

The real estate data used are the Core Logic Home Price Index (HPI) and Lender Processing Services (LPS) data on loans processed and the percentage of loans that are delinquent or foreclosed upon, all at the ZIP code level. The HPI is a repeat-sales index that is normalized to 100 for the month of January 2000. That is, the levels are comparable over time within a ZIP code but are not comparable across ZIP codes. The authors are interested primarily in *changes* in the HPI, which are all fully comparable, since the geographic scaling factor is the same at each point in time. In addition to real estate market information, the authors used gas and food price information for each location, the former obtained from the U.S. Energy Information Administration, the latter from the U.S. Department of Agriculture, as well as U.S. Census information on neighborhood characteristics.

Following previous research, the authors gave special attention to the effect of exposure to stressors on the magnitude of any attitude changes, where exposure is measured along two separate dimensions: age (existing evidence suggests that beliefs are most malleable in younger people) and the level of direct experience with the crisis. They proxy the latter dimension of exposure by asking individuals whether they or someone they know was foreclosed upon or lost a significant amount of money in the housing crash. They refer to such individuals as having experience and to individuals who did not have this type of experience but knew about the crisis through the media and social interaction as having information only. The authors explored whether the effect on beliefs regarding the housing market for individuals having exposure through information only was different from the effect on individuals with more direct personal experience of the crisis.

Whereas previous papers looked mostly at variation over time in order to ascertain the link between aggregate shocks and individual beliefs, the authors instead used variation over space. In particular, they combined several datasets, matching ZIP-code-level declines in housing prices (and foreclosures) with responses to the questions that were added to the monthly Michigan Survey of Consumers. Their main outcome variable asked people whether and how strongly they believe that owning a home is better financially than renting a home. Other work has focused on the discrepancy between beliefs after the crisis about buying versus selling homes (for example, Englehardt 2011), but the authors restricted their focus in this paper to general attitudes towards homeownership. Other outcome variables reflect responses to questions about the maximum monthly amount that should be paid toward a mortgage, relative willingness to commute, and general risk aversion, via a standard (hypothetical) investment decision.

To distinguish more clearly between responses to the question about whether owning or renting is the financially superior option, the authors isolated the responses that express strong confidence that homeownership is the better financial choice and examined, via a probit regression, what affects the probability that a respondent will express strong confidence in homeownership.

To examine the relationship between the 2008 real estate crash and confidence in homeownership following this event, the authors calculated the greatest percentage decline in the HPI from the local peak. Although the main variable of interest is the decline in the HPI, there are other explanatory variables that can impact housing confidence: demographics and neighborhood characteristics, risk aversion, personal experience, and current market conditions. The authors controlled for these factors one at a time, explaining the rationale for each and then adding these variables to the previous specification so that the individual effects are clear.

Rent versus Own: Which is Better Financially?
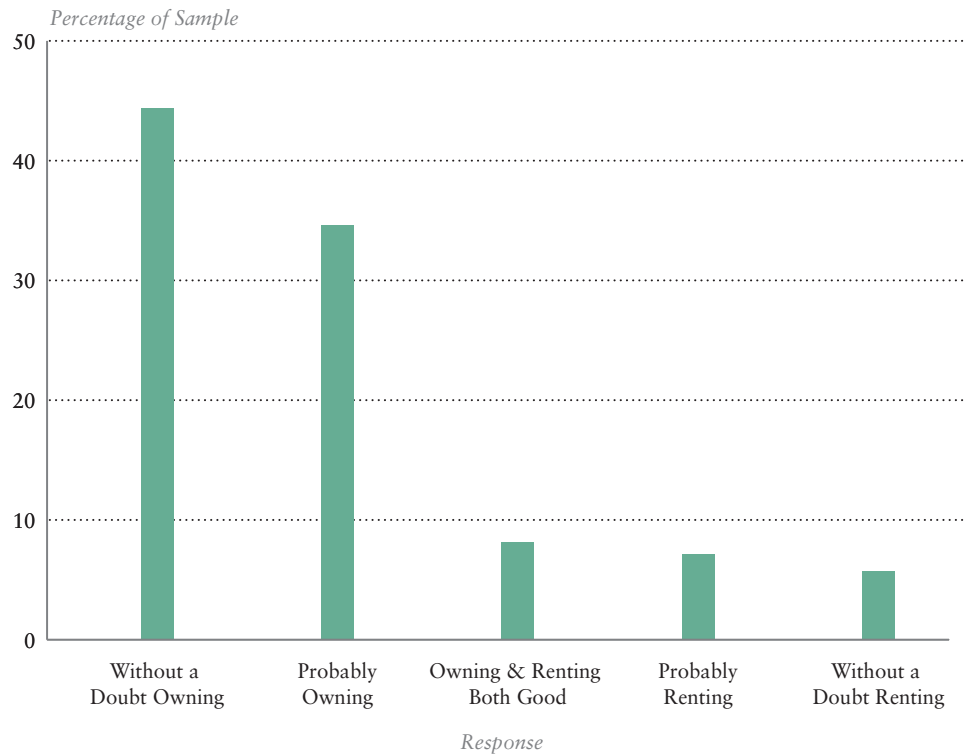
Source: Authors' calculations.

House Price Index Drop and Predicted Probability of Preference for Owning
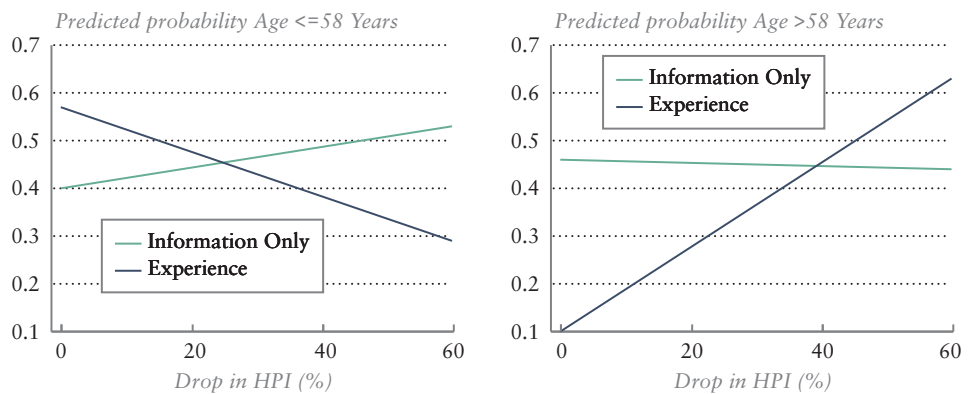
Source: Authors' calculations.

Key Findings

- The majority of respondents replied either that 1) owning a home is without a doubt better financially than renting a home, or that 2) owning a home is probably better financially. Nevertheless, about 20 percent answered either that the two options are about the same or that renting is better financially. Moreover, even the two most commons answers 1) and 2), differ in the degree of confidence expressed in the assertion that buying a home is better financially.

- Experience emerges as an important factor affecting an individual's confidence toward buying a home: the confidence of individuals who had no personal experience with the crisis was not systematically different across different geographical locations, while the confidence of individuals with personal experience regarding homeownership did systematically differ across different geographical locations with different crisis experience.

- For individuals 58 years of age or older, experiencing the crisis was associated with stronger home-buying confidence, while for the younger age group (under 58) the crisis was instead associated with shaken confidence in the desirability of buying a home.

- Relative to married individuals, those who were separated, divorced, widowed, or never married were less confident that homeownership is better financially than renting. This is the case even after controlling for the effect of actual homeownership. All else being equal, women were less confident about the financial benefit of buying a home than men, a result that may reflect gender differences in risk aversion.

- The gender and marital status effects found in the regression with the overall sample were driven mainly by respondents 58 years of age or older, while the language effect was driven solely by the younger respondents. For the overall sample and for respondents 58 years of age or younger, the greater the drop in the HPI, the higher the amount individuals thought a family should spend on a monthly mortgage payment. For respondents over 58 years of age, the main effect of the HPI was negative and insignificant. Finally, the housing market decline does not appear to have had any significant effect on the respondents' willingness to commute.

Implications

This study provides two main insights: first, direct personal experience with a financial shock plays a central role in determining whether individual attitudes change. Even an extremely negative experience such as the Great Recession, the worst U.S. economic crisis since the Great Depression, was not enough to shift the attitudes of those who lived through the crisis and thus had full access to information on its effects but did not have strong first- or second-hand experience of these adverse effects. As the Great Recession was a severe and extreme situation, this analysis may point to a more general rule: information alone may not be sufficient to change attitudes—rather, actual experience is necessary to change attitudes. Furthermore, the effects of the crisis seem to be confined to attitudes toward buying a home, and do not extend to attitudes related to other homeownership decisions, such as commuting or general risk aversion.

The second insight, consistent with some past studies (for example, Giuliano and Spilimbergo 2009), is the finding that real estate prices mainly had a negative effect on younger

individuals' confidence in buying a home, whereas, interestingly, the drop in house prices was associated with older individuals' gaining more confidence in the financial soundness of buying rather than renting a home. This observation is consistent with the idea that older individuals have a fixed set of beliefs and interpret the crisis as a temporary decline from a known trend. In contrast, the younger individuals who personally experienced the recent drop in house prices tended to have lower confidence in buying a home, a finding consistent with the idea that their beliefs are still flexible and may change over time.

p-12-5

Foreclosure Externalities: Some New Evidence

by Kristopher S. Gerardi, Eric Rosenblatt, Paul S. Willen, and Vincent W. Yao

Motivation for the Research

In a recent set of influential papers, researchers have argued that residential foreclosures reduce the sale prices of nearby properties. In the existing literature, researchers have typically estimated some variation of a spatial externality regression, where the log of the sale price of a property in a particular time period is a function of a vector of controls, a measure of the number of properties that experience some type of foreclosure event within a certain distance of the property in some window around the particular time period, and an error term. While there are substantial differences in the types of foreclosure events, the distances, and the time windows that previous papers have focused on, in general researchers have found negative estimates for the coefficient on the number of properties that experience some type of foreclosure event. The researchers interpret their negative estimates as evidence of the existence of negative foreclosure externalities.

The authors of this paper revisit this issue by using a more robust identification strategy combined with a new dataset. This method allows them to identify and locate properties at various stages of distress, from minor delinquency all the way through the foreclosure process in which the lender assumes ownership and then sells the property to a new owner. Additionally, a subset of their data includes information about the condition of the foreclosed properties.

Research Approach

The authors estimate a spatial regression similar to the one in the existing literature (described above) but with several important differences. They argue that their specification improves the identification of a true causal impact of foreclosures on prices and narrows the possible interpretations of the externality. The authors' approach features three main innovations. The first is the use of multiple measures of the stock of distressed properties, whereas previous researchers have focused on a single flow. Most papers in the literature have measured the flow of properties that complete the foreclosure process, an approach that implicitly assumes that the foreclosure externality does not occur until the foreclosure auction. In contrast, in their baseline specification the authors include the number of properties with seriously delinquent mortgages, which they define as properties owned by borrowers who have been delinquent 90 days or more on their mortgages for at least one year, the number of lender-owned properties, known in the industry as REOs (for real estate owned), and the

number of properties recently sold by the lender. Furthermore, in variations of their baseline specification the authors also include the number of properties with mortgages that have been seriously delinquent for less than a year and properties with mortgages that are fewer than 90 days delinquent, which they refer to as minor delinquencies. Thus, their approach allows for the possibility that the foreclosure externality occurs well before the foreclosure is completed, perhaps as early as when the borrower first becomes distressed.

The main reason to focus on stocks and not flows is that in many of the theories of why foreclosures might affect house prices, it is the inventory that matters and not the flow. For example, many have argued that borrowers facing foreclosure have little reason to invest in their properties and that the resulting neglect could generate negative externalities in the neighborhood and depress nearby home values. But the approaches used in the previous literature only roughly approximate the number of nearby properties in distress at the time of the sale.

The focus on the stock or inventory is important for policy reasons. If one interprets the relationship causally, then flow measures can lead to erroneous inferences. For example, suppose that all distressed properties exert downward pressure on prices due to investment externalities, but that the equation is estimated using only transitions into foreclosure. Because foreclosure transitions in a given area are highly correlated with the number of outstanding distressed properties in the same area, one would find a significant negative correlation between the sale price of a nondistressed property and the number of surrounding properties transitioning into foreclosure. Based on such results, one might conclude that implementing a foreclosure moratorium would increase house prices. However, such a conclusion would be mistaken. Delaying transitions into foreclosure does not reduce the total number of distressed properties, and according to the true model it is the number of nearby distressed properties that exerts downward pressure on prices. Indeed, over time, delaying foreclosures without stopping transitions into delinquency would increase the total number of distressed properties and thus serve to lower prices.

The second innovation is the manner in which the authors attempt to control for unobserved heterogeneity across properties. Unobserved heterogeneity is a serious issue in this context, as it is well known that foreclosures are generated by falling house prices, so any unobserved factor that causes house prices to decline and therefore foreclosures to rise will lead to simultaneity bias and erroneous inference. To deal with this issue, the authors estimate a version of the main equation that controls for previous sales of the same property and contains a set of highly geographically disaggregated fixed effects (at the census block group level). Thus, their estimates of the coefficient on the number of distressed properties within the time and distance window reflect differences in price growth across properties bought and sold in the same year within the same census bloc group (CBG). The authors argue that this identification strategy is largely immune to issues of reverse causality and simultaneity bias. In addition, they show that the inclusion of highly disaggregated geographic fixed effects dramatically reduces the estimated impact of nearby distressed properties on home values, suggesting that most of the previous papers in the literature that did not employ such fixed effects significantly overstate the magnitude of the true foreclosure externality.

The final major innovation in the analysis is the fact that the dataset includes information on whether a lender-owned property is vacant and on the condition of lender-owned properties.

The Importance of Geographic Controls

Map of Foreclosures and Sales *with* Census Tract Controls
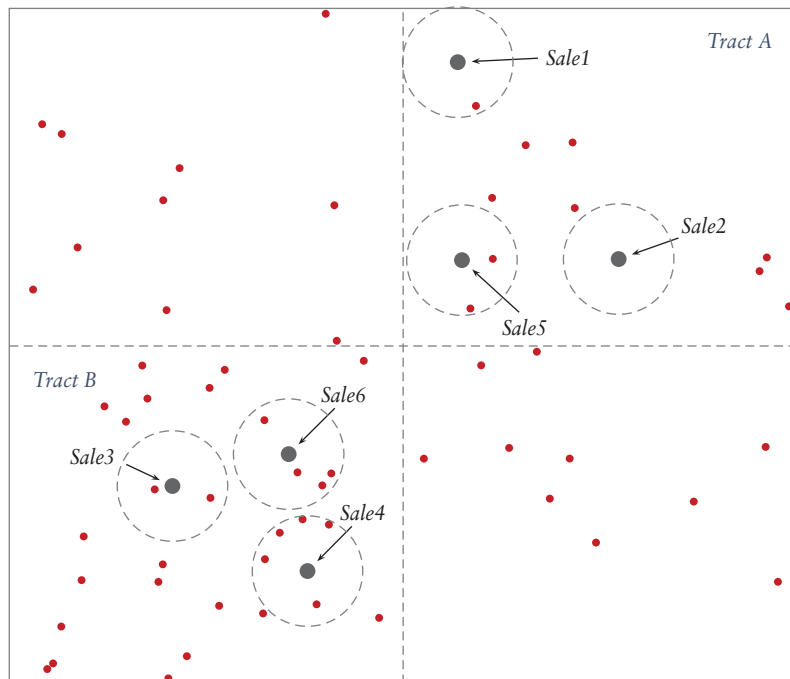
Map of Foreclosures and Sales *without* Census Tract Controls
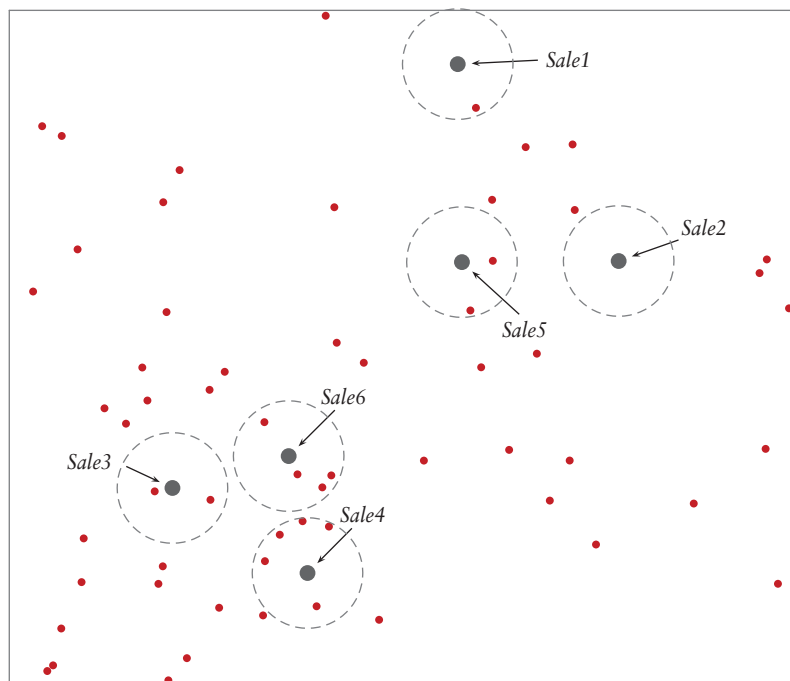
Source: Authors' illustration.
Note: This figure illustrates why it is important to control for geographic effects. If, to investigate the effect that proximity to a foreclosed property has on housing prices, a researcher runs a regression without geographic controls, he may mistakenly attribute the negative effect on house prices to the prevalence of foreclosures in the immediately surrounding area (as shown in the circles). In fact, the negative effect may be caused by the density of foreclosures in a larger surrounding area (as shown in the density of red dots in the Census tracts shown in the upper panel).

Key Findings

- Properties in all stages of borrower financial distress exert downward pressure on nearby home values. Estimates of the coefficient on the number of nearby homes in foreclosure within a specified time frame are smallest in absolute value for the number of nearby minor delinquencies and larger for the number with seriously delinquent mortgage borrowers who have not yet completed foreclosure proceedings. The estimated coefficient is slightly lower in absolute value when the lender owns the property, even lower after the property is sold by the lender to an arms-length buyer, and reaches zero approximately one year after the REO sale.

- The negative impact of a nearby distressed property on the sale price of a nondistressed property is economically small, ranging from just under 0.5 percent to just over 1.0 percent, depending on the exact regression specification, the sample period, and the assumptions made about the effect of distance.

- The estimate of the impact is more negative for both vacant properties and lender-owned properties in below-average condition, while the estimate for lender-owned properties in above-average condition is positive.

- The authors evaluate three possible explanations for their findings: 1) unobserved relative demand shocks drive down prices and result in some foreclosures; 2) foreclosures generate increased relative supply and drive down prices; 3) an externality of reduced investment by distressed borrowers in the delinquency phase and by financial institutions in the lender-ownership phase drives down prices. The authors observe that, given the data and the limited theory, it is very difficult to establish anything conclusively. However, they argue that the weight of the evidence points to the third explanation. Both of the first two explanations require that there be distinct within-CBG micro-markets not generated by the externality from the foreclosures themselves. Given the small size of CBGs, this seems unlikely. In addition, the evidence from the regressions that incorporate information on the condition of foreclosed properties is inconsistent with the supply explanation: a reasonable hypothesis is that foreclosed properties in above-average condition should compete more for buyers than foreclosed properties in poor condition, implying that foreclosed properties in above-average condition would have a negative impact on price rather than a positive one.

Implications

The results suggest that the key to minimizing the costs of foreclosure is to minimize the time that properties spend in serious delinquency and in REO.

The policy implications of even a small investment externality effect are important, especially in many of the areas that have been characterized by large numbers of distressed properties throughout the recent foreclosure crisis. The results suggest that the key to minimizing the costs of foreclosure is to minimize the time that properties spend in serious delinquency and in REO. On one hand, this implies putting pressure on lenders to sell properties out of REO quickly. On the other hand, and perhaps much less palatably, it implies minimizing the time a borrower spends in serious delinquency, which means accelerating the foreclosure process.

Put another way, the paper's results suggest that delaying the foreclosure process exacts a cost on society as a whole that should be taken into account when making policy. As an example, Massachusetts passed a "right-to-cure" law in 2007, which forced lenders to give borrowers an additional 90 days to cure their mortgage before foreclosure proceedings could start. Gerardi, Lambie-Hanson, and Willen (2011) use a difference-in-differences approach

to show that the law did not benefit borrowers in the sense that borrowers subject to the law were no more likely to cure or to renegotiate their loans than borrowers who were not covered by the law. One might say that the law only failed to produce benefits, but the authors' analysis suggests that it may also have imposed costs on homeowners who lived near those delinquent borrowers who were able to take advantage of the law.

p-12-6

Who Gains and Who Loses from the 2011 Debit Card Interchange Fee Reform?

by Oz Shy

Motivation for the Research

A final rule, establishing standards for debit card interchange fees, was recently issued by the Federal Reserve Board and took effect on October 1, 2011. This rule, called Regulation II (Debit Card Interchange Fees and Routing), was required by the Dodd-Frank Wall Street Reform and Consumer Protection Act. Debit card interchange fees are established by payment card networks and ultimately paid by merchants to debit card issuers (mostly banks) for each electronic debit card transaction. Under the final rule, the maximum permissible interchange fee that a card issuer may receive for an electronic debit transaction is the sum of 21 cents per transaction plus 5 basis points, multiplied by the value of the transaction. The new interchange fee replaces the proportional fees that were found on average to be 1.17 percent.

Some merchants and even media realized that the new rules allow card issuers to raise the interchange fees on lower-value transactions.

Whereas the change from an average proportional fee of 1.17 percent to an almost flat fee of 21 cents reduced the fee on the average transaction, some merchants and even the media quickly realized that the new rules allow card issuers to raise the interchange fees on lower-value transactions. (More precisely, the maximum allowable fee is 21 cents plus five basis points, plus an upward adjustment of no more than 1 cent per transaction if the issuer develops and implements policies and procedures reasonably designed to achieve the fraud-prevention standards set out in the interim final rule.) This paper aims to identify the type and value of transactions on which particular types of merchants are likely to be paying higher and lower interchange fees now that the reform has gone into effect.

Research Approach

The approach taken in this paper demonstrates that although the interchange fees charged to merchants by card issuers are determined by a complex set of schedules that depend on a number of factors, including merchant type and volume of transactions, the apparent underlying logic can be understood via a simple conceptual model. The author develops such a model using average fees and then shows that the actual fee burdens, which vary by merchant type, are very similar to those in the model.

Debit card transactions are divided into two types: signature and PIN. PIN transactions are those in which buyers key in their 4-digit personal identification number (PIN) at the point of sale. All other transactions are classified as signature regardless of whether customers actually sign the receipt at the point of sale. Before the new rule took effect, signature interchange

fees were much higher than PIN interchange fees. This is because signature debit transactions were cleared via the credit card networks whereas PIN transactions were cleared via the debit card networks, and interchange fees to merchants are higher for transactions cleared via the credit card networks than for transaction cleared via the debit card networks. Some small merchants do not offer a PIN option to buyers, as the availability of this option depends on the type of processors merchants use to transmit the information to their acquiring bank. The new regulations on interchange fees do not apply to card issuers with assets of less than $10 billion. These smaller card issuers are exempt from this regulation and may therefore continue to charge the old fees if they find it profitable to do so.

This paper identifies the dollar value of transactions under which merchants paid higher or lower interchange fees on signature debit and PIN debit card transactions. The author then uses data from the Federal Reserve Bank of Boston's 2010 Diary of Consumer Payment Choice (DCPC) to predict which types of merchants pay higher or lower interchange fees under the new rules.

Initially using interchange fees averaged across merchant types to develop the basic intuition behind the results, the author next computes the charges using interchange fees that vary by merchant type and compares results from the 2011 DCPC data with the results obtained from the 2010 DCPC data. The advantage of using a merchant-specific fee structure is that the results concerning gains and losses to merchants can be associated with whether the merchant paid a base fee or a fee based on a volume or value discount, known as a Tier 1 fee.

The DCPC groups merchants into 14 types, based on the goods or services they offer, as follows: groceries and pharmacies; gas stations and convenience stores; general merchandise stores and websites; all other retail establishments; payments to people; restaurants and bars; fast food and beverage establishments; transportation, tolls, and parking services; recreation, entertainment, and travel services; health, medical, and personal care providers; maintenance and repair services; education and day care; nonprofit, charity, and religious organizations; and other services.

The author bases his computations on 21 cents plus 5 basis points of the transaction, the maximum allowable under the new rule. He justifies using the maximum by citing a study by the Federal Reserve Board of Governors (BOG 2011) showing that on average debit card issuers charged the maximum interchange fee allowed under the Board's new rule. In fact BOG 2011 found that the actual average interchange fee exceeded 21 cents plus 5 basis points, which is permissible because the new rule allows for an upward adjustment of no more than 1 cent per transaction to an issuer's debit card interchange fee if the issuer develops and implements policies and procedures reasonably designed to achieve the fraud-prevention standards set out in the interim final rule.

Key Findings

- Because the new rule sets the same interchange fee for signature and PIN transactions, and because signature interchange fees were much higher than PIN interchange fees before the new rule took effect, merchants paid mainly with PIN debit cards were more likely to lose from the new rule than merchants whose transactions were mostly signature debit.

- With 95 percent confidence, based on the assumption that fees did not vary across merchant types, the debit card interchange fee reform: 1) lowered interchange fees of grocers

Interchange Fees Paid by Merchants as a Function of the Transaction Value

Interchange Fee

oif Signature

oif Average

oif PIN
nif

$1
60¢
40¢
21¢
0

$14.19 $18.78 $39.62 $50   *p*

Transaction Value
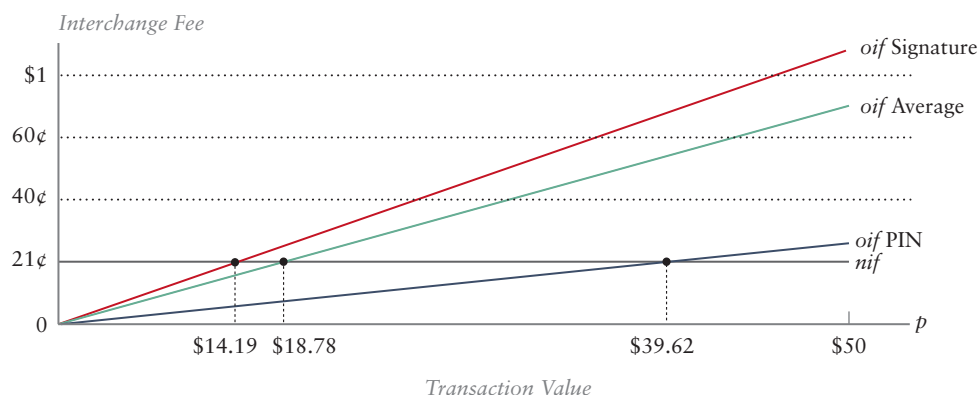
Source: Author's calculations.
Note: nif indicates new interchange fee; *oif* indicates old interchange fees. The 0.0005 slope of the *nif* is too shallow to be noticeable.

and pharmacies; general merchandise stores and websites; health, medical, and personal care providers; and maintenance and repair providers, 2) increased interchange fees for fast food and beverage providers, and 3) produced inconclusive results for gas stations and convenience stores; other retail stores; restaurants and bars; and recreation, entertainment, and travel providers.

- This paper's main conclusion is that fast food and beverage establishments pay 3 to 5 cents more on interchange fees for each signature transaction after the reform was implemented than before, whereas other sampled merchant types pay lower fees.

Fast food and beverage establishments pay 3 to 5 cents more per transaction than before the reform, whereas other merchant types pay less.

Implications

This paper presents a simple method for measuring the impact of interchange fee regulation on different merchant types, according to transaction values and merchant categories. Changes in fee structures have effects similar to changes in tax schedules: these increase the burden on some agents and reduce the burden on others. Therefore, the results do not tell us very much about the relative efficiency of the pre- and post-reform structure of debit card interchange fees. Additional research is needed to investigate how different merchants have adjusted to the new interchange fees. More precisely, the shift from a mostly proportional interchange fee to an almost fixed per-transaction fee has generated incentives for merchants to "pool" transactions to avoid fixed fees. For example, merchants such as Starbucks may reduce the number of swipes by having customers pre-fund a number of transactions on their store cards.

The results should be viewed cautiously because they rest on two simplifying assumptions: 1) the average transaction values for each merchant type did not change very much between the time when the pre-reform diary data were collected and October 2011 when the reform went into effect; 2) shares of signature debit and PIN debit transactions out of total debit card transactions did not change very much during the same period. The first assumption is crucial for the computations because whether a merchant pays higher or lower interchange fees following the reform depends mainly on the value of the average transaction. If this value is lower now than in 2010, then the results underestimate an increase in interchange fees. If the average transaction value has increased since 2010, then the results overestimate the true

value. Similarly, violations of the second assumption can also either enhance or diminish the validity of the results. More precisely, if the proportion of signature debit transactions has increased (equivalently, if the proportion of PIN debit has declined) since 2010, merchants will pay less under the reform rules than shown in the results reported in the paper, as signature debit interchange rates were significantly higher before the reform was enacted. However, if the proportion of signature debit payments has declined since 2010, then merchants will pay higher interchange fees than the amounts calculated in this paper.

According to the BOG 2011 study, which was based on 2009 data, there were more signature than PIN debit transactions, as measured in both volume and value. In contrast, the DCPC reports more PIN than signature transactions, also measured in both volume and value. This difference may be attributable to differences in data sources. The Board collected the data from financial institutions, card networks, and large merchants, whereas the diary collected the data directly from consumers. Whether the differences in the composition of debit transactions stem from the different types of survey respondents or whether these differences stem from the small samples, a natural question is whether the differences invalidate the characterization of merchant types that may be paying higher interchange fees after the reform.

The results in the paper state that the reform in debit card interchange fees has increased the interchange fees paid by merchants of fast food and beverages and show much higher relative use of signature debit than what is reported in both the Board's and the diary's findings for other merchant types. Since the reform has increased interchange fees more on PIN transactions than on signature transactions, there is no good reason to suspect that the conclusions drawn about fast food and beverage establishments constitute an overestimate. In fact, the conclusions may actually underestimate the additional burden on this type of merchant if prior to the reform their share of signature transactions was lower than 78.3 percent.

The computations in this paper are based on the assumption that all merchants currently pay the maximum permissible interchange fee (assumed for simplicity to be 21 cents per transaction plus 0.0005 of the transaction value). However, it is possible that some large retailers may be able to negotiate reduced rates, especially for signature transactions that are routed via the large card networks. Does this mean that the computations overestimate the new fees merchants actually pay? Most likely this is not the case for the following reasons: First, the interchange fee is only one component of the swipe fees merchants must pay. Hence, the fees computed in this paper may underestimate the burden of the new fees. Second, it has been reported in the press that card networks may increase the fees they levy on card acquirers to offset the reduction in interchange fees that are paid to card issuers. Acquirers may then pass these fees on to the merchants.

A Psychological Perspective of Financial Panic

by Anat Bracha and Elke U. Weber

Motivation for the Research

Kindleberger's classic *Manias, Panics, and Crashes* (Kindleberger and Aliber 1978/2005) and recent books by Reinhart and Rogoff (*This Time is Different* 2009) and Akerlof and Shiller (*Animal Spirits* 2009) provide many examples of financial crises, often depicted as financial panics—from bank runs in the 19th century to the Great Depression, the East Asian Crisis, the dot-com collapse, and the Great Recession. Yet despite the large number of such episodes, the notion of panic in financial markets is not very well understood.

According to the aforementioned books, in order to understand financial crises, and panic events in particular, we need to go beyond classic economic arguments. Specifically, we need to further explore the meaning of "animal spirits," the expression used by Keynes (1936) to describe the human emotions that he saw as the drivers of consumer confidence that are necessary to motivate action. This paper is an effort in that direction, and its argument is supported by a growing body of empirical research documenting the importance of the emotional (or affective) determinants of decisionmaking under risk and uncertainty, including financial investment decisions (for example, Holtgrave and Weber 1993; Loewenstein et al. 2001; Weber, Siebenmorgen, and Weber 2005). In this paper the authors offer a psychological account of panic—specifically panic in financial markets—by discussing uncertainty, the desire for predictability and control, the illusion of control, and confidence. The authors suggest how one might incorporate these psychological insights into existing economic models.

Research Approach

The authors begin by establishing that, at least in some of the financial crises regarded as panics, sophisticated investors have been taken by surprise. This suggests that such crises are indeed better described as panics where animal spirits are playing a major role than as "rational bubbles."

Having established that financial panics occur, the authors next posit that the human need for predictability and control is central to understanding panic behavior. Specifically, predictability, often expressed in a simple model of the world, gives investors a feeling of control, which reduces the perception of risk and legitimizes further opportunity-seeking that is often riskier than it is perceived to be (Hertwig et al. 2004). The authors argue that events that shatter investors' working model of the financial world destroys their sense of predictability and feelings of control, and this abrupt change in expectations triggers financial panics. Stated differently, panic can be described as the feeling that crucial control has been lost and that the future is unpredictable, and hence, dangerous. The resulting behavior, including a retreat to safe and familiar financial options, aims to minimize investor exposure to such danger until a new model of how things work has been established.

The authors build their suggested psychological account of panic by starting with a psychological perspective that describes human perception and reaction to risk and uncertainty. They introduce and describe the concept of perceived control, and the difference between

learning from description versus learning from experience in determining perception and choice under risk and uncertainty. The authors continue by discussing the illusion of control and its contribution to irrational exuberance or mania, and the flip side of this phenomenon—the relationship between a perceived lack of control and a panic response. Finally, they suggest how to incorporate the psychological insights introduced in this paper into existing economic models. The authors emphasize that their analysis is exploratory and offered in order to suggest a different way of thinking about financial panics.

Key Points

- In economics "decision under risk" refers to decisions made when the probability distribution over future states of the world is known, and "decision under uncertainty" or "ambiguity" refers to decisions made when this probability distribution is unknown.

- The probability distribution over future states of the world is therefore key to analyzing decisionmaking under uncertainty. Importantly, the probability distribution is a description of the environment that is exogenous to the individual.

- Yet studies in psychology indicate the existence of a human tendency, termed "the illusion of control," to believe we can control or at least influence outcomes, even when these outcomes are the results of chance events.

- Perceptions of uncertainty and choice under uncertainty are both influenced by a sense of control. When people feel in control they act as if they are facing risk rather than uncertainty, and they are more willing to take on risk/uncertainty, probably because they overestimate risk when they do not feel in control.

- Events suggesting that existing beliefs of control are illusory—when individuals or groups realize that they can no longer predict and hence control important (financial) events and outcomes in their lives—lead to panic, a strong negative emotion designed to motivate protective action. Such emotional reactions can be seen as an adaptive early warning system, evolution's way of jolting us out of our habitual way of doing things, counteracting our strong status quo bias (Samuelson and Zeckhauser 1988).

- Once perceived control is lost, investors seem to retreat from all markets where they held a mental model similar to the one that that was proven wrong. That is, investors shift from a perception of control to a perceived lack of control, which leads them to avoid similar investment environments, even if the event triggering the loss of control originated in a different market.

- Moreover, in economics we do not distinguish between different information sources on the probability distributions of choice options. Yet behavioral research has shown that there are important differences in the way people make decisions when the information about risky or uncertain choice options comes from repeated personal experience rather than from a statistical (numeric or graphic) description of possible outcomes and their likelihood (Weber, Shafir, and Blais 2004).

- Learning from experience is also related to the sense of control: the perception of control is history- or path-dependent, with a greater likelihood of illusory control in the face of continued positive feedback. As a result, one expects a perception of control will increase

Once perceived control is lost, investors seem to retreat from all markets similar to the one that was proven wrong.

given a long and recent sequence of favorable experiences. The longer and the better a recent historical pattern is, the greater the sense of control and the lower are the perceptions of risk on the part of financial decisionmakers, and the riskier their exhibited choices and behavior appear to an outside observer.

- To sum, there are two important elements in the authors' psychological account of financial panic: 1) recognition of two regimes governing investor beliefs: (a) perceived control and (b) perceived lack of control and 2) learning from experience. People usually feel they are in control, and this is the relevant regime for existing decisionmaking models. Panic occurs when individuals slip into the second, lack-of-control regime in which agents do not know what to do. The authors suggest three possible ways to address panic within economic frameworks: 1) by modeling panic as a switch from optimism to pessimism, 2) by using models with two layers of uncertainty, in which the additional layer captures the two perceived control regimes, and 3) by using experience-based models of reasoning.

Implications

The account of panics proposed in this paper suggests that a crucial role that policymakers could play to prevent or minimize reactions of panic during financial crises would be to provide investors with new, compelling narratives about the market or about a commodity in crisis in order to supplant the event that has shattered previous governing narratives (for example, the belief that some banks, such as Lehman Brothers, are too big to fail). Providing new but simple and positive narratives that offer guidance to action could fill the vacuum left by disproven narratives that, in the absence of intervention by policymakers, may give rise to panic and a sense of gloom and doom that may take a long time to dispel.

p-12-8

Labor-Market Polarization Over the Business Cycle
by Christopher L. Foote and Richard W. Ryan

....

Motivation for the Research

Recent decades have seen distinct winners and losers emerge in the U.S. labor market. Consistent with a century-long trend, labor demand for high-skill workers has grown rapidly, as new technologies improve the outcomes of workers who have both the skills and the flexibility to use them (Goldin and Katz 2008). Moving down the skill distribution, workers with mid-level skills have not fared as well. Many of these workers are employed in routine jobs that can be replaced by automation or offshored to countries where wages are lower. Examples of such jobs include assembly-line workers in manufacturing plants and workers in standardized office clerical jobs. Finally, low-skill jobs have proven relatively immune to replacement by automation or trade. The hollowing out of job opportunities in the middle of the skill distribution has been termed the "polarization" of the labor market (Autor 2010; Acemoglu and Autor 2011; Autor and Dorn 2009; Autor, Katz, and Kearney 2008). In support of the idea that the decline in middle-skill jobs stems from the types of tasks that these workers perform and not from country-specific labor-market policies, researchers have found evidence of polarization in other advanced economies within Europe (Goos, Manning, and Salomons 2009).

Unemployment Rates for Five Industry-Skill Groups: 1976: Q1–2012:Q1

Unemployment Rate (Percent)

Legend:
- High-skill
- Middle-skill: Manufacturing
- Middle-skill: Construction
- Middle-skill: Other
- Low-skill
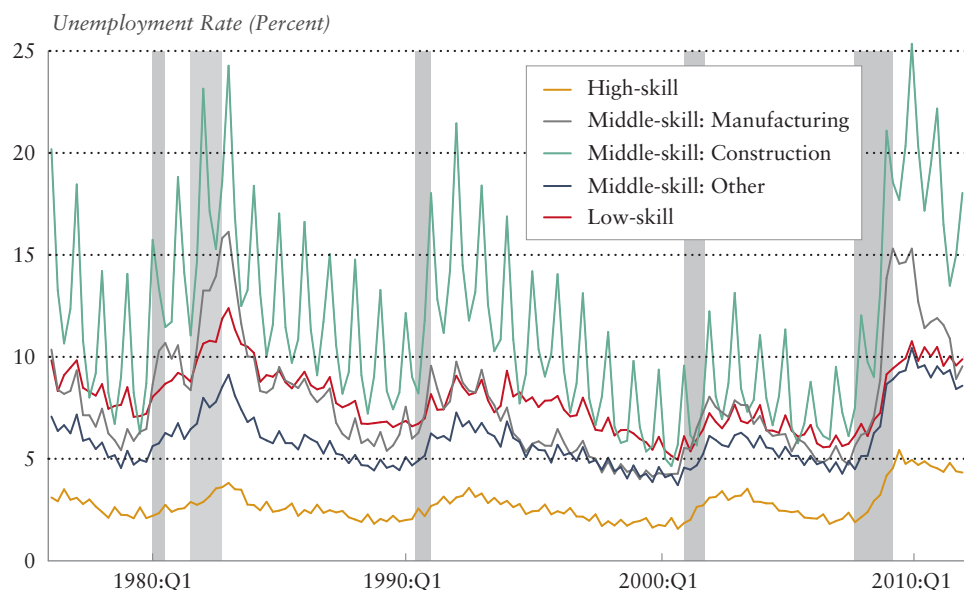
Source: Authors' calculations using CPS microdata.
Note: Series are quarterly averages of monthly data. The unemployment rates depicted here are not adjusted for changing demographic composition or for seasonal effects. Shading indicates recessions.

Most of the empirical work on polarization has focused on the long-run relationship between labor-market polarization and wage inequality. Less research has explored how polarization might be related to the business cycle. This paper attempts to fill part of that gap by measuring the degree of cyclical synchronization in the labor-market experiences of U.S. workers from different skill classes, and then asking how that synchronization affects the cyclical reallocation of workers across different skill types.

Establishing a relationship between labor-market polarization and the business cycle would inform both theory and policy. Business cycle theorists have long investigated potential links between recessions and the reallocation of productive factors across alternative uses. Some papers contend that firms are more likely to reorganize production during cyclical downturns when the opportunity cost of forgoing current production in favor of reallocation is low. Other papers have suggested that allocational shocks help to cause recessions in the first place. For current policymakers, a cyclical component to labor-market polarization could shed light on why recent U.S. recoveries have tended to feature slow employment growth, as suggested by Jaimovich and Siu (2012). In particular, polarization may explain why the degree of apparent mismatch between job vacancies and unemployed workers rose in the wake of the Great Recession. The well-documented adverse shift in the empirical relationship between job vacancies and unemployment—the so-called Beveridge curve—suggests that the labor market now produces fewer job matches for a given number of job vacancies. A possible reason for this shift is that the U.S. workers who lost jobs in the Great Recession were predominantly middle-skill workers whom firms do not want to hire, and concern that polarization is hindering the jobs recovery is now part of the policy debate.

Research Approach

This paper uses individual-level data from the *Current Population Survey* (CPS) to ask some basic questions about the experiences of different skill classes over the last 30 years of the

U.S. business cycle, paying particular attention to the most recent recession. To partially control for industry effects, in most of the analysis middle-skill workers are separated into three subclasses—middle-skill manufacturing, middle-skill construction, and middle-skill "other." Adding high-skill and low-skill workers from all industries to the three middle-skill groups yields a total of five industry-skill groups to analyze.

After graphing and examining the patterns observed in the data, the authors use statistical techniques including principal components analysis, dynamic factor models, and multinomial logit models to analyze the common and idiosyncratic variation in the unemployment rates, job-finding rates, and job-separation rates for the different groups.

The authors find strong comovement in labor market outcomes after sorting workers on the basis of the long-run outlooks for their occupations…. These results argue against a strong role for polarization in driving the currently slow U.S, recovery.

Key Findings

• Skill-specific unemployment rates and job flows move together strongly over the business cycle, even though individual rates and flows often have different means and variances. Specifically, the authors find strong comovement in labor market outcomes after sorting workers on the basis of the long-run outlooks for their occupations. Moreover, this comovement is apparent even in the most recent business cycle. These results argue against a strong role for polarization in driving the currently slow U.S. recovery. In particular, recent movements in job vacancies and the common component of job-finding rates do not support the view that labor-market polarization is responsible for the outward shift in the Beveridge curve.

• Recent idiosyncratic movements in job flows provide no evidence that recessionary periods are becoming relatively easier for high-skill workers who have been favored by polarization trends. If anything, the recessions of 2001 and 2007–2009 were especially difficult for high-skill workers. Relative to their experiences in previous business cycles, high-skill workers experienced job-finding rates in the early 2000s that were lower than expected, and they experienced separation rates that were higher than expected during the two most recent business cycles. If recent business cycles were strongly affected by labor-market polarization, we would not expect this pattern.

• Unemployed middle-skill workers appear reluctant or unable to transition out of unemployment to either high-skill or low-skill jobs: about 75 percent of middle-skill workers who do find jobs remain in the middle-skill sector. And while the fraction of middle-to-middle movements is trending down, this share does not display much cyclical variation. However, this is not the case for the share of unemployed workers who exit unemployment and leave the labor force. When the overall job-finding rate falls, the share of unemployed workers who leave unemployment for nonparticipation rises. In recent recessions the higher share of unemployment spells that end in nonparticipation can be explained by a simple mechanical relationship: when job-finding rates fall, more unemployment spells end in nonparticipation because fewer unemployment spells end in transitions to renewed employment. Taken together, these findings argue against a straightforward theoretical link between recessions and polarization-based reallocations.

• Idiosyncratic movements in job flows are hard to square with a claim that labor-market polarization is making U.S. recessions worse for middle-skill workers. It is true that middle-skill workers lost the most jobs in the Great Recession, but this pattern generally holds true in all recessions. Outside of the highly cyclical industries of construction and manufacturing, middle-skill job flows are explained well by the common variation in flows for all workers, even during the Great Recession.

- Common variation in job-finding rates across industry-skill groups closely followed the vacancy-unemployment ratio until recently, a finding that is consistent with the idea the job-matching efficiency has declined for many types of workers, not just for those in the middle of the skill distribution.

Implications

This paper was motivated by a potentially troubling pattern that emerged during the Great Recession and the subsequent slow recovery. From 2009 to 2011, the worst employment growth was experienced by middle-skill workers, the same group that has been adversely affected by long-term polarization trends in the U.S. labor market. Coupled with the outward shift in the Beveridge curve, this fact appeared to suggest that unemployment today has an important structural component. If so, we would expect to find some class of workers in high demand, but previous empirical work using large research datasets has failed to do so. And efforts to measure the degree of structural mismatch directly have concluded that it is not a large and persistent feature of today's labor market.

The study of high-frequency individual-level data over many years helps to reconcile these results. It is true that recent middle-skill job losses were the most severe, but this is a common pattern due in part to the disproportionate fraction of middle-skill jobs in manufacturing and construction. Outside of those cyclical industries, a dynamic factor model shows that middle-skill job flows are almost exactly what one would expect them to be, given the poor state of the overall U.S. labor market. The results also provide context for the small high-skill employment losses. While also small in an absolute sense, the job-separation rate of high-skill workers is now large relative to the rate that would be expected given the experiences of high-skill workers in previous business cycles. These results buttress other research that finds workers of all types are having trouble finding jobs in the current recovery—this paper shows that this pattern remains consistent even after workers are segmented on the basis of how their previous occupations line up with the patterns of labor-market polarization observed recently. Finally, bringing job vacancies into the analysis suggests that polarization is not behind the recent shift in the Beveridge curve.

Historical context is also useful for relating labor-market polarization to the recent academic literature on recessions as reallocations. In particular, a provocative paper by Jaimovich and Siu (2012) contends that polarization is responsible for the jobless recoveries experienced after the 1990–1991, 2001, and 2007–2009 recessions. But the specific predictions of the Jaimovich and Siu (2012) model are in some tension with the reallocation patterns identified in the results outlined above. This tension does not necessarily rule out a role for polarization in generating jobless recoveries, but it does suggest that any link between polarization and jobless recoveries is due to forces beyond the job-matching frictions central to the Jaimovich-Siu model.

Why Don't Most Merchants Use Price Discounts to Steer Consumer Payment Choice?

by Tamás Briglevics and Oz Shy

Motivation for the Research

In the past, contracts between merchants and the credit card networks prohibited merchants in the United States from using discounts and surcharges to steer customers to pay for their purchases with payment instruments such as debit cards, which were less costly to merchants than the transaction fees that these networks charged the merchants for credit card transactions. However, merchants were allowed to give discounts to customers who paid with cash.

Recent legislation and court settlements in the U.S. allow merchants to use price discounts to steer consumers to pay with instruments that are less costly to merchants than credit cards.

Recent legislation and court settlements in the United States allow merchants to use price discounts to steer customers to pay with instruments that are less costly to merchants than credit cards. Despite the new freedoms, steering has not been widely observed across most merchant types. In seeking to understand why discounting to encourage the use of less costly payment instruments is not observed more widely, this paper focuses on one aspect of the question: to what extent can merchants enhance their profit by providing price discounts to buyers who pay with debit cards and cash? This preliminary investigation focuses only on simple debit card and cash price discounts in order to illustrate how the degree of profitability of price discounts can be computed from transactions data. More sophisticated forms of price discrimination, such as tying merchant-specific loyalty rewards to a particular payment method, are not addressed here. Credit card surcharges, which are still prohibited in the United States by card networks and some state laws (although a proposed settlement may change this), are also beyond the scope of this paper.

Research Approach

The analysis in this paper is based on a simplifying assumption that, as a result of competitive pressures, merchants do not increase the base price of the good or service before offering discounts for paying with debit cards or cash.

The authors begin by discussing some theoretical considerations of changes in merchant cost resulting from a simple benchmark price discount scheme given to customers on debit card transactions. The analysis also applies to discounts given on payments made with cash instead of debit cards. The computations rely on the assumption that there are no administrative costs associated with steering customers via price discounts. The authors then turn to an empirical analysis using data taken from the Boston Fed's Diary of Consumer Payment Choice (DCPC) in 2010 and 2011. These diaries are pilot studies with trial versions of relatively small sample sizes (fewer than 400 respondents). The DCPC collected data on the dollar value, payment instrument used, and type of expense (identified by merchant type) for each purchase, including bills. The information associates a payment instrument and a merchant type with each dollar transaction value. For each purchase, 353 respondents in 2010 and 387 in 2011 recorded, among other things, the type of merchant they patronized and the payment method they used over a three-day period. One important caveat in interpreting the results is that while the DCPC was designed to match nationally representative consumers, it does not necessarily reflect nationally representative merchants.

Using the diary data, the authors computed the maximum price discount percentage that a merchant can offer on debit transactions, without reducing profit, in order to steer credit card users to pay with debit cards instead. The merchant fees paid to acquiring banks (who forward the interchange portion of the fees to the issuing banks) vary by merchant type, total transaction value, and the bargaining power of the merchant, and also include fees paid to card processors. Therefore, in order for the results to be applicable to a wide variety of merchants, the authors repeated their computations for a wide range of possible merchant fees.

Key Findings

- Steering via a debit card price discount enhances merchant profit if the initial ratio of debit card payers to credit card payers is sufficiently low so that the revenue gains from buyers who switch from paying with credit cards to paying with debit cards exceed the revenue losses from buyers who would have paid with debit even without the discount.

- If, in response to a debit price discount, all credit card users switch to paying with debit, then the maximum debit price discount that merchants can give without reducing their profit decreases with the number of debit card payers, increases with the average credit card transaction value, and increases with the proportional fee on credit card transactions.

- The maximum debit price discount that merchants can give drops by less than 50 percent when only half of credit card users switch from credit to debit in response to the debit price discount.

- If, in response to cash price discounts, all credit and debit card users switch to paying with cash, then the maximum cash discount rate that merchants can provide decreases with the number of cash payers, increases with the average credit and debit card transaction values, increases with the proportional fee on credit and debit card transactions, increases with the processor's swipe fee and the debit card fixed fee, and decreases with the merchant's per-transaction cost of handling cash.

- If the response rate of credit and debit card users facing a cash discount equals the response rate of card users facing debit card price discounts, then merchants can give higher cash discounts to credit and debit card payers than the debit card price discount they give to credit card payers. This finding is an outcome of simulations that assume that the buyers' sensitivity to cash discounts is the same as to debit card discounts. This need not be the case if, for example, buyers find credit and debit cards more substitutable than credit and debit cards versus cash.

- The maximum cash price discount that merchants can give drops by less than 50 percent when only half of card users switch from cards to cash in response to the cash discount.

- If merchants provide a 1 percent cash discount, then the minimum fraction of card users who switch to paying with cash (required to make steering profit enhancing) increases with the number of cash payers, decreases with the average value of credit and debit card payments, declines with the proportional fee on credit card transactions, declines with the processor's swipe fee and the debit card fixed fee, and increases with the per-transaction cost of handling cash.

Implications

More precise merchant-transaction data are needed in order to obtain more precise estimates of the cost reduction associated with giving debit and cash price discounts by merchant type, since the DCPC was not designed to match nationally representative merchants. Furthermore, the authors have no knowledge of how significant the profit enhancements calibrated in this paper are relative to the cost of administering debit and cash discounts. Moreover, there are obstacles to implementing a steering policy, including the possible reluctance of customers who use credit cards with reward programs to switch to using debit cards or cash.

p-12-10

Payment Size, Negative Equity, and Mortgage Default

by Andreas Fuster and Paul S. Willen

Motivation for the Research

Measuring the relative importance of payment size and negative equity is a central question in the analysis of the mortgage default decision. Recent policy debates have pitted proponents of principal reductions who argue that only the latter matters against opponents who argue that monthly payment reductions are sufficient to prevent most defaults. Early in the crisis, the dominant view was that foreclosures were entirely, or almost entirely, the result of rising monthly payments (for example, Bair 2007 and Eakes 2007). However, others, such as Foote, Gerardi, and Willen (2012), have argued that payment increases of adjustable-rate loans were not a major driving factor behind the foreclosure crisis, based on the fact that the number of defaults does not seem to react much even to large payment increases.

In this paper the authors contribute to this debate by exploiting the resets of Alt-A hybrid adjustable-rate mortgages (ARMs) over the period 2008–2011. Alt-A mortgages, also called near-prime mortgages, are linked to borrowers who are characterized by either minor credit quality issues or an inability or unwillingness to provide full documentation of income and assets. Hybrid ARMs have fixed payments for 3, 5, 7, or 10 years and then adjust annually or semiannually until the mortgage matures, meaning that the borrower's required monthly payment can adjust substantially at a particular moment in the life of the mortgage. What makes the authors' sample unique is that, because of the changed macroeconomic environment, required payments on most these loans fell at the reset, often dramatically. This gives the authors an advantage over previous work because the prepayment option makes it impossible to use payment increases to measure the effects of payment changes on mortgage defaults. The authors compare the performance of mortgages before and after payment reductions to the performance of otherwise similar mortgages that did not receive a contemporaneous payment reduction, either because the loan was originated at a different time or because it had a different fixed payment period.

Research Approach

The authors begin by plotting the hazard of becoming 60 days delinquent for three types of loans as a function of the number of months since the origination of the loan. They use statistical techniques to show that the payment reductions indeed caused the changes in the default hazards and quantify the size of the effect. They focus on comparing the effects of an

Default Hazard Rates Over the Life of the Loan

Baseline Hazard Contribution
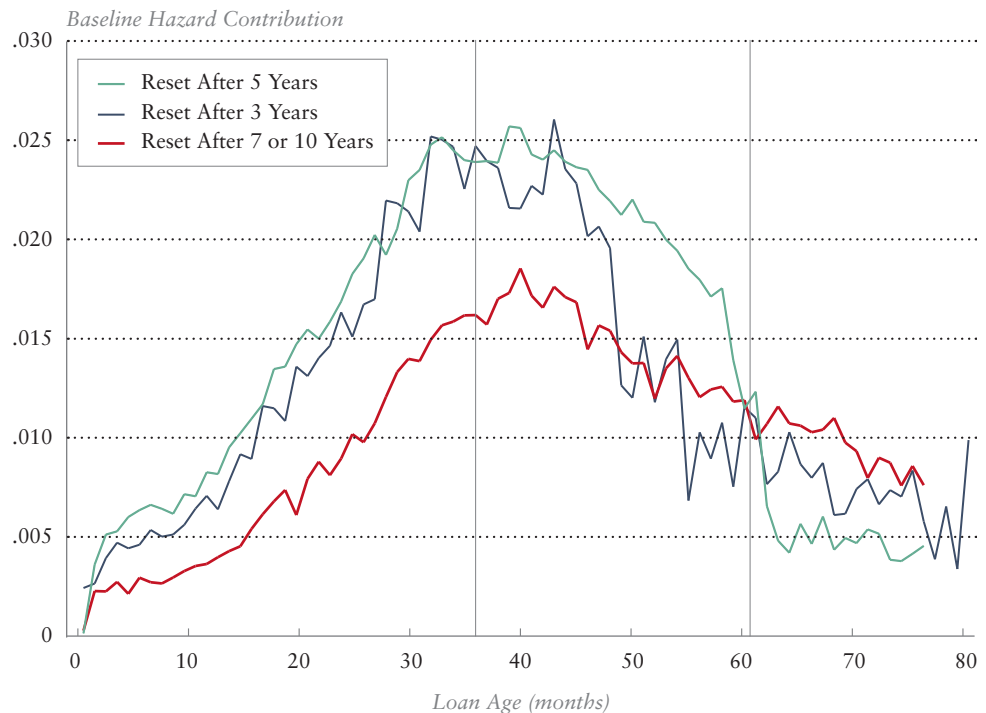
Source: Authors' calculations based on sample of hybrid Alt-A loans originated between January 2005 and June 2006 from the CoreLogic Loan Performance dataset.
Note: Except for exclusions based on origination characteristics as explained in the text, this chart includes all loans (also those with upward resets). After loans aged 65 months, the sample changes because loans originated toward the end of the origination period are no longer observed. Vertical lines indicate loan ages of 37 months (when 3/1s reset for the first time) and 61 months (when 5/1s reset for the first time). A small percentage of loans are recorded as resetting one month before or after the scheduled reset month.

interest rate reduction with those of reducing a borrower's negative equity position, while holding the payment size constant.

Key Findings

• Payment reductions have very large effects. A 2 percentage point reduction in the interest rate charged to a borrower has effects on the default hazard approximately equivalent, for instance, to reducing the borrower's combined loan-to-value ratio (CLTV) from 135 to 100. A reduction of 4 percentage points or more, which applies to about 20 percent of loans that reset after 5 years in the authors' sample, has approximately the same predicted effect on the delinquency hazard as a reduction in the CLTV from 155 to 80. (Loans that reset after 5 years are referred to as 5/1s, with the "1" referring to the annual frequency of subsequent adjustments, in a slight abuse of terminology as a majority of the ARMs in the authors' sample actually adjust every 6 months.) As an alternative way to quantify the effect, the authors' estimates imply that an interest rate decrease of 3 percentage points for a group of "typical" 5/1s at age 61 months (close to the mean reduction such loans actually experienced) with a CLTV between 130 and 140 reduces the number of delinquencies for these loans over the year after the reset by about 10 percentage points, or more than half. This illustrates the important finding that the authors' estimates are similar if one looks at only a subset of borrowers in their sample who are severely underwater. This is consistent with basic finance theory and goes against the intuition held by some commen-

tators that once a borrower's mortgage is sufficiently far underwater, it is always optimal for him to default.

- The authors' results show that the size of the monthly payment is an important determinant of mortgage delinquencies and cures, even for borrowers who are deeply underwater. This is not to say that a borrower's equity position is unimportant: in fact, the authors document very substantial effects of the CLTV on the likelihood of delinquency and argue that much of the previous literature has suffered from data limitations that may have led it to underestimate the link between negative equity and mortgage defaults.

Implications

The results indicate that payment reductions, if sufficiently large, are an effective tool to reduce mortgage defaults and increase cures, even if a borrower is massively underwater. This suggests that government or lender programs that allow underwater borrowers to refinance at a lower rate or loan modifications that lower the interest rate have the potential to significantly reduce delinquencies and that the view that principal reduction is the only way to meaningfully reduce defaults is incorrect.

These findings, which the authors argue are consistent with theoretical predictions, shed light on the driving forces behind mortgage default and have a variety of policy implications. A number of government-supported programs such as HAMP (Home Affordable Modification Program) and HARP (Home Affordable Refinance Program) attempt to reduce mortgage delinquencies and foreclosures by lowering the payments to "affordable" levels. However, empirical evidence on the success of such programs is scarce (for exceptions, see Adelino, Gerardi, and Willen 2009; Haughwout, Okah, and Tracy 2010; and Agarwal et al. 2011, all of whom study modifications, with a focus on how payment reductions perform relative to principal reductions in affecting re-default rates) and is somewhat difficult to interpret because servicers and lender *choose* the borrowers to whom they offer a modification or a refinancing (and on what terms). As a consequence, it is very difficult to know to what extent any observed effect is driven by selection or treatment; therefore, one cannot reliably extrapolate the resulting estimates of intervention effectiveness to either larger-scale modification programs or policy interventions aimed at reducing delinquency in the first place.

The identification of the effects of payment reductions in the authors' setting is cleaner in that regard, as the payment reduction for borrowers with a certain mortgage type at a certain loan age is unconditional on any other borrower covariates that may have changed since origination. Absent the ideal scenario of completely randomized payment reductions—which unfortunately have not occurred—this seems to provide as good a natural laboratory to look at the effects of substantial payment reductions as the authors can conceive. On the other hand, the Alt-A hybrid ARM borrower population on which they focus is obviously not necessarily representative of the broader market. That said, contemporaneous work by Tracy and Wright (2012) documents similar effects of interest rate reductions on the delinquency rates of ARM borrowers in the prime segment.

One needs to keep in mind two things when trying to apply the authors' results to broader policy questions. First, the interest rate reductions they study are not necessarily permanent, as the benchmark rates may increase again in the future. If these rates were permanent, the resulting reductions in the default hazard might be even larger. Second, the effects of an interest rate reduction of *x* percent on the required monthly payment would be smaller for amortizing mortgages than for the interest-only mortgages they study, and so the reduction

<div style="float:left; font-style:italic;">
The results indicate that payment reductions, if sufficiently large, are an effective tool to reduce mortgage defaults and increase cures, even if a borrower is massively underwater.
</div>

in the default hazard following a fixed cut in the interest rate would likely be smaller than for the loans in the authors' sample.

From a broader perspective, a key feature of the payment reductions in the authors' sample is that these came about because of the historically low interest rates, which are arguably tied closely to the state of the economy and also to monetary policy. The results thus show that, with ARMs, monetary policy can have large effects on mortgage delinquency, and by extension, on the health of the housing market as a whole. In principle, to the extent that monetary policy affects long-term rates (either through the expectations channel or, more recently, through expansion of the Fed's balance sheet), the same would be true for fixed rate mortgages (FRMs). However, a painful realization of the period since 2008 is that in the case of a credit crunch with tight underwriting standards, many borrowers are not able to take advantage of the lower rates. In this sense, FRMs make the transmission of monetary policy more fragile. On the other hand, should benchmark rates increase without a contemporaneous improvement in house prices and economic conditions more broadly (for example, in a stagflation episode) ARMs would be at a higher risk of default again.

In terms of the regulation of mortgage products, the authors' results suggest that one might want to limit the ability of lenders to offer ARMs with asymmetric floors and caps on interest rates. Asymmetries, such as allowing the interest rate to increase but not to decrease at the end of the fixed-rate period, were prevalent for subprime ARMs. This meant that decreases in short-term interest rates due to economic conditions did not get passed through to subprime ARM borrowers to the same extent they did to Alt-A and prime ARM borrowers, and this asymmetry likely caused subprime defaults to be higher than they would have been without the rate floors. To prevent this from happening in future cycles, one could imagine a regulation along the following lines: if an ARM's interest rate can increase by up to x percentage points relative to the initial rate, it must also be possible for the rate to decrease by x percentage points relative to the initial rate.

A logical area for further research is whether, given the authors' estimates, it is more cost-efficient from an investor perspective to reduce an underwater loan's interest rate (and thus the required monthly payment) or the principal (which lowers the CLTV *and* the required payment).

The authors' results could be used to calibrate or discipline quantitative models of mortgage delinquency in which the effects of different policy options are simulated. Their findings should also be useful for the pricing of mortgage-backed securities based on ARMs.

The results show that, with ARMs, monetary policy can have large effects on mortgage delinquency and on the health of the housing market as a whole.

w-12-6

Relative Pay and Labor Supply

by Anat Bracha and Uri Gneezy

Motivation for the Research

Beginning with Adam Smith in 1759, a fundamental psychological insight into economic behavior has been the idea that people respond to relative as well as to absolute levels of material improvement. These relative comparisons are made according to a reference point; for example, individuals often compare their present situation to a past situation, or someone measures his or her current income according to what others earn. Later economists have explored the logical implications of Smith's insight by examining how relative concerns may affect consumption patterns, job choice, and labor force participation.

Yet there is little direct evidence documenting the impact of relative wages on labor supply. The existing literature on relative pay that uses past wages as a salient point of comparison relies mainly on anecdotal survey data. The authors of this paper aim to fill this gap by conducting an experimental test of the working hypothesis that relative pay affects labor supply and that, all things being equal, offering a given pay rate that is high (low) relative to the pay levels others receive will increase (decrease) labor supply.

Research Approach

Subjects who had participated in an unrelated experiment were given the option to participate in this study. (The authors approached subjects who had already taken part in another experiment in order to make it a reasonable choice to decline to participate in this experiment.) They were informed that the task involved solving individual math problems that required finding three numbers in a four by four matrix that exactly summed to 10. After completing a practice problem, they were told the pay rate they could receive for solving more problems. Participants were given the option to decide how long they wanted to work on the task—any time interval between zero (no work) and 30 minutes.

The subjects were randomly assigned to one of two main treatments. In the "No Relative" treatment, every participant in a single session received the same pay rate for each correctly solved matrix. In half of the "No Relative" sessions all the participants received $0.40 per correct solution and in the other half participants received $0.80. Because the participants in the "No Relative" treatment were only aware of a single pay rate, it was not possible to make any interpersonal relative pay comparisons. In the "Relative" treatment, subjects were told that they would be randomly assigned one of two different rates of pay, either $0.40 or $0.80, thus giving them a natural reference point for comparison. Once the individual pay rates were determined, each participant's rate was publicly announced.

The randomization into pay rates was done by using either a "Random Notes" or "Random Essay" method. In the "Random Notes" method each participant drew a note from an envelope containing 10 notes, five marked "40" for $0.40 and five marked "80" for

$0.80. After each subject drew a note, he or she announced the number. The experimenter then announced either "You got 40" or "You got 80" and pressed a button to activate the appropriate pay rate. This procedure was designed to make it clear that the assigned pay rate was completely random in the sense that no plausible reason for the pay differential was provided. In the "Random Essay" method, subjects were assigned a pay rate based on a deliberately arbitrary evaluation of a short essay. Consisting of about 200 words, the essay described what the subjects had eaten for lunch the previous day and was written before the participants received any information about the study. The evaluation of the essay was random—it was judged according to the number of times that the letter "r" appeared in the essay. Those participants whose essays had "r" counts higher than the median received $0.80 per correctly solved matrix, and those with "r" counts lower than the median received $0.40 per correctly solved matrix. At this point the experimenter announced each individual's pay rate and activated it before the session began.

To explore whether providing a reason to justify the pay differential would reduce or eliminate the impact of relative pay on the subjects' labor supply decision, the authors ran another "Relative" condition where participants were assigned the same pay rates as in the "Random Essay" treatment. The only difference was that the exact evaluation criterion was never disclosed, thus leading the participants to believe that the assigned payment was based on some criterion based on merit. This condition was titled "Essay Evaluation."

The experiment took place at the Harvard Decision Science Lab, where a total of 320 Harvard students participated in the study, 60 in the "No Relative" treatment, 117 in the "Relative" treatment, in which 59 were assigned pay using the "Random Notes" method and 58 were assigned pay according to the "Random Essay" method, and 150 individuals participated in the "Essay Evaluation" treatment. The authors performed regression analysis to further test the experimental results.

Key Findings

• In the "No Relative" treatment when relative pay comparisons were not available, labor supply did not vary statistically across the two different pay rates: participants who received $0.40 per correctly solved matrix worked for 22.86 minutes, on average, compared with those who received $0.80 per correctly solved matrix and worked 24.74 minutes on average. But when subjects were aware of different pay rates being given for performing the same task, as in the "Relative" treatment, lower-paid individuals supplied significantly less labor than the higher-paid individuals: participants assigned the $0.40 pay rate worked for 19.24 minutes on average, while those assigned the $0.80 pay rate worked 25.86 minutes on average, a statistically significant difference.

• The effect of having information on relative pay was significant using either the "Random Notes" method or the "Random Essay" method. Using the "Random Notes" method, subjects who received the low pay rate worked 20.82 minutes on average compared with those getting the high pay rate working an average of 26.88 minutes. Using the "Random Essay" method, those receiving the low pay rate worked 17.51 minutes on average, while those earning the higher rate worked 24.92 minutes on average. Moreover, the relative pay information reduced the labor supply of those getting the low rate much more than it increased the labor supply of those receiving the high rate.

Effect on Labor Supply of Knowing Relative Pay

Minutes Supplied

Without Relative Pay Information   With Relative Pay Information

Legend:
- 40 cents
- 80 cents
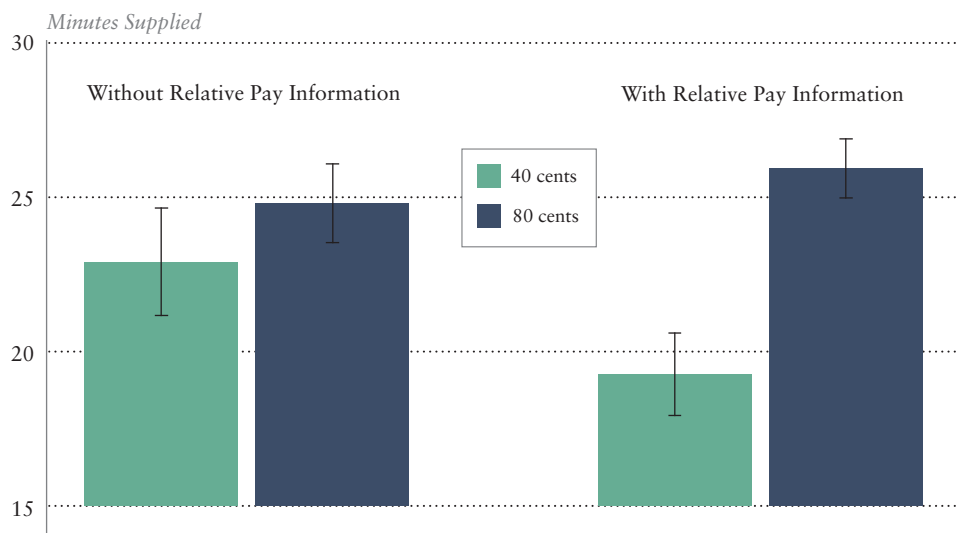
Source: Authors' calculations.
Note: The bars represent the standard error of the mean.

- When a plausible justification was offered for the differential pay rates, as in the "Essay Evaluation" condition, the relative pay effect on labor supply seemed to disappear. This suggests that in the presence of a justification for the differential pay, participants accepted their assigned pay as if it were the rate they deserved to get. Yet when the reason offered for the pay differential was clearly arbitrary, as in the "Random Essay" condition, the effect of relative pay on labor supply was significant.

Implications

The paper provides direct evidence that relative pay information plays an important role in labor supply decisions. A possible explanation for this effect may be tied to fairness considerations—people may judge that receiving different pay scales for performing essentially the same work is inherently unjust. Providing relative pay information lowered the low-paid individuals' labor supply but did not raise the labor supply of those who received the high pay rate. If this general result holds, it suggests that providing relative pay information is a no-win proposition for employers.

Measuring Household Spending and Payment Habits: The Role of "Typical" and "Specific" Time Frames in Survey Questions

by Marco Angrisani, Arie Kapteyn, and Scott Schuh

Motivation for the Research

The rapid transformation of the U.S. payment system and the increasing availability of new payment instruments have greatly changed household spending habits and use of payment methods. Understanding these trends has important policy implications. An assessment of consumers' preferences and extent of financial literacy may help to bring about regulations, laws, and educational programs to protect and support consumer payment choices. Furthermore, identifying which individual characteristics and personal traits drive such preferences and attitudes is critical to successfully targeting interventions aimed at reducing households' exposure to consumer debt and boosting lifetime savings.

The Survey of Consumer Payment Choice (SCPC) developed by the Federal Reserve Bank of Boston and administered in the RAND American Life Panel (ALP) offers a unique opportunity to study these questions. The authors of this paper designed and fielded the first of four waves of an experimental module in the ALP in which they ask individuals to report the number of their purchases and the amount paid by debit cards, cash, credit cards, and personal checks. In this paper, the authors describe the experiment's design and sample characteristics and provide some preliminary evidence of the role time frames play in eliciting spending and payment habits in household surveys.

Research Approach

Assessing the quality and validity of individual reports referring to specific and typical periods of different lengths is an interesting methodological question with important implications for the design of consumer spending surveys and their use in policy analysis. Measuring the frequency with which people perform regular actions, such as purchasing consumer goods, is not a simple task. The cognitive process used by subjects to answer a frequency question may differ substantially, depending on the question's content and format (Chang and Krosnick 2003). The SCPC asks respondents about their spending and payment behavior during a "usual" or "typical" period (week, month, or year). This type of question may trigger a rate-based estimation, in which individuals construct an occurrence rule and apply it to the reference time frame. An alternative approach is to elicit behavior frequency within "specific" time periods, such as the past day, week, month, or year. In this case, respondents may be more likely to use episode enumeration, in which they recall and count episodes from a well-specified time frame.

The authors' experimental design features several stages of randomization. First, every month three different groups of sample participants are invited to take the survey. Each respondent is randomly assigned to an entry month and is interviewed four times during a year, once every quarter. Second, for each payment method a sequence of questions elicits spending behavior during a day, week, month, and year. At the time of the first interview, this sequence

is randomly assigned to refer to specific time spans or to typical time spans. In all subsequent interviews, a specific sequence becomes a typical sequence and vice versa. Finally, the ordering of the time frames (day, week, month, or year) within a sequence is randomly determined in order to reduce anchoring or order effects.

The authors analyze the experimental data in a regression framework so as to quantify the effect that different type—specific or typical—and length of recall periods may have on reported household spending and payment habits. They begin by expressing all responses in annual terms and regress these on the question format indicators. The authors control for a set of individual characteristics, including gender, age, education, and family income, as well as for survey-specific factors, such as the time it took the respondent to complete the questionnaire.

Key Findings

- Across all instruments, both the median and the average number of reported payments are mostly higher in typical recall periods than in specific ones. Credit cards are something of an exception in that the mean number of credit card payments both per year and per month is higher for specific than for typical periods. This reflects a more skewed distribution of the number of payments in specific years and months than in typical ones.

- Respondents tend to report a higher number of payments and amounts spent (when translated to annual equivalents) when referring to short reference periods, such as a day or a week, than when referring to longer reference periods. Differences between answers to "monthly" and "yearly" questions are relatively small.

- The probability of reporting nonzero payments by debit cards, cash, and credit cards is significantly higher when reporting for typical than for specific periods, while there is no differential effect for checks. At the same time, reported amounts spent are systematically lower for typical than for specific reference periods across the four payment instruments.

- Overall, the answers to monthly and yearly spending questions are reasonably consistent, while relatively large discrepancies can be observed between spending reports referring to short (day and week) and long (month and year) recall periods. There is also evidence that answers are anchored to those given in the preceding question.

Implications

The present analysis is preliminary since it uses only the data from the first completed wave of the survey. Further evidence will be provided as data from subsequent waves become available. Over the four planned waves, the authors will have data reflecting changes over time for each specific and typical period. Hence, they should be able to analyze the stability of answers for the four different question formats. A priori, one would expect reported payment frequencies and spending amounts within typical periods to be less volatile than those within specific periods. Moreover, one would expect such differences to decrease with the length of the reference time frame. The consistency of answers could be treated as an indicator of the reliability of the measurements.

This analysis offers an interesting window into how alternative measures obtained from different question formats correlate with individual respondent characteristics such as education, cognitive ability, and wealth. The authors plan to test the validity of such measures by evaluating their association with criterion variables (variables with which they expect

Respondents tend to report a higher number of payments and amounts spent when referring to short periods—a day or a week—than when referring to longer periods.

spending and payment habits to correlate relatively strongly and in a particular way). Such variables already collected by the Survey of Consumer Payment Choice include household income, respondents' financial responsibility within the household, individual financial literacy, and variables associated with a particular payment instrument, such as convenience, acceptance for payment, and cost.

Core Competencies, Matching, and the Structure of Foreign Direct Investment: An Update

by Federico J. Díez and Alan C. Spearot

Motivation for the Research

As a result of the worldwide trade and financial liberalizations that have taken place over the last few decades, several large new markets have been opened, providing new opportunities for large multinational enterprises (MNEs). Given the millions of potential customers in these new markets, choosing the right mode of market entry is of paramount importance. Indeed, choosing the wrong entry mode can lead to negative outcomes, even for the "best" MNEs.

This paper addresses issues around the choices available to an MNE preparing to enter a new market. At a general level, the MNE can work alone via greenfield investment, or it may instead choose to operate with a local partner. If it chooses the latter, the MNE has the option of working under a joint partnership with multiple stakeholders or purchasing the local partner outright. The costs and benefits of each option will likely vary with country and industry characteristics, complicating matters beyond the nontrivial number of entry choices. For example, consider a U.S. MNE entering a developing market. On one hand, it might be optimal to work with a local partner that has poor outside options and is relatively easy to purchase. On the other hand, the developing market may have poor institutions that may make the purchase difficult and could make it difficult to operate the jointly owned firm even if the purchase goes through. Issues like these will be amplified in industries in which relationships and bargaining are of high importance.

Research Approach

The authors develop a model of foreign direct investment (FDI) to study how multinationals enter a foreign market and how industry and country characteristics affect this choice. In the model, MNEs choose whether to match with a local partner, and, if so, whether to bring the match under full ownership. The key elements of the investment model are as follows. First, production is viewed as a set of tasks that must be completed. Each firm, local and MNE, is relatively efficient at certain tasks and inefficient at certain other tasks. The task that can be performed most efficiently is the firm's core competency. Entering the market for corporate control is a way to increase efficiency by finding a local partner with complementary assets. However, as each task requires investment, an ownership structure involving multiple independent parties may be complicated by agency issues in the investment process. Hence, the model allows the MNE to choose the contractual arrangement that governs the new foreign affiliate. Depending on the quality of the match with the local partner—the degree of comple-

mentary—the MNE may be compelled to complete the match through a full acquisition rather than operate with joint owners sharing revenues from a final product.

The model integrates a circle-type matching framework similar to those in Rauch and Trindade (2003) and Grossman and Helpman (2005) within an investment model in the mold of Antràs and Helpman (2008). Specifically, the investment framework in Antràs and Helpman (2008), in which firms invest in a continuum of tasks and earn revenues in the context of a constant elasticity of substitution (CES) type model, provides the foundation on which to define tasks around a circle and add a simple matching framework. Overall, the result is a hybrid model in which the closed-form solution for match efficiency is very simple and is likely applicable to any CES-type model that requires a matching framework.

The data for the empirical portion of the analysis are obtained from the Thompson SDC Platinum dataset, which uses regulatory filings and public records to build a large database of acquisition behavior across industries and countries. These data are complemented with data from the Penn World Tables, the source of the data used to indicate relative country development, and from Nunn (2007) for industry contract intensity.

Allocation of Tasks Between a Multinational Enterprise and Its Partner
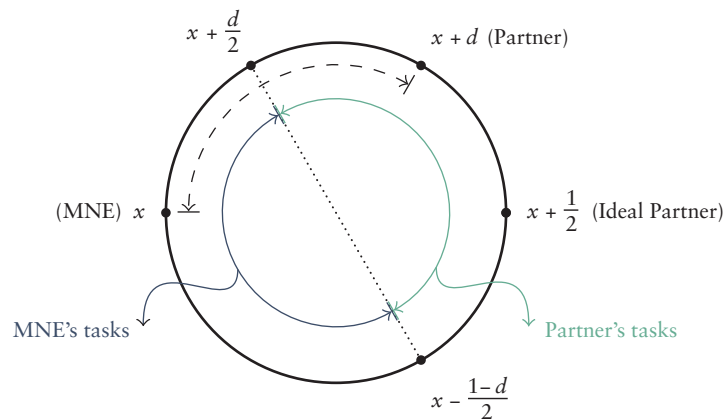
Source: Authors' visualization.
Note: The MNE is positioned at point x, making x its core competency. Generally, since matching is random and firms are uniformly distributed around the circle, the partner will be located at distance d from x, with the MNE handling the tasks closest to x and the partner undertaking those closest to $x+d$.

Key Findings

- In equilibrium, all ex ante identical firms will enter the foreign matching market to find a local partner. The result is a group of ex post heterogeneous firms that have sorted into three forms of ownership: the least efficient of these matches are forgone, the mid-efficiency matches operate under joint ownership, and the most efficient matches involve full acquisition. The intuition for this sorting is straightforward. The least efficient matches are forgone because the match does not offer joint profits sufficient to compensate the MNE and local firms for the opportunity cost of their outside option. For matches that reach a threshold level of efficiency gains, firms operate as a jointly owned firm, or if superior in efficiency, via full acquisition. Intuitively, the incomplete contracts associated with joint ownership cause a holdup problem in coordinating investments in the final product. When match potential is high, the loss of profits due to the holdup is quite severe, and the

MNE instead chooses to buy out the local firm, pay a fixed integration cost, and bring all investment responsibilities under one owner.

- The authors find that industries with a greater share of inputs requiring contracts involve a greater share of full acquisitions. Furthermore, within target industries, a more developed host relative to the source in terms of GDP per capita also yields a higher share of full acquisitions. Finally, in industry-host pairs in which contract intensity is larger and legal systems involve less-complete contracts, the evidence shows that full ownership arrangements are chosen.

Implications

This paper merges multiple strands of literature on topics relating to firm heterogeneity and FDI, the property rights theory of the firm, and firm-to-firm matching. On a very basic level, the paper is similar to the canonical literature on firm heterogeneity in Melitz (2003) and Helpman et al. (2004), where firms select into different options by balancing fixed costs against heterogeneous operating profits. However, this paper differs from the earlier work in that heterogeneity in operating profits is endogenous and a function of both the quality of a match with a local partner and the organizational form that governs the match.

In terms of broad policy questions, the model and aggregate empirical analysis may provide a framework to help guide future work that evaluates the efficacy of investment policies that are industry specific, and in some cases, target the depth of foreign ownership.

Potential Effects of the Great Recession on the U.S. Labor Market

by William T. Dickens and Robert K. Triest

Motivation for the Research

Previous recessions in the United States have not left many lasting scars. Wage movements over past business cycles are hard to detect, labor force participation rates have quickly returned to trend levels, and unemployment rates have shown no long-term effects after typically quick recoveries. Other countries have not been as fortunate. At least since Blanchard and Summers (1986) it has been noted that after economic downturns many other OECD countries have experienced long drops in labor market participation and persistently high unemployment.

It has been suggested that U.S. exceptionalism in this regard is due to our experiencing quick recoveries in output after our recessions (see, for example, Ball 1999). Indeed, none of our postwar recessions has been particularly protracted until now. This paper examines whether this difference, or any other aspect of the Great Recession, is likely to cause medium- or long-term changes in the functioning of the U.S. labor market.

Research Approach

The paper focuses on a few areas where previous research and recent discussions have suggested that there may be medium-to-long-term labor market effects. One area where the

Great Recession may have a substantial impact is on the wages and earnings of workers displaced during the recession. Individuals who are displaced from long-term jobs may lose the value of job-specific skills and may need to search anew for an employment situation to which they are well matched, and they may suffer persistent decreases in labor market earnings as a result. Displacement may also have persistent effects on the probabilities of future job separations and on the aggregate job-finding rate. Workers who gain new employment after having been displaced from long-term jobs may be at a higher risk of termination in their new jobs than they were in their previous jobs. Workers separated from long-term jobs may also have relatively low job-finding rates after displacement, due to the greater specificity of their human capital. The potential for increased labor market churning and relatively slow matching of displaced workers with new job opportunities might contribute to an outward shift of the Beveridge curve (the relationship between the unemployment rate and the job vacancy rate) and an increase in the non-accelerating inflation rate of unemployment (NAIRU). The authors evaluate the evidence for this possibility and examine the degree to which the apparent outward shift of the Beveridge curve may reflect structural issues in the U.S. labor market that will persist over a reasonably long horizon.

The authors investigate these issues using a variety of statistical techniques, including multinomial logit analysis, regression analysis, and estimates of Cox proportional hazard models of reemployment following job separation. The data used in this study come from the 2004 and 2008 panels of the *Survey of Income and Program Participation* (SIPP), a large-scale sample survey that interviews households every four months and that fields a new panel of sample members every few years. In each wave (sample interviews) of the SIPP, household respondents answer questions that refer to the four preceding calendar months; the particular months covered in a wave depend on the rotation group to which the household is assigned. Comparison of data from the two panels provides a convenient means of contrasting labor market experiences before and after the recession.

Key Findings

The probability of remaining unemployed is much greater for a worker in the 2008 panel than for one in the 2004 panel.

- For the first few years of employment the probability of either a voluntary or involuntary job transition decreases sharply with time. In contrast, the probability of an involuntary transition varies relatively little with age. Workers under age 25 and over age 59 are at significantly higher risk of involuntary transition than those in the intermediate age groups, but the magnitudes of the effects from age are much smaller than those from job tenure. The probability of an involuntary job transition decreases sharply with educational attainment; this is also true for voluntary transitions, but to a lesser extent. The main effect of the Great Recession (as indicated by membership in the 2008 panel) is a larger probability for involuntary transitions, and smaller and less statistically significant probability for voluntary transitions. One interpretation of these results is that the Great Recession greatly increased the probability of involuntary job transitions across the board but did not greatly change the relative transition probabilities of different types of workers. Worker character characteristics and their interactions with the effects of the Great Recession appear to have had little to no effect on monthly earnings.

- The probability of remaining unemployed (instead of being reemployed) is much greater for a worker in the 2008 panel than for one in the 2004 panel; this is true both for those who lost their job involuntarily and for those who left voluntarily. There is not a statistically significant difference between the two panels in the estimated probability of remaining out of the labor force instead of being reemployed.

Industry Mismatch of Job Seekers and Vacancies

Unemployment Rate   *Mismatch*
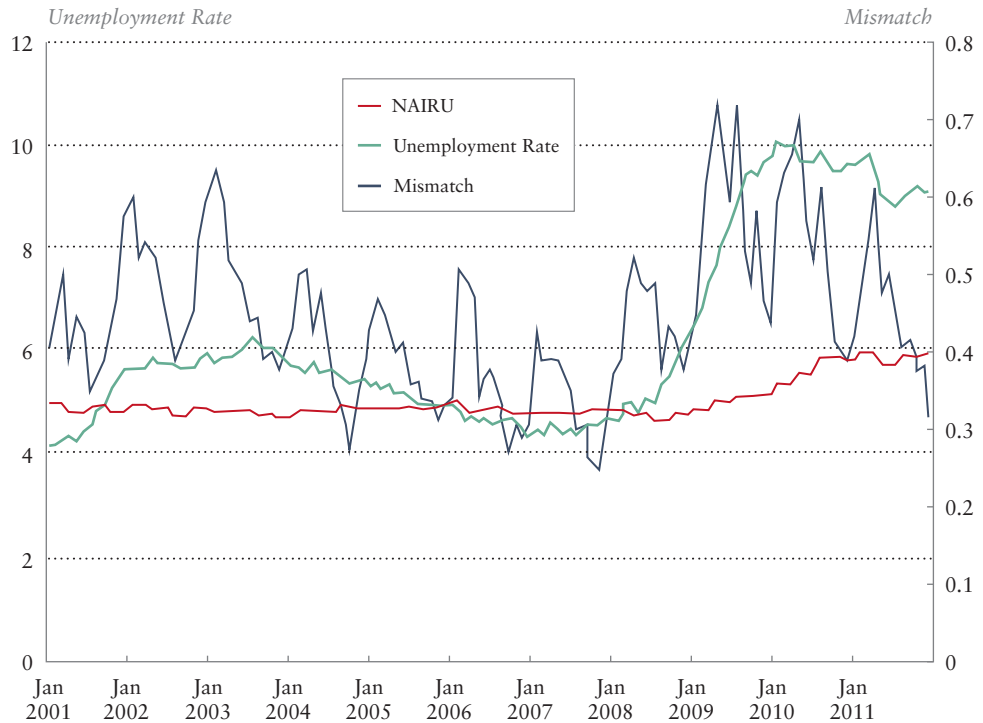
Source: Authors' calculations of the mismatch index and NAIRU. Unemployment rates from the Bureau of Labor Statistics.
Note: The mismatch index represents the fraction of workers who would have to move to another industry in order for the fraction of workers unemployed in each industry to equal the fraction of all vacancies in that industry.

Conditional on previous job tenure, older workers are more likely than young workers to remain unemployed.

- Conditional on previous job tenure, older workers are significantly more likely than younger workers to remain unemployed. Although the human capital specificity associated with losing a long-term job does not appear to be an impediment to job matching, age does appear to be an impediment. Older workers are not only significantly more likely than younger workers to remain unemployed rather than being reemployed, but are also significantly more likely than middle-aged workers to drop out of the labor force after both voluntary and involuntary job separations. The voluntary separations that lead to being out of the labor force likely reflect planned retirement, but involuntary separations that lead to being out of the labor force are probably best interpreted as the unplanned retirements of discouraged workers.

- The recent increase in the job vacancy rate, while the unemployment rate has remained mostly unchanged probably does suggest a decline in the efficiency of the matching process in the U.S. labor market and an increase in the NAIRU. Estimates from the authors' model of the NAIRU as a function of labor market efficiency suggest that it has increased by about 1 percentage point. However, this phenomenon may pass once aggregate demand has increased enough to bring vacancy rates back within their normal range and extended unemployment insurance programs have expired. An alternative explanation of the decline in labor market efficiency—that it is a result of a mismatch between the industry (implying also industry-specific skills) and/or the unemployed workers' geographic region and the vacant positions that could use them—does not appear to be borne out by the evidence. Another suggested alternative explanation centers on the effect on the labor market of

extended unemployment benefits. It seems likely that a substantial part of the authors' estimate of the increase in the NAIRU is due to the effect of extended unemployment benefits, but there is uncertainty regarding its precise magnitude.

Implications

Although the Great Recession did not greatly affect the relative risks of job displacement, it is still likely to have long-term consequences. Long-tenured workers were at increased risk relative to the pre-recession period, even though they were not disproportionately displaced during the recession. To the extent that the displacement of long-tenured workers results in long-term consequences for these workers, the Great Recession will have a long-term impact through the increase in the number of long-tenure job matches that were destroyed.

The Great Recession's main long-run effect on job finding is likely to be in its impact on older workers, who at all stages of the business cycle tend to have a lower likelihood of reemployment than younger workers. Although older workers are not at a high risk of job loss, once unemployed they tend to stay unemployed longer than do younger workers, and they are more likely to permanently leave the labor force. And once they have lost the protection of a long-term job, they are no longer at a lower risk of job loss than younger workers.

w-12-10

Fiscal Devaluations

by Emmanuel Farhi, Gita Gopinath, and Oleg Itskhoki

....

complete text: http://www.bostonfed.org/economic/wp/wp2012/wp1210.htm
e-mail: efarhi@harvard.edu, gopinath@harvard.edu, itskhoki@princeton.edu

Motivation for the Research

Exchange rate devaluations have long been advocated as a desirable policy response to macroeconomic shocks that, given price and wage rigidities, impair a country's economic competitiveness and well-being. Milton Friedman famously argued that these grounds constituted a strong case for maintaining flexible exchange rates. Yet countries that want or need to maintain a fixed exchange rate, perhaps due to membership in a currency union, cannot devalue their exchange rates in response to a macroeconomic shock.

During the Great Depression, when the global economy adhered to the gold standard, Keynes conjectured that a fiscal devaluation in the form of a value-added tax on imports combined with a uniform subsidy on exports would allow a country operating on a fixed exchange rate to achieve the same policy outcome as a devalued exchange rate. The current crisis in the euro currency zone has brought fiscal devaluations back to the forefront of policy considerations. The problems faced by Greece, Ireland, Portugal, and Spain in restoring their economic competitiveness have been blamed on their membership in the euro zone, which precludes an exchange rate devaluation, a situation that has prompted some to call for these countries to exit the euro. At the same time, it has been suggested that these troubled countries could improve their economies by using value-added taxes and payroll subsidies. Yet there has been little formal analysis of the equivalence between fiscal devaluations and exchange rate devaluations, as the policy debate has outpaced the academic knowledge. The authors' goal is to bridge this gap by providing a complete analysis of fiscal devaluations in a workhorse dynamic stochastic general equilibrium (DSGE) New Keynesian open economy model. This analysis departs from most of the existing academic literature on the topic by allowing for

varying degrees of price rigidity, alternative asset market assumptions, and devaluations that are both anticipated and unexpected. The authors' analysis incorporates dynamic price setting, endogenous labor supply, interest-elastic money demand, and household savings and portfolio choice decisions.

Research Approach

The authors define a fiscal devaluation as a set of tax policies that, together with an adjustment in the money supply, will result in the same real economic allocations (consumption, output, and labor supply) as would be achieved by a nominal exchange rate devaluation. To set up the equivalences that are at the heart of the dynamic analysis, the authors first present a static (one-period) framework with an arbitrary degree of price and wage flexibility. They consider the cases of producer and local currency price setting with some price stickiness, as the real effects of nominal devaluations depend on whether prices are set in the producer's currency or in local currency. The model features two countries, home and foreign, the latter with a passive policy of a fixed money supply. The home country can alter its money supply and also potentially use six different fiscal instruments to achieve the policy goal that mimics a nominal devaluation but maintains a fixed nominal exchange rate: import and export tariffs, a value-added tax (with border adjustment), a payroll tax paid by producers, and consumption and income taxes paid by consumers. The authors consider various degrees of capital account openness: balanced trade (financial autarky), complete risk-sharing with Arrow-Debreu securities (securities that are paid in only one time period), and an arbitrary net foreign asset position. The last case takes balanced trade and complete risk sharing as special cases that allow the authors to study the valuation effects associated with a fiscal devaluation. This one-period analysis is developed through the statement and proof of five propositions and yields the central insight that two types of fiscal devaluations are equivalent to nominal exchange rate devaluations.

The authors extend the results from the static model to a complete DSGE model with sticky prices and wages, prices set in producer currency or local currency, interest-elastic money demand, and different asset market structures. Households face endogenous savings and portfolio choice decisions. The dynamic analysis is formally developed through additional propositions and proofs. The authors discuss the dynamic model without capital and then show how including capital changes the conclusions. The dynamic framework permits analysis of both one-time unexpected devaluations and expected dynamic valuations. Finally, the authors consider under what circumstances the optimal policy response to a negative productivity shock is a fiscal rather than a nominal devaluation and address the issues involved with implementing a fiscal devaluation in the context of a currency union.

Key Findings

- Despite the differences in allocations that accompany the various specifications, a small set of fiscal instruments can robustly replicate the effects of nominal exchange rate devaluations across all specifications. The exact details of which instruments need to be used depend on the extent of asset market completeness, the currency denomination of bonds, and the expected or unexpected nature of devaluations.

- The two fiscal devaluation policies that mimic nominal exchange rate devaluations are 1) a uniform increase in import tariffs and export subsidies and 2) a uniform increase in value-added taxes and a reduction in payroll taxes. The key to understanding the mechanism behind these fiscal devaluations is their effect on the terms of trade. An increase in the import tariff must be accompanied by an increase in the export subsidy in order to

ensure the same movement in international prices as under a nominal devaluation. When conducting a fiscal devaluation based on value-added taxes and payroll taxes, the equivalence to a nominal exchange rate devaluation relies on the symmetry of the pass-through of these taxes into producer prices.

- In general, both types of fiscal devaluations need to be accompanied by a uniform reduction in consumption taxes and an increase in income taxes. However, in some circumstances changes in consumption and income taxes can be dispensed with, depending on the extent of asset market completeness and whether the exchange rate movements being mimicked are anticipated or unanticipated.

- When asset markets are incomplete, the currency denomination of the home country's debt is important. If bonds are denominated in the foreign currency, no additional instruments are required for a fiscal devaluation. But when international bonds are denominated in the home currency, equivalence requires a partial default by the home country. Specifically, a nominal devaluation depletes the foreign-currency value of the home country's external debt denominated in home currency. Since the limited set of fiscal instruments cannot replicate this effect on the home country's foreign debt obligations, a fiscal devaluation under these circumstances must be accompanied by a partial default of the home country's debt denominated in the home currency.

- In the case of an expected devaluation, the different behavior of the real exchange rate under nominal and fiscal devaluations induces different savings and portfolio decisions. A reduction in consumption taxes and an offsetting increase in income taxes will allow the fiscal devaluation to fully mimic the behavior of expected real exchange rate movements on optimal saving decisions.

- When production involves the use of capital as a variable input in addition to labor, the fiscal intervention that uses value-added tax increases and payroll subsidies needs to be extended to include a capital subsidy to firms. Without a capital subsidy, under a fiscal devaluation firms will have an incentive to substitute labor for capital in production given the payroll subsidy—an effect that does not occur under a nominal devaluation. In the case of a one-time unexpected devaluation when a consumption subsidy is not used, a capital subsidy is the only additional instrument required. More generally, all variable production inputs, apart from intermediates, will need to be subsidized uniformly under fiscal devaluations based on value-added taxes, but no such subsidies will be necessary under tariff-based fiscal devaluations.

- The proposed fiscal devaluation policies are robust across a number of different environments despite the fact that the actual allocations induced by the devaluations are sensitive to the details of the particular economic environment. In particular, for a given asset market structure, fiscal devaluations work independently and are robust to the degree of wage and price stickiness and to whether prices are set in local or producer currency. Most importantly, the proposed fiscal devaluations are revenue-neutral for the government and only require adjusting taxes in the home country, an important advantage since these policies can be implemented unilaterally.

Implications

In international macroeconomics, the Impossible Trinity refers to a country's inability to maintain an independent monetary policy in an open economy with fixed exchange rates and free

capital mobility. While it is true that fixed exchange rates and free capital mobility restrict monetary independence since nominal interest rates are tied by a parity condition, the authors show that when fiscal policies are added to the mix of instruments, the allocations that can be attained are the same as those obtained with a flexible exchange rate or an independent monetary policy. This insight has important implications for countries that do not have the option of implementing nominal exchange rate devaluations because they belong to a currency union, and this paper speaks directly to the current plight of certain euro zone countries.

In general, the authors' proposed fiscal devaluations require a change in the home country's money supply, but in the context of a currency union, where the money supply is controlled by the union's central bank, implementation of these fiscal devaluations may call for the union's central bank to increase the money supply. The seignorage income from this policy should then be transferred to the home country. Equivalently, the union central bank could let the national central bank of the country under consideration print the required increase in money. Such implementations cannot be considered a unilateral policy change by the home country. However, when the home country is small relative to the overall size of the currency union and/or when seignorage revenue as a share of GDP is small (as is the case empirically), no coordinated action by the union's central bank is necessary and a fiscal devaluation can be achieved by the home country's unilateral change in fiscal policy.

w-12-11

Sovereign Default Risk and Uncertainty Premia

by Demian Ponzo and Ignacio Presno

Motivation for the Research

Sovereign defaults and debt crises in general are a pervasive economic phenomenon, especially among emerging economies. Recent defaults by Russia (1998), Ecuador (1999), and Argentina (2001), and Greece's current debt crisis have put sovereign default issues at the forefront of economic policy discussion. A key aspect of a default event, or rather a default risk, is that forecasting this event (and further contingencies regarding the debt restructuring process) prompts bond holders to require higher compensation for bearing this risk, which simultaneously hinders the borrower's access to credit . Since high and volatile bond spreads translate into high and volatile borrowing costs for these economies, constructing economic models that can both generate these default events and provide accurate predictions in terms of pricing is key to understanding and pricing this risk.

Like most of the asset pricing literature, the literature on defaultable debt follows the rational expectations paradigm: lenders fully trust the single probability model governing the state of the economy and are not concerned with any source of potential misspecification. It is well documented that economic models using rational expectations face difficulties when confronted with asset price data. The case of modeling defaultable debt (either corporate or sovereign) is no exception, as these models are typically unable to account for the observed dynamics in the bond spreads while preserving the default frequency at historical levels. This paper tackles this "pricing puzzle" and also accounts for other empirical regularities of emerging economies by studying how lenders' desire to make decisions that are robust to

model misspecification affects equilibrium prices and allocations in an otherwise standard general equilibrium model of sovereign wealth.
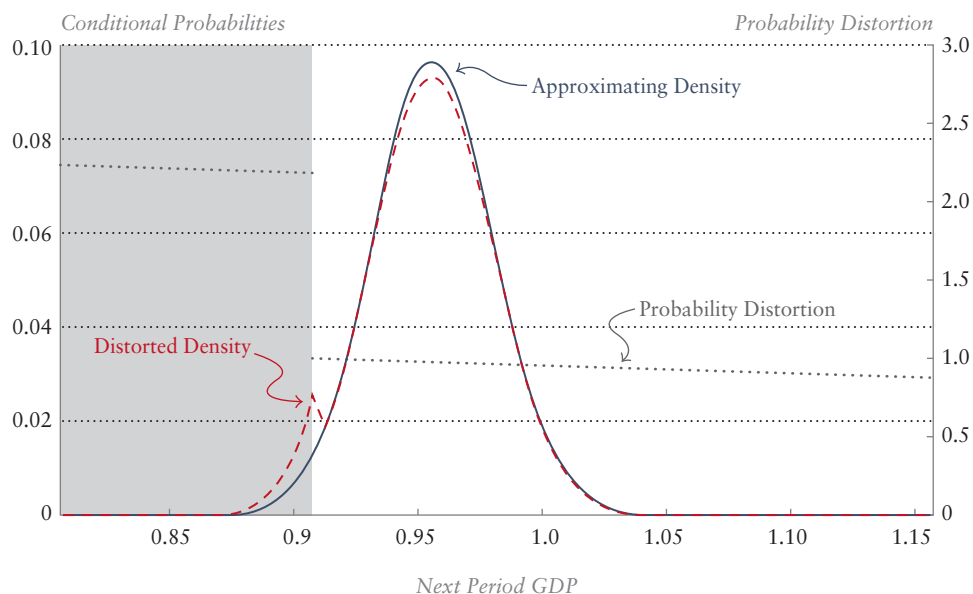
Research Approach

In this paper the authors adapt the seminal general equilibrium model of Eaton and Gersovitz (1981) by introducing lenders that distrust the probability model governing the evolving state of the borrower's economy and want to guard themselves against misspecification errors. In the model a borrower (for example, an emerging economy) can trade one-period discount bonds with international lenders in financial markets. Debt repayments cannot be enforced and the emerging economy may decide to default. In equilibrium lenders anticipate the default strategies of the emerging economies and demand higher returns from the sovereign bonds they hold to compensate for the increased default risk. In the case of default, the economy is temporarily excluded from financial markets and suffers a direct output cost. In this setting the authors show how the lenders' desire to make the decisions that are robust to misspecifying the conditional probability of the borrower's endowment alters the returns on sovereign bond holdings.

This paper's novel approach stems from the fact that lenders are uncertainty averse in the sense that they are unwilling or unable to form a unique probability distribution or probability model for the borrower's endowment, and at the same time lenders dislike making decisions in the context of alternative probability models. Indeed, in the authors' model lenders acknowledge that the stochastic process of the borrower's endowment may be misspecified and they want to make decisions that are robust to such misspecification. To express these fears about model misspecification, following Hansen and Sargent (2005), the authors endow lenders with multiplier preferences. In this context the lenders construct a conditional probability distribution (referred to as the "approximating probability distribution" or "approximating model") for the borrower's endowment, but suspect that it can be misspecified and hence surround the approximating model with alternative probability distributions that are statistical perturbations of the baseline model. To make choices that perform well over this set of probability distributions, the lender acts as if contemplating a conditional worst-case probability distribution that is distorted relative to the approximating model. This distorted conditional probability distribution is determined by minimizing the lender's objective function but remains statistically indistinguishable from the approximating probability distribution at some confidence levels. Therefore the worst-case probability arises from perturbing the approximating density by slanting the probability distributions toward the states associated with low utility. In the model these low-utility states for the lender coincide with those in which the borrower defaults on its debt.

The assumption that lenders are concerned about model misspecification is intended to capture the fact that foreign lenders may distrust their statistical models' ability to predict the borrowing country's relevant macroeconomic variables. In addition, foreign lenders are aware of the limited availability of reliable official data, measurement errors, and lags in the release of the official statistics combined with subsequent revisions. These arguments are aligned with the suggested view of putting econometricians and agents in a position with identical information and limitations on their ability to estimate statistical models.

In addition to studying the level, volatility, and countercyclicality of the bond spreads, the authors document and study higher moments, such as skewness and kurtosis, and different quantities for the spreads. They believe that these moments are crucial for depicting the

Approximating and Distorted Conditional Densities for Argentina's GDP

Conditional Probabilities　　　　　　　　　　　　　　　*Probability Distortion*

Approximating Density

Probability Distortion

Distorted Density

Next Period GDP

Source: Authors' calculations.
Note: Shaded area indicates period of Argentinian default.

behavior of bond spreads, especially in an economy like Argentina, because these spreads contain information about tail behavior, particularly about the upper tail, which accounts for the bond spreads during debt crises.

Key Findings

• By introducing lenders' fears about model misspecification, the authors' calibration matches the high, volatile, and typically countercyclical bond spreads observed in the Argentinian data and the standard business cycle features, while keeping the default frequency at historical levels. At the same time, the model can account for the average risk-free rate observed in the data; in the authors' economy model uncertainty does not alter the risk-free rate.

• In the simulations using plausible parameter values, risk aversion alone on the lenders' part with time-separable preferences is not sufficient to generate the observed risk premia. Also, as the degree of lenders' risk aversion increases, the average net risk-free rate declines, eventually to negative levels.

• The authors document that Argentina's bond spreads based on the country's macroeconomic variables are skewed to the right and leptokurtic (that is, exhibit a sharper peak and longer, fatter tails) compared with the spreads observed in developed open economies. The authors' calibrations show that their model approximates these moments very well.

Implications

Under the assumption that international lenders are risk neutral and have rational expectations (meaning that they fully trust their model), the equilibrium bond prices are given by the discounted conditional probability of not defaulting in the next period. Consequently, the pricing rule in these environments prescribes a strong connection between equilibrium prices and default probability. When calibrated to the data, matching the default frequency

to historical levels (the consensus level for Argentina is around 3 percent annually) delivers spreads that are too low relative to those observed in the data. The authors' methodology breaks this strong connection by introducing a different probability measure, one that manifests lenders' uncertainty aversion. In the authors' framework there is a strong connection between equilibrium prices and the default probability under the new probability measure. Additionally, some recent papers instead assume an ad hoc functional form for the market stochastic discount factor in order to generate sizable bond spreads as observed in the data. This paper can be seen as providing microfoundations for such functional forms.

From an asset pricing perspective, the key element in generating high spreads while matching the default frequency is a sufficiently negative correlation of the market stochastic discount factor with the country's default decisions. With fears about model misspecification, the stochastic discount factor has an additional component given by the probability distortion inherited in the worst-case density for the borrower's endowment. This probability distortion, which is low when the borrower repays and high when the borrower defaults, generally induces a negative comovement between the stochastic discount factor and the borrower's default decisions, a comovement that is necessary to explain high bond spreads. In the authors' model with a defaultable asset, this endogenous probability distortion is discontinuous when the borrower's next-period endowment is realized, as a result of the discontinuity in the payoff of the risky bond due to the default contingency. This yields an endogenous hump depicting the worst-case density over the interval of endowment realization where default is optimal. This special feature is unique to this current setting. A direct implication of this consequence is that the subjective probability assigns a significantly higher probability to the default event than the actual one. Since from the lenders' perspective we can view the default event as a "disaster event," this result links to the growing literature on "rare events"; for example, see Barro (2006). Fears about model misspecification then amplify its effect on both allocations and equilibrium prices, as these fears increase the lenders' perception of the likelihood of these rare events occurring.

The authors make two methodological contributions that are of independent interest. The first relates to the way they solve the model numerically using the discrete state space (DSS) technique in the context of model uncertainty. Since the decision to default is a discrete choice, under the DSS technique it can be the case that the debt policy rule is not continuous in the current-state variables and prices. In turn, the discontinuity in the debt policy function with respect to bond prices translates into discontinuity in the lenders' Euler equation, which may lead to convergence problems. The authors handle this technical complication by introducing an independent and identically distributed preference shock. This preference shock enters additively in the autarky utility value of the borrower's utility when the default decision is evaluated, and the resulting utility value is drawn from a logistic distribution, following McFadden (1981) and Rust (1994). As a result, the default decision, which was originally a discrete variable taking values of 0 or 1, becomes a continuous variable representing a probability that depends on the spread of the borrower's continuation values of repaying and defaulting on the outstanding debt. The authors show that as the distribution of the preference shock converges to a point mass at zero (that is, the variance converges to zero), it does so to the economy's equilibrium without reflecting preference shock. Therefore, the authors' model implies that for sufficiently small preference shocks, the economy with the preference shock is closed to the original economy.

The second methodological contribution consists of an alternative way of interpreting the detection error probability (DEP) presented in Anderson, Hansen, and Sargent (2003), among

others. Roughly speaking, DEP is akin to the type I error, which measures the probability of mistakenly rejecting the true model. The authors' interpretation links the parameter driving the concerns of model misspecification with the minimum number of observations needed to separate the distorted model from the approximating one, with a certain degree of confidence that is reflected in a chosen probability level.

Competitive Incentives: Working Harder or Working Smarter?

by Anat Bracha and Chaim Fershtman

Motivation for the Research

Business firms and other organizations often use competitive incentives to motivate their members. Almost every task requires a combination of cognitive effort and labor effort, and a tradeoff between these two kinds of effort exists whenever agents need to think about how to perform a task or to choose a method to solve a problem before they actually take action. It is the chosen combination of cognitive and labor effort that determines whether people work harder or work smarter. Recognizing that a difference exists between cognitive and labor effort raises a question: how do different incentive schemes influence the choice of effort? The authors designed an experiment to see whether the incentive scheme offered affects the subjects' chosen combination of effort. The pay-for-performance scheme rewarded players for their individual effort, while in the tournament incentive a pair of players competed to win a prize.

This study adds to the experimental investigation of tournament incentives relative to pay-for-performance schemes by focusing on how competitive incentives affect the allocation of effort, and contributes to the recent literature on gender differences in response to competitive pressures as well as the recent work on the psychological foundations of incentives.

Research Approach

To investigate whether under competitive incentives people work harder or smarter, the authors conducted an experiment at the Harvard Decision Science Laboratory. The experiment centered on two computerized tasks focused either on cognitive effort (working smarter) or labor effort (working harder). Subjects were given 10 minutes to work, during which they could engage in either task and switch between tasks when desired. To analyze the effects of incentives, the authors used a between-subject design with two treatments, pay-for-performance (PFP) and head-to-head tournament, and examined whether the time allocation between the two tasks differed across the two treatments. In particular, allocating more time to the cognitive-intensive task and less time to the labor-intensive task is interpreted as working smarter, not working harder, and vice versa. A total of 134 Harvard students participated in the study, 74 in the PFP treatment and 60 in the tournament treatment.

The goal for the individual subjects was to maximize their monetary earnings. In the PFP treatment, subjects were rewarded based on their individual performance in the session plus a bonus award used to achieve complementary between the two tasks. In the tournament

treatment each participant competed against an anonymous opponent; for their work participants received points according to a point scheme similar to the payment scheme under the PFP treatment. The person in each pair with the highest number of points was announced as the winner.

Both the payment scheme and the point scheme were based on the number of correctly solved sequences in a cognitive task and the number of numbers filed in a labor-intensive task. The number of net correctly solved sequences was computed as the number of correctly solved sequences minus half the number of incorrectly solved sequences, a penalty designed to prevent guessing the answer. The number of net filed numbers equaled the number of correctly filed numbers minus the number of incorrectly filed numbers, a penalty designed to prevent random clicking. The extra reward introduced a complementary term, as a great number of net correctly solved sequences increased the marginal return to successful filing.

In the PFP treatment, subjects were paid $2.00 per net correctly solved sequences, 3 cents per net correctly filed numbers, and a 1 cent extra reward for the product of net correctly solved sequences times net correctly filed numbers. In the tournament treatment, the winner was determined according to the greatest number of accumulated points, with the following point schedule: 2 points per net correctly solved sequences, 0.03 of a point per net correctly filed numbers, and an extra 0.01 point for the product of correct net sequences times net numbers filed. The winner received $60, while the loser got the $10 guaranteed minimum amount such that the expected earnings were $35, similar to the average earnings under the PFP treatment.
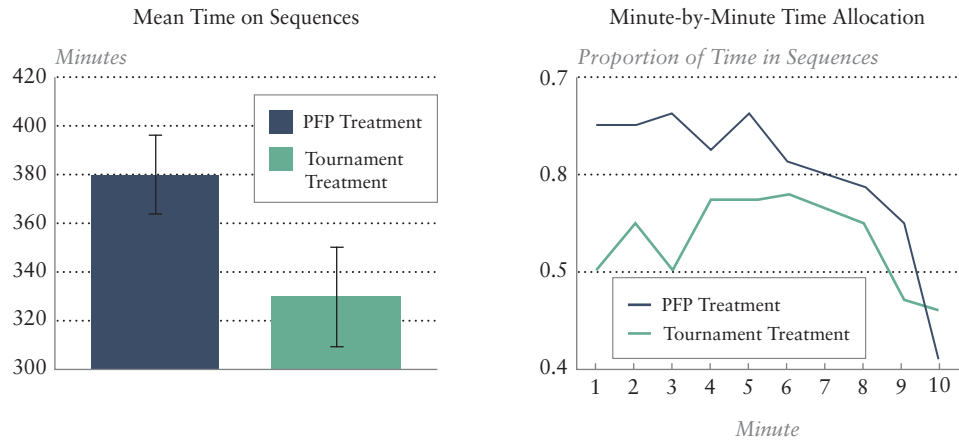
Key Findings
- Under the competitive tournament incentives, participants allocated less time to the sequences task. The effect of tournament incentives is neither due to a single episode nor to a particular stage of the task. Rather, the effect of tournament incentives on time allocation stems from different time allocation decisions made during the study's entire 10-minute interval.

Participants had a lower success rate under tournament incentives than under pay-for-performance incentives.

- Participants had a lower success rate under tournament incentives than under PFP incentives: 78.6 percent under PFP, but only 72 percent under tournament incentives. Under the tournament incentives participants devoted an average of 330 seconds (5.5 minutes) to the cognitive sequences task compared with an average of 381 seconds (6.35 minutes) under the PFP treatment. Stated differently, the lower success rate on the sequences task and the higher amount of time devoted to the filing task shows that under competitive incentives participants worked harder but not smarter.

- Surmising that the lower success rate in the tournament treatment was due to some participants feeling pressed for time and that this effect would be stronger toward the end of the session when the competitive pressure was highest, the authors calculated the participants' success rate in the cognitive-intensive task during the first seven minutes and the last three minutes of the tournament treatment. They found that the participants' average success rate was 77.5 percent during the first seven minutes compared with 57.9 percent during the last three minutes, a decline that is highly significant. In the PFP treatment, for comparison, the success rate was 76.4 percent during the first seven minutes and 77.2 percent in the last three minutes. That is, while time pressure had no effect in the noncompetitive PFP treatment, it had a significant effect in the tournament competition.

Allocation of Time by Treatment

Mean Time on Sequences

Minutes

420	
400	PFP Treatment
380	Tournament Treatment
360	
340	
320	
300	

Minute-by-Minute Time Allocation

Proportion of Time in Sequences

0.7
0.8
0.5
0.4

PFP Treatment
Tournament Treatment

1 2 3 4 5 6 7 8 9 10

Minute

Source: Authors' calculations.
Note: N=73 under PFP, N=59 under tournament. The bars in panel A represent the standard error of the mean.

- Under pressure some people may perform better and some worse, as competitive incentives do not necessarily affect individuals uniformly. The authors identified the winners and losers in the tournament treatment and compared their performance with the appropriate group in the PFP treatment. In the tournament treatment, the winners and losers both spent the same statistical amount of time on the cognitive-intensive task: 5.78 minutes on average versus 5.22 minutes. But on average the winners solved 11.13 cognitive-intensive questions, had an 85 percent success rate, and scored 44.38 points, while on average the losers solved 7.20 cognitive-intensive questions, had a 59 percent success rate, and scored 21.2 points. When the tournament and PFP participants were divided into above- and below-median performers based on their overall scores in each treatment, the success rates of the above-median performers were very similar: 85.64 percent in the tournament treatment and 84.96 percent in the PFP condition. The success rates of the below-median performers were affected by the competitive environment, as their average success rate in the tournament treatment was 57.93 percent compared with 72.45 percent in the PFP treatment.

- In both treatments the results were sensitive to gender. In the PFP treatment, women devoted less time to the cognitive-intensive task and more time to the simpler, labor-intensive task. This is in spite of the fact that men and women exhibited the same ability in the cognitive-intensive task under the PFP incentives. Analyzing the tournament treatment by gender, the authors find that relative to the PFP treatment, competitive incentives induced both men and women to spend less time on the cognitive task and more time on the labor task—meaning that both genders worked harder, not smarter. Under the tournament treatment, on average men spent a little over six minutes on the cognitive task compared with almost seven minutes in the PFP treatment, but had an average success rate of 78.69 percent in the tournament treatment compared with 76.23 percent in the PFP treatment.

- The women's success rate in the cognitive task declined from an average of 79.87 percent under PFP to 67.18 percent under tournament incentives, a strong and sharp decline of over 15 percent. This decline was evident in the last three minutes, not the first seven minutes. Compared with the six minutes women spent on the cognitive task under PFP, in

the tournament treatment they spent an average of only 5.13 minutes. Thus, the negative effect on the success rate associated with competitive incentives is entirely a female effect.

Implications

The results of this study offer evidence that incentives influence the way people choose to work, an important finding that has been under-researched. One clear implication is that the optimal incentive scheme used should depend on the type of effort an organization wants to elicit. For example, if a firm wants to encourage its employees to work smarter, they should consider a PFP compensation structure instead of one based on competitive incentives.

Nice to Be on the A-List

by Yasushi Hamao, Kenji Kutsuna, and Joe Peek

Motivation for the Research

It is well established that Japanese banks provided support to firms listed on national and regional stock markets during Japan's extended period of economic malaise following the bursting of its stock market and real estate bubbles (for example, Peek and Rosengren 2005; Caballero, Hoshi, and Kashap 2008). In particular, the weaker a bank's health was, the more likely it was to increase lending to the weakest Japanese firms—largely because of the perverse incentives banks had to avoid recognizing an even greater quantity of problem loans. Extending additional credit that enabled zombie firms to continue making interest payments on existing loans (a loan practice called "evergreening") may have avoided the mutually assured destruction of the banks and their borrowers, but such behavior likely helped to prolong Japan's economic malaise, commonly referred to as the "Lost Decade." Bank regulators were complicit in allowing such bank behavior by permitting troubled banks to overstate their capital and understate their problem loans, in part to avoid the high costs that would be associated with widespread bank failures and a massive increase in unemployment if many large firms were to fall into bankruptcy.

While the existing literature provides strong evidence that Japanese banks engaged in evergreening, this evidence has been produced primarily for firms listed on stock exchanges, an omission of precisely the set of unlisted smaller firms that were most likely to be "bank dependent" and thus most affected by reduced credit availability during a banking crisis. This study uses Japanese data to investigate the extent to which banks treated unlisted firms differently than listed firms in terms of their willingness to make credit available and to determine whether the loans extended were based on the fundamentals of healthy firms or on evergreening of loans to unhealthy firms.

Japan's extended period of economic malaise, in combination with the banking crisis that followed the bursting of the stock market and real estate bubbles at the beginning of the 1990s is particularly relevant for a study of bank credit availability that attempts to distinguish between the experiences and treatment of unlisted firms and those of listed firms. Moreover, previous studies have generally concluded that the evergreening of loans to unhealthy listed Japanese firms was widespread and that some relatively healthy Japanese firms may have faced a credit crunch, suggesting that including the smaller, unlisted, and primarily bank-

The negative effect on the success rate associated with competitive incentives is entirely a female effect.

dependent firms is essential for obtaining a better understanding of how, and to whom, bank credit was provided during this troubled period.

Research Approach

The authors employ a dataset that covers the period from 1993 to 2005 and contains annual data for both unlisted and listed firms in Japan. They specify an equation that explains the probability of a firm receiving increased loans, using variables intended to measure firm health, other firm characteristics, and the health of the firm's main bank (the lender with the largest volume of loans outstanding to the firm in each year), as well as additional controls for loan demand and general macroeconomic activity. By extending the sample to include unlisted firms as well as listed firms, using regression analysis the authors are able to investigate whether differences existed between the determinants of bank lending to unlisted firms and to listed firms.

The data on unlisted firms come primarily from Teikoku Databank, a credit research firm. The original Teikoku dataset contains over 500,000 unlisted firms, from large firms to small proprietorships. From this extensive dataset, the authors obtained annual balance sheet and income statement data for firms with paid-in capital exceeding 80 million yen after 1993. They excluded firms that were wholly parent-owned subsidiaries, cooperatives, public utilities, and financial firms. They also required that the firm report data for at least five consecutive years during the sample period.
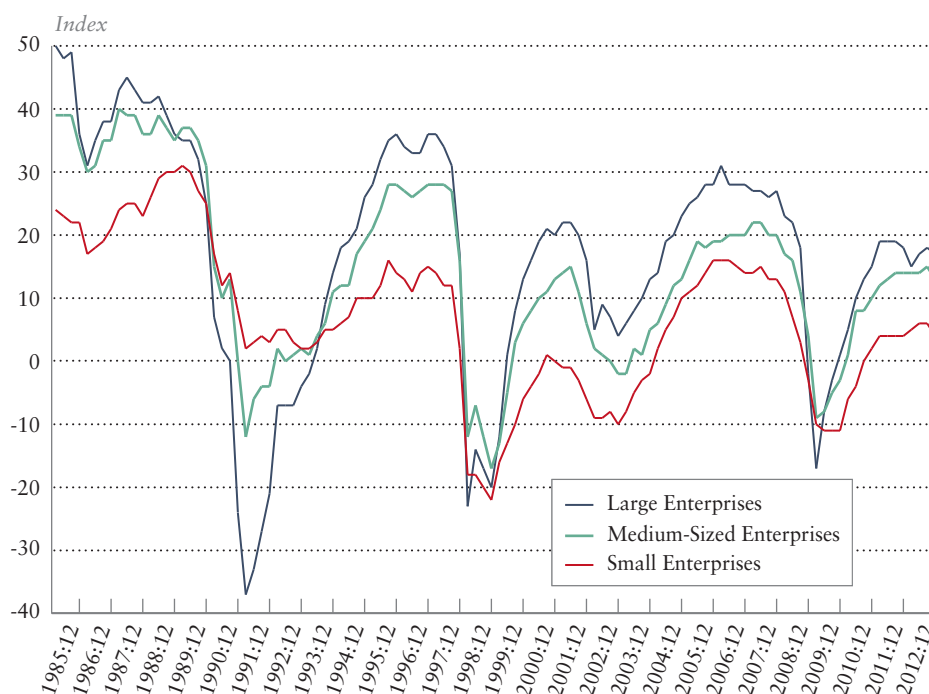
These data were supplemented with data for unlisted firms contained in Nikkei Financial QUEST, although if an unlisted firm appears in both datasets, the Teikoku data were used. For listed firms, the authors obtained annual financial and attribute data for 1993 to 2005 from Nikkei Financial QUEST, which includes all listed firms on the Tokyo and regional stock exchanges (including newly established exchanges for new and emerging firms), and JASDAQ. They excluded public utilities and financial firms, both listed and unlisted, and divided firms into the following three categories: 1) listed on the first or second section of the Tokyo Stock Exchange (TSE), 2) listed on other exchanges (regional exchanges, TSE MOTHERS, and JASDAQ), and 3) unlisted.

For listed items, worse-performing firms were more likely to obtain an increase in loans, a result consistent with banks' evergreening loans to the weakest firms.

Key Findings

- For listed firms, the return on assets has a negative effect, suggesting that worse-performing firms were more likely to obtain an increase in loans, a result consistent with banks' evergreening loans to the weakest firms. Furthermore, listed firms with declining return on assets (ROA) were even more likely to obtain increased bank loans, again consistent with banks' evergreening behavior toward listed firms.

- Firms with more working capital were less likely to obtain an increase in loans, perhaps reflecting their lower need for additional loans, and thus these firms' lower loan demand. The heavier was a firm's existing debt load, the less likely the firm was to obtain increased loans. Larger listed firms were less likely to obtain an increase in bank loans, perhaps reflecting their better access to alternative sources of funds through the bond market, or perhaps reflecting less loan demand to the extent that these tended to be more mature firms. Listed firms with faster sales growth were more likely to obtain increased loans, consistent with such firms having a stronger demand for credit in order to increase capacity to meet the growing demand for their goods and services. Listed firms with a larger share of their assets in the form of property, plant, and equipment were less likely to obtain increased loans.

Bank Lending Attitude Diffusion Index

Source: Bank of Japan.
Note: This figure presents the Bank Lending Attitude Diffusion Index during the 1985–2012 period based on a quarterly survey by the Bank of Japan for all industries. A questionnaire survey asks firms whether bank lending attitudes are moderate, not so severe, or severe. The Diffusion Index is calculated as the percentage of firms that described bank lending attitudes as being moderate minus the percentage of firms that described bank lending attitudes as being severe. Until 2003:Q4, the size of the firms was based on the number of permanent employees (small: 50–299, medium: 300–999, large: over 1,000). From 2004:Q1, the size is based on the amount of paid-in capital (small: 20 million–100 million yen, medium: 100 million–1 billion yen, large: over 1 billion yen).

- In contrast with the results for listed firms and consistent with banks' practice of evergreening loans, a higher ROA increased the probability that an unlisted firm would obtain increased loans. The positive differential effect on the direction of the change in ROA for unlisted firms offsets most of the negative effect for listed firms, although the net effect remains negative. The net effect of working capital for unlisted firms remains negative, but is only about half as large (in absolute value) as for listed firms. Unlisted firms with greater leverage were more likely to obtain increased loans. Smaller unlisted firms were even more likely to obtain increased loans. Finally, the differential effects for both sales growth and tangible assets provide only partial offsets to the effects for listed firms.

- Firms with bonds outstanding were more likely to obtain an increase in bank loans. Listed firms with decreased bonds outstanding over the prior year were more likely to experience an increase in bank loans, and if outstanding loans decreased all the way to zero, the firm was even more likely to obtain increased bank loans. These two effects are consistent with bank loans replacing bond issuance as a source of credit to firms as their outstanding bonds mature. Furthermore, these effects are also consistent with banks' aiding weakened firms that are no longer able to access the bond market. And when listed firms enter the bond market, with bonds outstanding increasing from zero, the bond issuance appears to replace the need for bank loans, reducing the probability of the firm obtaining increased loans.

- Unlisted firms with outstanding bonds were more likely to obtain increased loans, although the effect does not differ significantly from that for listed firms. An increase in an unlisted firm's outstanding bonds decreased the firm's probability of obtaining increased loans even more than was the case for a listed firm. The negative differential effect of a decrease in outstanding bonds offsets most of the positive effect for listed firms, although the total effect if bonds outstanding fall to zero is stronger for unlisted firms than for listed firms. Similarly, the differential marginal effect when unlisted firms enter the bond market offsets most of the negative effect for listed firms, although the differential effect is significant only at the 10 percent level.

- The health of a firm's main bank, as measured by the bank's market-to-book ratio, had a negative effect, suggesting that weaker main banks were more likely to increase loans to a firm. However, the effect is significant only at the 10 percent level. For unlisted firms, the marginal effect more than offsets the listed firm effect. This effect, too, is significant only at the 10 percent level, and the total unlisted effect does not differ significantly from zero, suggesting no additional evergreening effect for unlisted firms by weak main banks.

- A firm headquartered in a prefecture with a smaller value of the three-year average growth rate of real per capita income was more likely to obtain increased bank loans. This is consistent with loans being directed to listed firms in the worst-performing geographical areas. In contrast, for unlisted firms local economic conditions had no net effect on the probability of an unlisted firm obtaining increased loans, once the firm's own health and characteristics were taken into account.

- Among the industry effects (for six industry groups—agriculture, forestry, fishing, and mining; manufacturing; construction; wholesale trade, retail trade, and eating and drinking establishments; real estate; and transport and communications) listed firms in these industries were more likely than listed firms in the services industry, which serves as the benchmark, to obtain increased loans, although the effect for the agriculture industry is not statistically significant. Only two of the differential effects for unlisted firms, those for the transport and communications group and for the real estate group, are statistically significant, although there are partially offsetting effects in each case. The total effects for unlisted firms differ significantly from zero for three industries (manufacturing, wholesale, and real estate), with the total effect being positive in each case.

The results are consistent with banks' evergreening behavior toward listed firms…. Banks appear to have treated the smaller, unlisted firms differently.

- The overall results reveal evidence consistent with banks' evergreening behavior toward listed firms, consistent with prior studies. The more striking result is that banks appear to have treated the smaller, unlisted firms differently and to have been much less willing to engage in evergreening behavior toward these borrowers. It is not simply a matter of firm size: these results remain even after controlling for differences in firm size.

Implications

The authors' evidence is consistent with "connected" firms receiving favorable treatment, where the connection in this instance is a connection to a stock exchange, and even better treatment if that stock exchange is the premier stock exchange; in the case of Japan this is the Tokyo Stock Exchange. Stated differently, being on the list matters, and being on the A-list matters even more. Moreover, among listed firms, for which data on ownership by banks are available, a higher concentration of firm ownership by either the main bank or the firm's top three lenders increases the likelihood that the firm will obtain increased loans, with the effect being even stronger for the weakest firms that have a negative return on assets.

Explaining Adoption and Use of Payment Instruments by U.S. Consumers

by Sergei Koulayev, Marc Rysman, Scott Schuh, and Joanna Stavins

....

Motivation for the Research

During the past three decades, the U.S. payments system has been undergoing a transformation from paper to electronic payment methods. Innovations include ATM machines, debit and prepaid cards, online banking, and even mobile payments via cell phone. A notable by-product of this transformation has been an increase in the number of payment instruments held and used by consumers. By 2008, the average consumer held 5.1 of the nine most common payment instruments and used 4.2 of them during a typical month (Foster, Meijer, Schuh, and Zabek 2009). In the authors' dataset, the Survey of Consumer Payment Choice (SCPC), consumers overall held more than 50 different portfolios of payment instruments and their patterns of payment use varied widely even after conditioning on their portfolio of payment instruments. This strikingly varied range in consumer payment behavior is not fully explained in the economics literature. This paper develops and estimates a structural model of adoption and use of payment instruments by U.S. consumers.

This paper is motivated in part by recent research and policy actions aimed at interchange fees for debit and credit card systems. Interchange fees are the subject of regulatory and antitrust activity in a growing number of countries (Bradford and Hayashi 2008; Weiner and Wright 2005). This paper focuses on two recent policy developments. First, in the United States, recent legislation requires the Federal Reserve to regulate the interchange fees of debit cards. As banks respond to this regulation, consumers may face a variety of different charges for adopting and using affected payment instruments. A second relevant policy development arises from two recent antitrust cases. A July 2011 settlement between the Department of Justice and Visa and MasterCard allows merchants to discount card products at the point of sale, so a merchant could offer a discount to a consumer for using a debit or credit card that imposes low merchant fees. Under the legislation requiring the regulation of debit interchange fees the Federal Reserve has also allowed for merchant discounting. A separate settlement proposed in July 2012 between merchants and Visa and MasterCard would allow merchants to surcharge different card products rather than offer a discount. Prior to these events merchant contracts with card companies prohibited merchants from steering consumers among card products, although merchants have always been allowed to offer discounts for cash payments.

Understanding how consumers substitute between payment instruments following such regulatory and legislative changes is important for evaluating these policies. For instance, consumers may respond to an increase in the cost of using debit cards either by switching to cash or by switching to credit cards. As a digital mechanism credit cards are often considered faster and easier to use than cash, but since they rely on consumer credit, some view a switch to increased credit card use as undesirable. Furthermore, substitution patterns in response to adoption charges may differ from substitution in response to changes in use charges, so it is important to employ an approach that recognizes these differences. Moreover, payment

substitution is especially important to policymakers because consumers rarely encounter the explicit costs of using a particular payment instrument, and so they may receive poor signals about the social cost of their choices.

Research Approach

The authors develop a two-stage model in which consumers first adopt a portfolio of payment instruments, such as debit, credit, cash, and check. Then, consumers choose how much to use each instrument in different contexts, such as online essential retail and nonessential (discretionary) retail. The authors separately identify the effect of explanatory variables on payment method adoption and use and then compute elasticities of substitution across different instruments, focusing on how these differ in response to changes in the costs of adoption and use.

The SCPC enables the authors to study a number of important payment instruments: cash, check, credit and debit, prepaid cards, online banking, bank account deductions, and direct income deductions. In addition, they examine use in different merchant contexts, such as traditional retail, online retail, and bill pay. The survey asks respondents to evaluate instruments on a numerical scale along several dimensions, such as security, ease of use, and setup cost.

To evaluate substitution patterns for debit cards, the authors simulated changes to consumers' perceived costs of using debit cards. They considered cases in which consumers can and cannot adjust their bundle of payment instruments, which the authors view as long-run and short-run scenarios, respectively. They also distinguished between responses to changes in use costs and adoption costs. To derive their results, they computed choices for each consumer in their dataset and used the survey weights to construct a nationally representative sample.

Key Findings

Substitution was heavily weighted toward paper products, meaning cash and check.

- Income and age are important determinants of payment choice, with older, wealthier households more likely to use credit cards than other households. Payment instrument characteristics are also important determinants of payment choice, with ease of use being particularly highly valued.

- In this study substitution was heavily weighted toward paper products, meaning cash and check. For example, cash would pick up between 32 and 34 percent of debit's loss, with checks gaining about 25 percent and credit cards gaining 21 percent. Check's popularity as a substitute for debit may be surprising, but the authors show that this result was driven by the heavy use of debit in bill-pay contexts, where check is also very popular. Responses were relatively similar across use and adoption costs, in both the short and long run. However, responses were heterogeneous based on income and education differences. High-income and high-education households substituted toward credit cards much more than low-income and low-education households, which tended to move toward paper products. This effect is due in part to adoption patterns, since poorer households tend not to hold credit cards.

- In response to recent proposed antitrust settlements that allow credit card surcharging, the authors also consider the effect of a change in the use cost of credit cards. Similar to debit, the results showed substantial substitution of paper products. However, in this case, wealthy consumers suffered relatively more, as they are more likely to be credit card users.
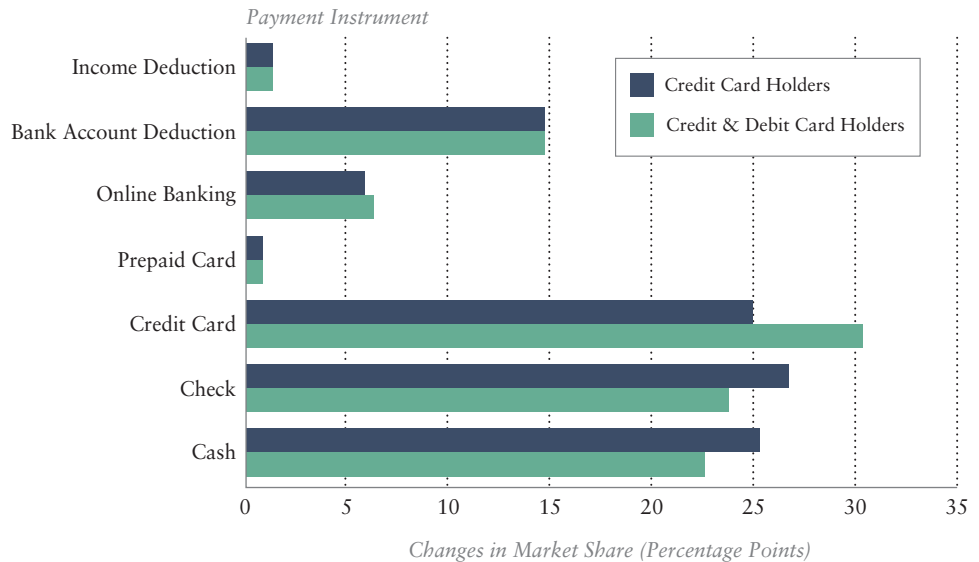
Effect of an Increase in the Use Cost of Debit Cards
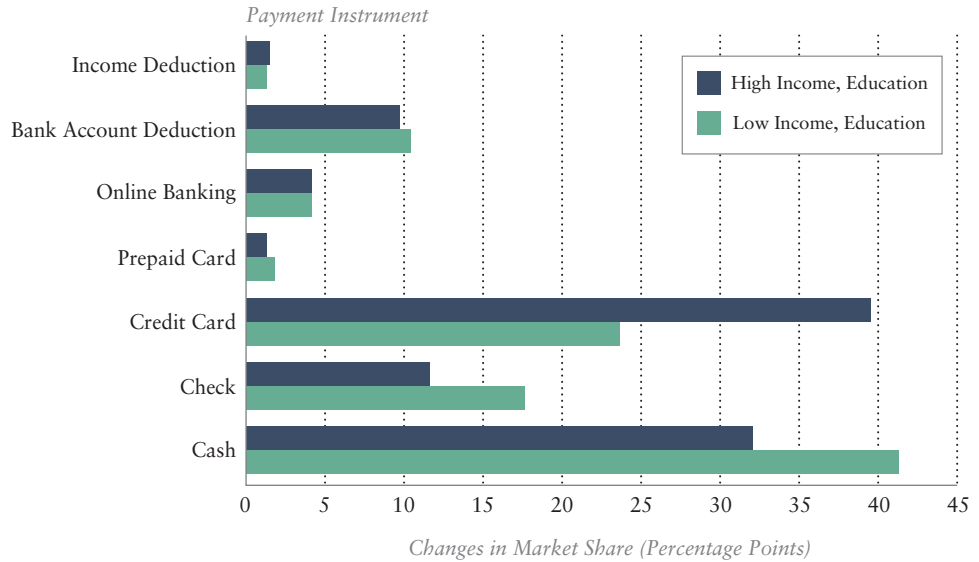
Source: Authors' calculations.
Note: The figure shows the user data from the Survey of Consumer Payment Choice.

Effect of an Increase in the Use Cost of Credit Cards

Source: Authors' calculations, using data from the Survey of Consumer Payment Choice.
Note: The figure shows the changes in market share percentage points in response to an increase in the use cost of credit cards, assuming consumers need all instruments.

Implications

In evaluating these results, keep in mind that the paper addresses only some of the issues associated with interchange regulation. The authors do not incorporate the merchant response to such regulation either in terms of acceptance or pricing, and do not consider the ways in which such regulation will affect bank pricing or consumer banking choices. Also, other recent policy changes, such as changes in policies toward discounting or surcharging by merchants for particular payment methods, also affect these outcomes. Conditional on these factors, the model is able to provide an estimate of substitution patterns.

Uncertainty Shocks in a Model of Effective Demand

by Susanto Basu and Brent Bundick

Motivation for the Research

Economists and the financial press often discuss uncertainty about the future as an important driver of economic fluctuations; such uncertainty is seen as a contributor to the Great Recession and subsequent slow recovery. For example, Diamond (2010) says, "What's critical right now is not the functioning of the labor market, but the limits on the demand for labor coming from the great caution on the side of both consumers and firms because of the great uncertainty of what's going to happen next." Recent research by Bloom (2009), Bloom, Foetotto, and Jaimovich (2010), Fernàndez-Villaverde, Guerròn-Quintans, Kuester, and Rubio-Ramìrez (2011), and Gilchrist, Sim, and Zakrajšek (2010) also suggests that uncertainty shocks can cause fluctuations in macroeconomic aggregates. However, most of these papers have difficulty generating business cycle comovements among output, consumption, investment, and hours worked from changes in uncertainty. If uncertainty is a contributing factor to the Great Recession and the persistently slow recovery, then increased uncertainty should reduce output and its components. In this paper the authors investigate whether increased uncertainty about the future played a role in worsening the Great Recovery, as has been suggested by some policymakers, economists, and many in the financial press.

Research Approach

To analyze the quantitative impact of uncertainty shocks under flexible and sticky prices, the authors calibrate and solve a representative-agent dynamic stochastic general equilibrium model with nominal price rigidity. They examine uncertainty shocks to both technology and household preferences, which they interpret as cost and demand uncertainty. They calibrate their uncertainty shock processes using the Chicago Board Options Exchange Volatility Index (VIX), which measures the expected volatility of the Standard and Poor's 500 stock market index over the next 30 days. Using a third-order approximation to the policy functions of their calibrated model, they show that uncertainty shocks can produce contractions in output and all its components when prices are sticky. Finally, they examine the role of monetary policy in determining the equilibrium effects of uncertainty shocks.

Key Findings

- Increased uncertainty associated with future demand can produce significant declines in output, hours, consumption, and investment. The model predicts that a one-standard deviation increase in the uncertainty about future demand produces a peak decline in output of approximately 0.3 percentage point. Calibrating the size of uncertainty shocks using fluctuations in the VIX, the authors find that increased uncertainty about the future may indeed have played a significant role in worsening the Great Recession, a finding that is consistent with statements by policymakers, economists, and the financial press.

- Furthermore, increases in uncertainty have larger negative impacts on the economy if the monetary authority is unable to adjust its nominal interest rate. The model predicts that an increase in uncertainty causes a much larger and more persistent decline in output and its components than when the monetary authority is unconstrained. The peak drop in

output in response to the uncertainty shock is about 50 percent larger when the monetary authority is at the zero lower bound. In addition, the peak drop in the model variables occurs much later, almost two years after the shock's initial impact. Finally, output and all of the other model variables remain far below their steady state values even five years after the shock. The sharp increase in uncertainty during the financial crisis in late 2008 corresponds to a period when the Federal Reserve had a policy rate near zero. Therefore, the authors believe that greater uncertainty may have plausibly contributed significantly to the large and persistent output decline that began at that time.

Implications

While the authors find that the dramatic increase in uncertainty during the Fall of 2008 combined with the zero lower bound on nominal interest rates may be an important factor in explaining the large and persistent decline in output starting at that time, use of the authors' model to determine the role of uncertainty shocks in the Great Recession faces the potential criticism that it lacks a realistic financial sector and abstracts from financial frictions. A financial market disruption, such as the failure of Lehman Brothers in the Fall of 2008, is a single event that can have multiple effects. Recent work by Iacoviello (2011), Gertler and Karadi (2011), and many others focuses on the first-moment effects of the financial market disruption, such as a higher cost of capital and tighter borrowing constraints for households and firms. In this paper the authors analyze the likely effects of the concurrent rise in uncertainty and its effect on the economy during the Great Recession. Indeed, the authors believe that the increased uncertainty in late 2008 might also be due to a large financial market disruption. To analyze the independent mechanism and effects of the increase in uncertainty, they chose to model uncertainty in a simple but reasonable macroeconomic model that abstracts from financial frictions. This paper complements other work on the Great Recession, since one could easily combine changes in the expected mean and expected volatility of financial frictions to obtain a complete picture of the effects of the financial crisis. Adding a detailed financial sector to the authors' model might obscure the transmission mechanism of uncertainty to the macroeconomy as presented in this paper, so the authors opted to forgo doing so. This could be done in future work.

The peak drop in output in response to an uncertainty shock is about 50 percent larger when the monetary authority is at the zero lower bound.

Predicting Health Behaviors with Economic Preferences and Perceived Control

by Lynn Conell-Price and Julian C. Jamison

Motivation for the Research

In this note the authors provide new evidence on the relationship between individual preferences and health behavior. Fuchs (1982) was the first to empirically relate experimentally measured risk and time preferences to individual behaviors, including several related to health. He found that individuals who were more future oriented were more likely to exhibit behaviors associated with positive health consequences—such as exercising and seeking preventive health care—and less likely to exhibit behaviors associated with negative health consequences—such as smoking and eating unhealthy foods. There is a growing literature focused on relating experimentally measured risk and time preferences to health behaviors

and outcomes such as smoking (Sutter et al. forthcoming; Harrison et al. 2004; Chabris et al. 2008; Anderson and Mellor 2008; Barsky et al. 1997), drinking (Sutter et al. forthcoming; Anderson and Mellor 2008; Barsky et al. 1997), cocaine and heroin abuse (Kirby and Petry 2010), obesity (Anderson and Mellor 2008; Komlos et al. 2004), seat belt use (Anderson and Mellor 2008), demand for medical screening tests (Picone et al. 2004) and vaccines (Chapman and Coups 1999). While these surveys find some effects of time and risk preferences on various health behaviors, the evidence is not consistent across studies and the magnitudes of the effects are often small.

The health psychology literature includes a large body of evidence that an individual's perceived control over future health outcomes impacts her investments in health. Measures of perceived control have not generally been incorporated into studies using individual preferences to predict health behaviors. An exception to this is Chapman and Coups's (1999) study of demand for a flu vaccine, which includes measures of flu-specific perceived control but finds no evidence of a significant relationship between an individual's perceived control and demand for the vaccine.

Research Approach

The authors analyzed survey data from 144 students enrolled in a master's of public health program at a large public university. The sample is predominantly female (115/144). The students ranged in age from 21 to 55 years, with a median age of 27 years, just over half of whom were white (74/144). The racial/ethnic composition of the balance of the sample was 37 Asian or Pacific Islanders, 14 Hispanics, 9 Blacks, and 10 students who indicated their racial/ethnic background as "other." The students answered questions about demographic background and health behavior as well as questions designed to elicit risk and time preferences. Students were asked four questions that involved making choices between risky and less risky gambles and were also asked to report how strongly they agreed or disagreed with these statements: "I enjoy the thrill of physically dangerous sports/activities" and "I enjoy the moment and don't worry about the future." The authors also included a general measure of perceived self-control where participants were simply asked to report their level of agreement with the statement, "I have control over my life."

The authors analyzed 10 questions on health behavior. Seven of these questions elicited self-reported frequency of engaging in a given activity. These activities were taking vitamins, flossing one's teeth, exercising, eating fast food, smoking, having unprotected sex, and drinking alcohol. Three additional items asked respondents to report how strongly they agreed or disagreed with a given statement. The statements were that they "usually eat healthy food," "almost always wear a seatbelt," and "go to the doctor/dentist as often as I should."

Using exploratory factor analysis, the authors derived two indices combining health behaviors that appear to be driven by a common underlying factor. They used iterated principal axis factor analysis with a promax rotation to extract two factors from the 10 items. The first factor appears to represent preventive health behavior, while the second factor represents more active disinhibition.

Key Findings
- Risk aversion has a significant positive association with preventive health behavior, and self-described thrill-seeking—a qualitative measure decreasing in risk aversion—is significantly associated with disinhibition.

- Perceived control is associated with significant increases in both preventive health behavior and self- described thrill-seeking. The former effect is consistent with the idea that preventive behavior increases with perceived control because the individual conceives of her behavior as an important determinant of future outcomes. The latter effect is consistent with the idea that perceived control may also increase an individual's belief that she will be able to control current overindulgence and/or limit the future negative consequences of her actions.

- Perceived control is the only measure other than gender that is associated with both preventive health behavior and self-described thrill-seeking. In regressions predicting each health behavior individually, perceived control is a significant predictor of all but two behaviors (fast food consumption and unprotected sex). The magnitude of the effect of perceived control is significant, equivalent to around half of the difference explained by gender.

- Myopia (seeing only what is near and not seeing further ahead) is not significantly related to either of the health behaviors studied. When each health behavior is analyzed separately, only exercise is significantly associated with myopia, with more myopic individuals tending to exercise more. This finding is consistent with a view of exercise as providing immediate gratification, in contrast with the view of exercise as a preventive health behavior that is standard in the literature.

- Risk aversion over losses (as opposed to risk aversion restricted to positive domains) is a significant predictor only of self-reports of visiting the doctor and dentist "as often as I should."

Implications

In this note the authors introduce to the economics literature evidence that one's perceived control over health outcomes is an important predictor of health behaviors, and they add further evidence that time and risk preferences explain some variation in health behaviors. Their findings motivate future work investigating the link between risk and time preferences and health behaviors and the potentially mediating factor of perceived control. The results also suggest that qualitative measures of risk and time preferences may explain some behavior that game-elicited measures fail to capture, motivating further work investigating when each type of measure is most useful and which survey questions have the greatest predictive power.

Cyclical and Sectoral Transitions in the U.S. Housing Market

by Daniel H. Cooper and Rüdiger Bachmann

Motivation for the Research

Extensive empirical work on job and worker flows in the labor market (Davis and Haltiwanger 1999; Elsby, Michaels, and Solon 2009; Elsby, Hobjin, and Shavin 2011; Shimer 2005) has shown that strong heterogeneity and large gross flows underlie the comparatively small net labor market flows. Housing tenancy changes by households can similarly be described in terms of flows. This paper examines the cyclical and long-run flow of U.S. households

Perceived behavior increases with perceived control because the individual conceives of her behavior as an important determinant of future outcomes.

within and between two distinct segments of the housing market—renter-occupied properties and owner-occupied properties. The paper documents a number of key findings beyond the already established result that there has been a downward secular trend in household geographic mobility over time.

Research Approach

The authors study housing market flows using longitudinal data from the Panel Study of Income Dynamics (PSID), which tracks annual data on household moves, housing tenure (own versus rent), and other characteristics from 1968 to 1997 and biennial data on these traits from 1999 to 2009. Specifically, the authors tabulate and analyze household transitions from homeownership to renting (own-to-rent), renting to homeownership (rent-to-own), moving from one rental property to another (rent-to-rent), or moving from one owner-occupied property to another (own-to-own) during the period 1970 to 1997. This time horizon gives the longest span of continuous data on household moves at the same frequency (annual) in the PSID and covers a number of economic expansions and contractions. The authors also analyze the period 1970 to 2007, as a robustness check. The paper focuses on the trends in households' disaggregated turnover rates—how movement between the two sectors of the housing market has changed over time.

To analyze cyclical fluctuations in household moves, the authors detrend the annual PSID moving rates using a Hodrick-Prescott (HP) filter. Their baseline cyclical analysis compares fluctuations in household moving rates with fluctuations in detrended real GDP. They disaggregate the data by type of move and examine moving patterns, looking at cyclical patterns and volatility of the disaggregated flows, and the secular and cyclical behavior of gross versus net flows in the housing market.

Key Findings

- The vast majority of household moves are by renters transitioning within the rental sector, and while the net flows into homeownership are very small on average, the gross flows within the owner-occupied housing sector are substantially larger.

Moves by renters tend to lead the business cycle while moves by owner-occupants tend to coincide with and/or slightly lag the cycle.

- Much of the decline in household moves over time is due to downward trends in rent-to-rent and own-to-own turnover rates. On average, housing turnover occurs most often within the rental sector, followed by turnover within the owner-occupied sector, and then cross-sector moves (rent-to-own and own-to-rent). Thus, while the transitions in which households maintain their same-sector tenancy status are the ones that occur most often on average, they are also the ones trending downward. Moves in which households change their housing tenancy, however, are not trivial. Own-to-rent and rent-to-own moves account for roughly 25 percent of all housing turnover.

- Household moves exhibit interesting dynamics at a business cycle frequency. The overall U.S. moving rate is procyclical: the contemporaneous correlation between moving rates and output is about 0.5. Moves by renters tend to lead the business cycle while moves by owner-occupants tend to coincide with and/or slightly lag the cycle. Moves from one owner-occupied property to another occur last relative to the cycle; these moves are procyclical and/or slightly lag movements in real GDP. The authors interpret these results as suggesting that renters move in advance of the business cycle to take advantage of economic opportunities and/or future house price growth. In contrast, homeowners wait until the expansion has taken hold to lock in housing gains and/or trade up their housing stock.

Correlations between Disaggregated Moves and Real GDP (Baseline)
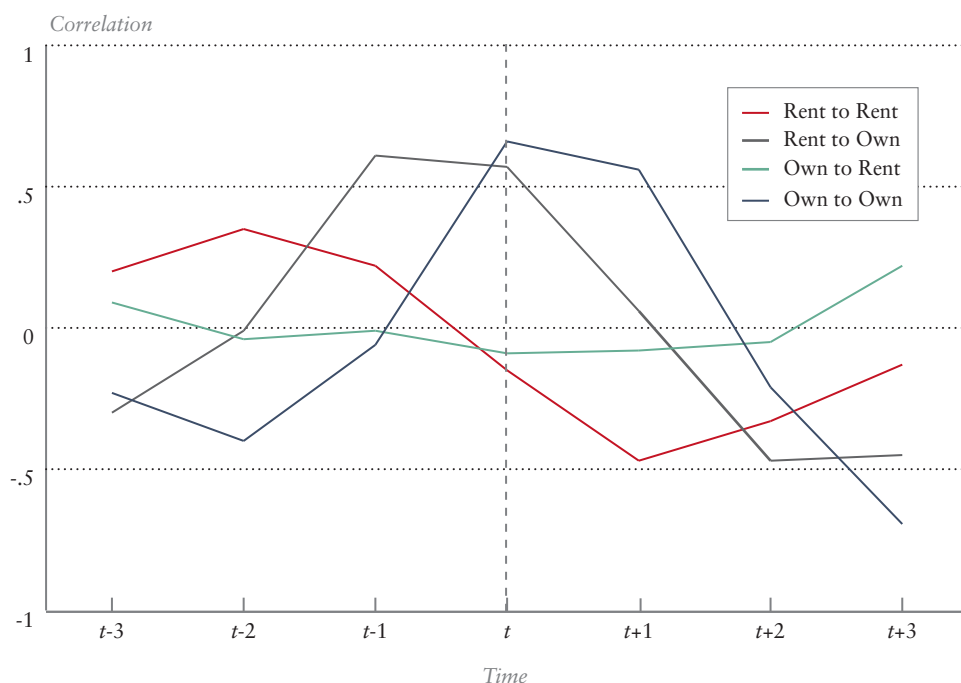
Source: Authors' calculations based on PSID and NIPA data.

- Household moves between the two housing market sectors exhibit the most variation, while within-sector moves are the least variable. In particular, the coefficient of variation of rent-to-own moves is more than double that of own-to-own moves, and more than triple the variation of rent-to-rent moves. This result suggests that own-to-own and rent-to-rent moves occur with more regularity than the more involved decision households make to enter homeownership or shift from being their own landlords to renting their residence from someone else.

Gross flows in the housing market are substantially greater than net flows.

- Gross flows in the owner-occupied sector of the housing market are four times as large as the net flows. That is, the net turnover within the owner-occupied sector is relatively small, but the combined number of rent-to-own and own-to-rent moves is relatively large. This result parallels the labor market evidence that large gross labor flows underlie relatively small net flows. Gross turnover in the owner-occupied sector occurs contemporaneously with the business cycle, and perhaps even slightly leads the cycle. This trend is not surprising given that rent-to-own moves occur 1.5 times more often, on average than own-to-rent moves.

Implications

The results show that gross flows in the housing market are substantially greater than net flows and that there is substantial heterogeneity in terms of the absolute level of household moves, the long-run trends, and the cyclical behavior of household housing tenancy changes. All these patterns support viewing the housing market as composed of two distinct sectors. To the authors' knowledge, they are the first to document such flows in the housing market.

The findings are relevant for constructing and calibrating microfounded models of the housing sector. For example, even though the overall household moving rate is procyclical, there

are interesting dynamic patterns in the underlying data on households' moves within and between the two housing market sectors. Currently, there is a growing theoretical literature that uses search and matching frameworks to model the housing market—similar to the approach used in the labor market (see Diaz and Jerez 2010; Genesove and Han 2012). Yet the current housing market search and matching models lack the empirical underpinnings that the related labor market models enjoy, and this paper helps to fill that gap. The dynamic patterns observed in the data likely exclude a simple, one-shock, near-liner model of the housing market. Instead, a proper microfounded model of the U.S. housing market should feature substantial nonlinearities and/or multiple sector-specific shocks to generate the moving patterns observed in the data—in particular the different long-run and dynamic properties of household transitions within and between the rental and ownership sectors. One way to potentially capture the fact that renters appear to move in anticipation of movements in real output would be to develop a model that includes a form of rational inattention, where renters endogenously react more than they do in the current models to news shocks or other indicators of future economic growth.

Overall, the analysis and results in this paper provide a useful starting point for future theoretical work modeling the housing market.

w-12-18

Monetary Shocks and Stock Returns: Identification Through the Impossible Trinity

by Ali Ozdagli and Yifan Yu

Motivation for the Research

How does monetary policy affect stock prices? The answer to this question is important for both investors and policymakers. For investors, it is important to know the extent to which their stock market holdings are vulnerable to monetary policy shocks. For policymakers, it is crucial to understand how monetary policy affects the real economy through its influence on stock prices. This paper attempts to resolve the difficulties involved in understanding the effect of monetary policy on stock prices.

As illustrated in Rigobon and Sack (2004), there are two major identification difficulties in the literature that studies the relationship between stock prices and monetary policy: the endogeneity problem and the omitted variable problem. The endogeneity (simultaneity) problem arises from the joint determination of monetary policy and stock returns because monetary policy can simultaneously react to changes in stock prices. The omitted variable problem arises from the possibility that stock returns and monetary policy variables may be jointly reacting to some other macroeconomic variables that could cause a bias even in the absence of the endogeneity problem.

Research Approach

The authors solve the endogeneity problem by using the Impossible Trinity theory developed in Fleming (1962) and Mundell (1963). According to this theory, it is impossible to simultaneously have a fixed exchange rate, free capital movement (an absence of capital controls),

and an independent monetary policy. A clear example of the Impossible Trinity theory is the case of Hong Kong, which imposes no restrictions on capital flows or on the trading of financial assets and where the Hong Kong Monetary Authority (HKMA) has successfully implemented a fixed exchange rate for the Hong Kong dollar/U.S. dollar since October 1983. Since the linked exchange rate system was established, the Hong Kong dollar exchange rate has remained stable in the face of various shocks. Because Hong Kong has free capital movement and a fixed exchange rate, the Impossible Trinity theory suggests that the entity's monetary policy depends on U.S. monetary policy. Close observation reveals that changes in the Hong Kong base rate closely follow changes in the U.S. federal funds target rate, and since the U.S. Federal Open Market Committee (FOMC) does not base its monetary policy on stock price movements in Hong Kong, one can conclude that unexpected changes in the fed funds target rate represent exogenous shocks to Hong Kong stock prices. Therefore, Hong Kong's monetary policy and Hong Kong's stock prices are not simultaneously determined, and the endogeneity problem vanishes. The authors identify the impact of monetary policy on asset prices using Hong Kong stock price data and surprise changes in the U.S. federal funds target rate.

The Impossible Trinity theory, however, cannot represent the ultimate solution to the omitted variable problem because there may be global shocks that directly affect both the U.S and the Hong Kong stock markets, in addition to their indirect effects through U.S. monetary policy. The authors use two steps to address and solve the omitted variable problem. First, they show that a simple regression of Hong Kong stock price growth on monetary policy surprises can suffer severely from omitted variable bias. Second, they present evidence that this bias disappears once they add stock returns as an additional control variable in the regression.
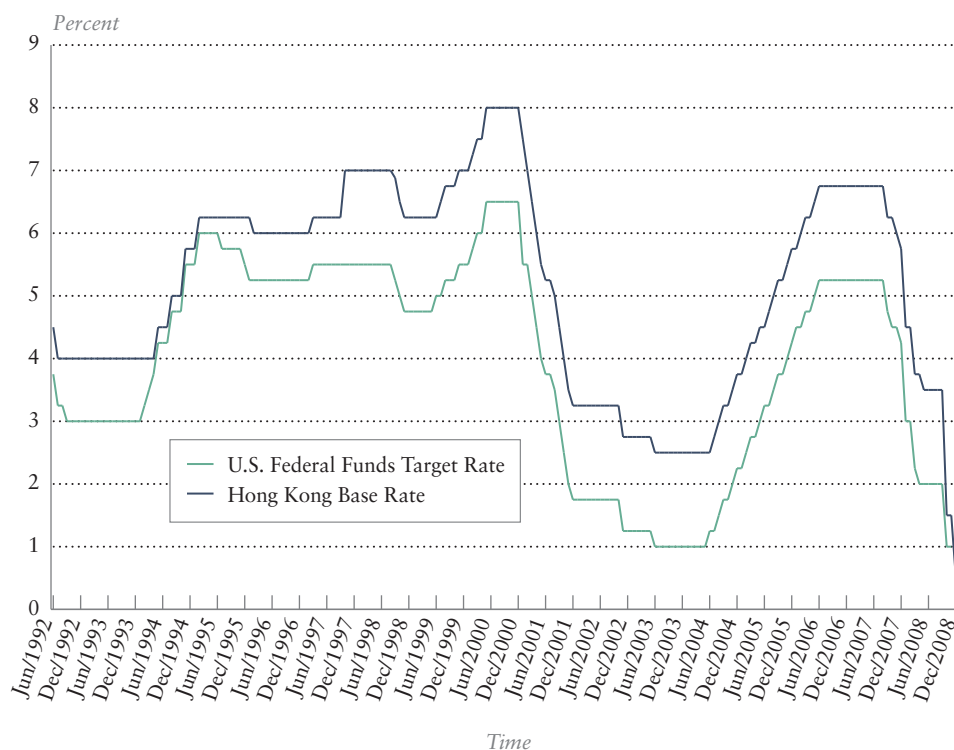
The data used in the empirical study fall into two main categories: indices of the U.S. and Hong Kong equity markets and variables that represent changes in U.S. monetary policy. For U.S. equity returns, the authors use the total return on the CRSP value-weighted index, and for Hong Kong's stock market performance they use the daily Hang Seng index. To provide further evidence regarding the close relationship between U.S. monetary policy and overnight interest rates in Hong Kong, the authors use the overnight Hong Kong Interbank Offered Rate, known as the HIBOR.

One problem associated with estimating the market's reaction to monetary policy changes is that the equity market is not likely to respond to anticipated policy actions. To ease the problem, the authors follow a method employed in Bernanke and Kuttner (2005), based on a method proposed by Kuttner (2001), that separates the unexpected, or "surprise," component of a monetary policy change from the anticipated component—specifically a change in the federal funds target rate. To represent the surprise element in the target rate change the authors rely on the price of 30-day federal funds futures contracts, a price that encompasses market expectations of the effective federal funds rate. They then define the expected federal funds rate change as the actual change minus the surprise component.

In their initial analysis of stock prices, the authors focus primarily on the period between February 1994 and May 2005, for three reasons: 1) starting in February 1994, the FOMC's policy of announcing target rate changes at pre-scheduled dates virtually eliminated the timing ambiguity associated with rate changes prior to that time; 2) Hong Kong switched to a narrow floating band policy on May 18, 2005; 3) during this period, the Federal Reserve had the same chairman, Alan Greenspan, and this continuity decreases the possibility of the results being contaminated due to a change in the policy regime. In their robustness check, the authors extend the dataset to include the period from June 1989 to June 2008.

....
Hong Kong's monetary policy and stock prices are not simultaneously determined, and the endogeneity problem vanishes.
....

Hong Kong Base Rate vs. U.S. Federal Funds Target Rate (End of Month)

Source: End-of-month data on the Hong Kong base rate and the U.S. federal funds target rate are available at http://www.info.gov.hk/hkma/en/statistics/index_efdhk.htm and http://research.stlouis-fed.org/fred2/series/DFEDTAR, respectively. The U.S. federal funds target rate data end in 2008, when the Federal Reserve stopped announcing a specific target rate and started announcing a range.

Key Findings

- By focusing on the Hong Kong stock market's response to U.S. monetary policy, the authors are able to circumvent the simultaneity problem, since changes in Hong Kong stock prices do not directly influence U.S monetary policy.

- The authors also show that the omitted variable bias is potentially a very severe problem and that using U.S. stock returns as an additional regressor can mitigate this problem.

Implications

This paper contributes to the literature that studies the relationship between monetary policy and stock returns. This is the first paper that presents evidence of severe omitted variable bias in the event studies that focus on the relationship between monetary policy and stock returns, and the authors suggest a way to remedy this bias.

The authors' empirical analysis is closely related to Bernanke and Kuttner (2005), whose analysis studied the reaction of the U.S. stock market to changes in the federal funds target rate. Following Bernanke and Kuttner's method, the authors use changes in the federal funds futures price on the dates of monetary policy announcements to identify surprise changes in the fed funds target rate. To control for the endogeneity problem, the authors use Hong Kong stock returns on these event dates rather than U.S. stock returns as the dependent variable. To control for the omitted variable problem, the authors include U.S. stock returns as an additional regressor. As a result, the authors' regressions do not suffer from the identification

problems discussed in Rigobon and Sack (2004) Moreover, this paper employs an identification mechanism that allows the authors to avoid some potential pitfalls introduced by high-frequency intraday data.

Real Expectations: Replacing Rational Expectations with Survey Expectations in Dynamic Macro Models

by Jeffrey C. Fuhrer

complete text: http://www.bostonfed.org/economic/wp/wp2012/wp1219.htm
e-mail: jeff.fuhrer@bos.frb.org

Motivation for the Research

Over the past decade macroeconomists have arrived at a general consensus that using dynamic stochastic general equilibrium (DSGE) models with rational expectations should be the standard approach to use for macroeconomic modeling. These DSGE models have been empirically successful and judged to be useful tools when formulating monetary and fiscal policy. DSGE models place a great deal of importance on the expectations—in wage- and price-setting, consumption and investment expenditures, and the evolution of asset prices—that most economists agree are essential for building a realistic depiction of economic behavior. In almost every case the expectations used in DSGE models are assumed to be "rational" in the sense that all agents' expectations are assumed to equal the mathematical expectations implied by the DSGE model. Yet a body of work suggests that simple DSGE models using rational expectations can yield significant counterfactual implications. To get around this issue, a number of macroeconomists have proposed augmentations to earlier DSGE models that will better match key moments in the data; these additions include habit formation, price indexation, adjustment costs, and serially correlated shocks. However, these augmentations still use the rational expectations paradigm.

Research Approach

The author proposes that a change in the expectations assumption can substitute for the augmentations necessary for DSGE models to overcome some significant empirical issues. Instead of employing rational expectations, the author investigates how using real expectations obtained from survey forecasts formed by actual agents in the economy might improve the performance of DSGE models. Beginning with a brief illustrative example of the challenges posed by substituting survey expectations in DSGE models, the author then conducts an empirical exercise that yields a number of single-equation results linking survey expectations measures with key macroeconomic aggregates. These survey measures use regression equations with multivariate relationships similar to those found in standard macroeconomic relationships and models: a price-setting Euler equation, an IS curve (based on the unemployment gap) that is motivated by a consumption Euler equation, and a monetary policy rule that is explicitly forward-looking. The short-term inflation expectation used in the exercise is the four-quarter change in total CPI inflation taken from the Survey of Professor Forecasters (SPF). Since inflation depends on a sequence of expected future unemployment gaps, regardless of how expectations are formed, a longer-term inflation expectation—in the exercise the SPF's measure of the average inflation rate expected over the next 10 years—is used as a proxy for the sequence of expected future unemployment gaps. As much survey data were not available until the early 1980s, the exercise's sample period is 1983:Q1 to 2011:Q3.

Ordinary least square (OLS) estimation is used, as the survey expectations are recorded in the middle of quarter *t* and only contain price and output information for quarter *t–1* and earlier. Because the OLS regressions are potentially contaminated by classical simultaneous equations bias through the presence of the contemporaneous unemployment gap and real interest rate, these two equations are subjected to instrumental variables estimates that partially alleviate the concern regarding simultaneity bias. While the results of these exercises using single equations demonstrate the strong correlations between survey variables and key macroeconomic variables in regression equations that evoke standard macroeconomic relationships, these regressions do not provide true structural identification: the equations include some contemporaneous variables that may well be subject to simultaneity bias, and the single equations do not fix the problem of how to close the model by solving for future values of survey expectations.

The author next suggests how a complete DSGE model might be constructed in which survey expectations play a key role in the linkages among interest rates, output, and inflation. He takes up the issue of how to simultaneously estimate the key equations for the Phillips curve, the IS curve, and the policy rule. Lacking the ease of being able to use conventional solutions for solving out rational expectations, he offers some reasonable compromises for closing the model when using survey expectations—albeit compromises that share some common features with the conventional methods. This hybrid method implies that at some horizon, survey expectations will converge towards the rational expectations for the model and that, consequently, the long-run expectation implied by the surveys will equal the model's steady-state value for that variable. The author then presents empirical results from system estimation using this fully articulated model and conducts a head-to-head empirical comparison of DSGE models based on rational expectations with those based on survey expectations.

Key Findings

- An empirical fact that has vexed researchers for decades is the dependence of macro variables on their own lagged values once normal structural influences are accounted for. This problem has given rise to the inclusion of rule-of-thumb pricing or indexation for price-setting (Galí and Gertler 1999; Christiano, Eichenbaum, and Evans 2005) and to habit formation for consumption models (Fuhrer 2000; Carroll and Overland 2000), although indexation and habit formation have, at best, limited support in the micro data. Substituting survey expectations greatly diminishes or entirely eliminates the dependence of the key equations used for price-setting and consumption on lagged dependent variables. This substitution thus means that there are no more lags in the Phillips curve and the IS curve! Using real expectations also obviates the need to incorporate complex error processes into models in order to match the dynamic properties of macro data.

- The figure shows the estimated coefficient on the unemployment gap using three different proxies for expected inflation: three quarterly lags for expected inflation, the rational expectation of inflation in period *t +1,* and the survey expectation of the next period's inflation rate. The model that employs survey expectations most consistently develops estimates of the unemployment gap coefficient that are correctly signed and statistically consistent at conventional levels. The rational expectations model performs particularly poorly and the old-style backward-looking Phillips curve yields intermediate results. The figure highlights the advantage afforded by survey expectations in identifying this key structural parameter.

Comparison of Identification in Phillips Curve with Alternative Expectations Proxies

Unemployment Gap Coefficient, Rolling Regression Estimates, Window = 60 Months

π^e coefficients constrained to 1

Coefficient Estimates

Estimation Start Date

p-values

Estimation Start Date
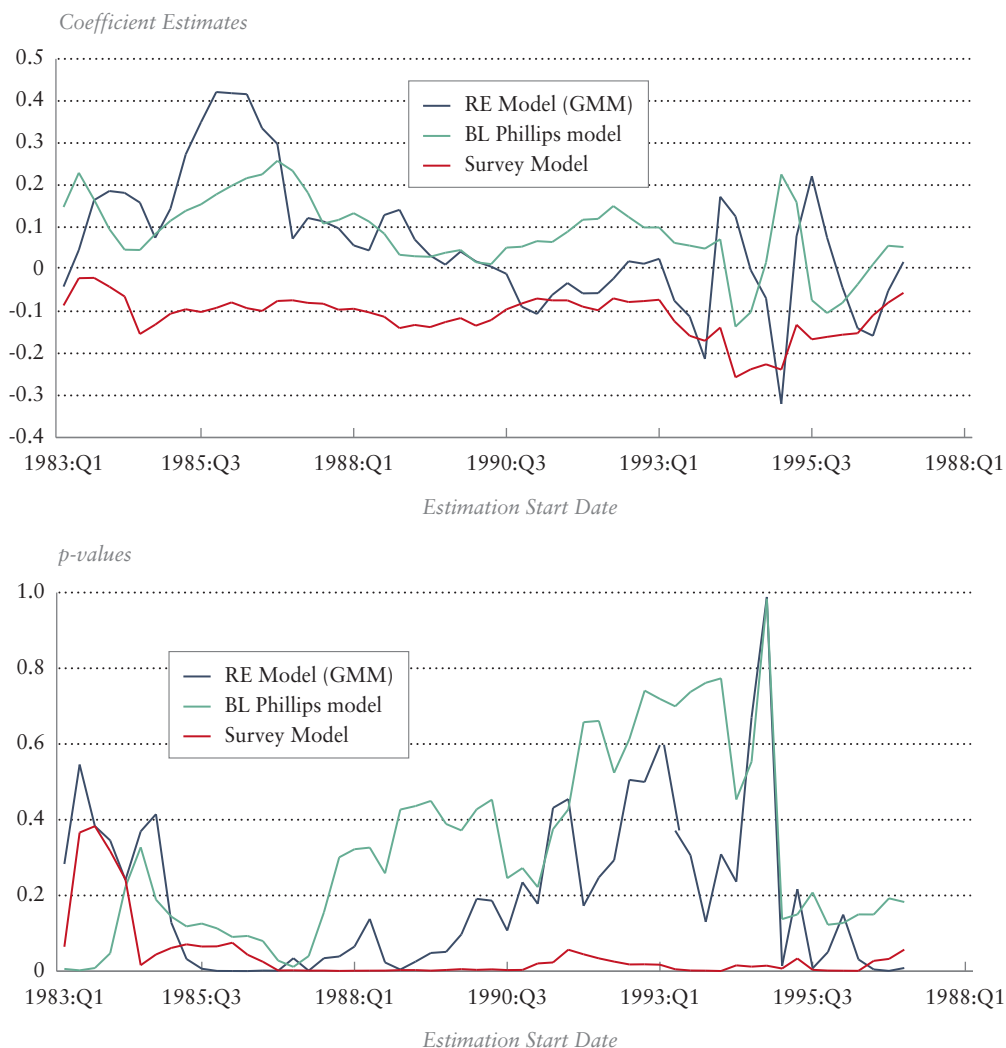
Source: Authors' calculations.

Note: p-values represent the probability that the estimated coefficients differ from zero purely by chance. If these values are very small, the chance that the results are nonzero is very small.

The use of survey methods for expectations improves the performance of DSGE models along a variety of dimensions.

- The single equation results show that the one-year inflation expectations exhibit very strong correlation with the longer-run expectations and with the forecast for the unemployment gap one-quarter forward.

- Taken together, these single-equation results suggest a strong empirical linkage, acting through a variety of channels, between the survey expectations and the key macro variables in a DSGE model.

- The author finds that the use of survey measures of expectations—for near-term inflation, long-term inflation, unemployment, and short-term interest rates—improves the performance of DSGE models along a variety of dimensions. In a head-to-head empirical test, the weight placed on the DSGE model's rational expectations is essentially zero and the

weight on survey expectations is one. This result suggests that at best there is a small and economically insignificant role for rational expectations and lagged dependent variables once the information in survey expectations is taken into account.

Implications

Survey-based DSGE models perform well in a system context and permit very good identification of the key parameters, although not all identification issues are solved. Using survey-based expectations does come at a cost, since the beauty of the rational expectations paradigm is that it instantly answers many questions about how expectations evolve. This advantage is lost with the introduction of survey expectations since one can no longer "solve out" expectations in the simple way that has become standard in the DSGE literature. Choosing to use survey expectations necessitates the use of theory-based approximations and empirically motivated compromises. Recognizing these tradeoffs, on balance the move to employing survey-based measures of expectations represents a viable and potentially useful direction for macroeconomic modeling. Forming a better understanding of how survey expectations evolve, what structures drive their evolution, whether these expectations are stable across different monetary regimes, how best to incorporate them into structural macroeconomic models, and precisely why the deviations of survey expectations from rational expectations matter for macroeconomic dynamics are all topics for further research.

....

Public Policy Briefs

....

U.S. Household Deleveraging: What Do the Aggregate and Household-Level Data Tell Us?

by Daniel H. Cooper

....

complete text: http://www.bostonfed.org/economic/ppb/2012/ppb122.htm
e-mail: daniel.cooper@bos.frb.org

Motivation for the Research

The United States is experiencing a very slow recovery from the Great Recession, which technically ended in June 2009. One potential explanation offered for this sluggish recovery is the idea that consumers, whose expenditures account for about 70 percent of U.S. GDP, are making a deliberate choice to curtail their spending in order to pay down debt and improve their balance sheets. Part of this so-called deleveraging theory rests on the idea that prior to the beginning of the Great Recession in December 2007, U.S. households took on more debt relative to income based on expectations that house prices would continue to increase. In this sense, such leveraging results in consumption growth beyond what would be expected given past and current changes in household income, asset valuations, and net worth.

Research Approach

The author uses aggregate and household-level data to explore whether U.S. consumers are making a concerted effort to reduce their debt levels—beyond what would be expected from the standard historic pattern that exists between consumption, income, and net worth—and whether this indeed supplies a valid reason for explaining why the U.S. economic recovery

has not been more robust. The aggregate data come from the National Income and Product Accounts of the Bureau of Economic Analysis and from the Federal Reserve Board's Flow of Funds accounts. Given that the aggregate data do not contain cross-sectional variation, the author uses the individual household-level data to check and deepen the results obtained from the macro-level data. The household-level data are taken from the PSID (Panel Study of Income Dynamics) from 1999 to 2009; this dataset includes an expanded measure of household spending data and detailed household wealth data.

To examine the aggregate data, the author uses a stylized relationship that posits the percentage change in household consumption as a function of changes in income and net worth and computes what this formula predicts for consumption growth four years prior to the onset of the Great Recession, 2003:Q1 to 2007:Q4, and almost four years after it began, 2007:Q4 to 2011:Q3.
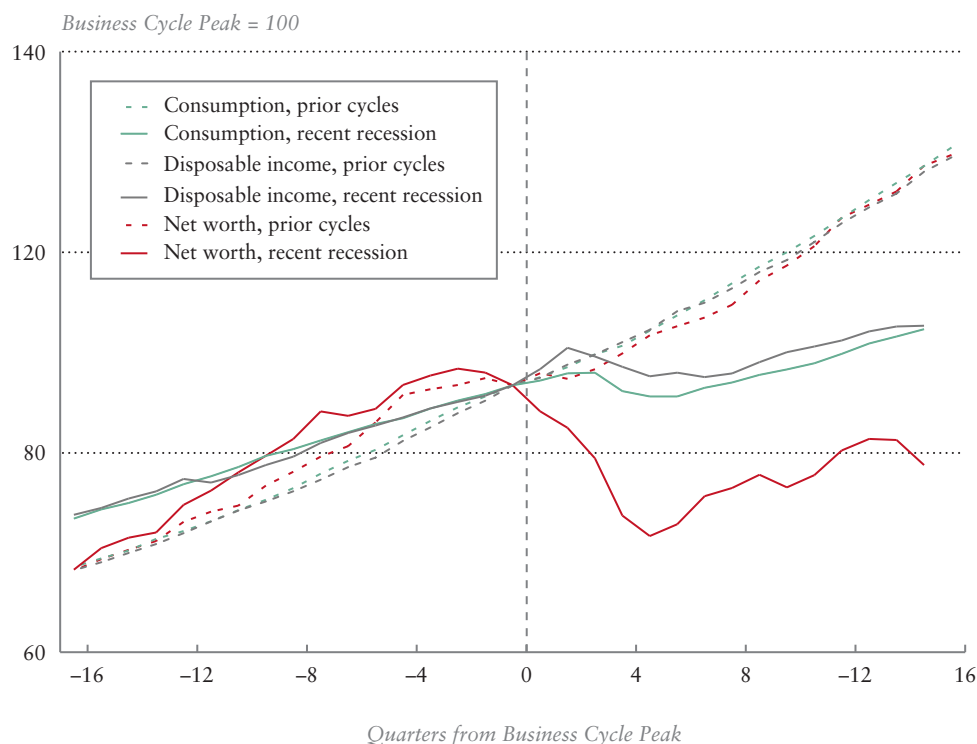
The household-level PSID data are better positioned to establish whether differences in consumption behavior across different household groups correct for the simultaneity issue between consumption, income, and net worth that confounds macro-level consumption analysis. A key idea underpinning the household deleveraging theory is that prior to the Great Recession, debt leverage increased based on optimistic forecasts of U.S. house price growth. The author uses the PSID data to examine whether highly indebted households residing in ZIP codes with high house price growth behaved differently during the recession than did households with low debt levels and/or highly indebted households that did not experience large house price appreciation. Highly indebted households are defined as those in the top quartile of the debt change distribution between 2001 and 2005. Households exposed to high house price growth are defined as those living in a ZIP code with housing appreciation in the top quartile of the house price growth distribution.

Key Findings
- The aggregate data show little evidence of a period of leveraging before the Great Recession, followed by a period of deleveraging during and after the recession. If anything, prior to the recession households consumed less than what would be predicted based on a standard, simple relationship between consumption, income, and net worth and have consumed somewhat more than the model would predict since the recession took place. These results are contrary to the idea that households ramped up their spending prior to the Great Recession and have been engaged in concerted debt reduction since it began.

- Consumption growth has been very sluggish during the current recovery compared with the previous five recoveries, and income growth has also been very slow to rebound during this period. The author argues that the obvious first-order reason for the shortfall in consumption relative to income is the extremely weak net worth experienced by U.S. households during the most recent recession and the current recovery. Overall, the aggregate data show that U.S. consumer spending has remained in line with what would be predicted based on changes in housing income and net worth.

- The PSID data show that U.S. household net worth fell 15 percent, on average, for the households that reported experiencing a wealth decline between 2007 and 2009. This drop in net worth was 4–5 percentage points greater than in previous years, but consumers did not respond to it by dramatically accelerating debt repayment. There is less than a 2 percentage point difference between the share of households that reported reducing their debt

The aggregate data show little evidence of a period of leveraging before the Great Recession, followed by a period of deleveraging during and after the recession.

Current versus Previous Business Cycles

Business Cycle Peak = 100

Legend:
- - - Consumption, prior cycles
— Consumption, recent recession
- - - Disposable income, prior cycles
— Disposable income, recent recession
- - - Net worth, prior cycles
— Net worth, recent recession

Quarters from Business Cycle Peak

Source: BEA, Flow of Funds.
Note: Prior cycles include the 1970, 1974, 1981–82, and 2001 recessions.

loads during the recent recession and the share that reported lowering their debt during the 2001–2007 period before the recession began. The average dollar decline in leverage for households that did lower their debt levels during the Great Recession was only about 6 percent higher than in previous years. These data are inconsistent with a story contending that U.S. households are responding to asset price declines and downgraded economic expectations by broadly curtailing their spending in order to reduce their debt burdens.

- The PSID data suggest that highly indebted U.S. households had similar consumption responses to changes in their net worth between 2007 and 2009 irrespective of whether they lived in a ZIP code that benefited from high house price growth. Low-debt households living in ZIP codes that did not experience large house price increases exhibited the strongest decline in consumption relative to their drop in net worth. This result is inconsistent with the idea that highly indebted households became particularly concerned about their debt levels when house prices fell and responded by more sharply curtailing their consumption when compared with less-indebted households.

- The author divides the PSID data between households where the head of household lost his or her job during the 2007–2009 period and those where this did not occur, and according to whether the household had a high debt level at the start of this period. Highly indebted job losers had the largest spending decline during this period, but job losers with low debt levels also had a sizable decrease in consumption. Even in households where the head did not suffer a job loss, consumption edged down while total debt rose. These find-

ings suggest that changes in U.S. household expenditures between 2007 and 2009 were mainly a response to income dynamics, not a dramatic increase in debt repayment.

Implications

Overall, there is limited evidence in either the macro or micro data that deleveraging or any other nonfundamental factor has had a sizable impact on U.S. consumer spending to date. Movements in consumption prior to, during, and in the aftermath of the Great Recession are consistent with the standard historic relationships implied by fluctuations in household income and net worth.

What Can We Learn by Disaggregating the Unemployment-Vacancy Relationship?

by Rand Ghayad and William T. Dickens

Motivation for the Research

The Beveridge curve—the empirical relationship between unemployment and job vacancies—is thought to be an indicator of the efficiency of the functioning of the labor market. Normally, when job vacancies rise, unemployment falls, following a curved path that typically remains stable over long periods of time. When vacancies rise and unemployment does not fall (or falls too slowly), this may indicate problems of structural mismatch in the labor market that can lead to an increase in the lowest unemployment rate that can be maintained without increasing inflation (the NAIRU or nonaccelerating inflation rate of unemployment). Such a change in the vacancy-unemployment relationship occurred once in the 1970s and persisted through the late 1980s, and a similar change has recently been observed. Although the U.S. economy has been recovering slowly since 2009:Q4, the unemployment rate has remained stubbornly high. The persistence of high unemployment is particularly puzzling, given that during this same period the number of job openings has been rising. This policy brief explores the nature of the recent change in the job vacancy-unemployment relationship by disaggregating the data by industry, age, education, and duration of unemployment, and by examining blue- and white-collar groups separately.

Research Approach

Using monthly data from the *Current Population Survey* and the *Job Openings and Labor Turnover Survey*, both from the Bureau of Labor Statistics, the authors plot job vacancy-unemployment points from 2001 through June 2012 and superimpose a stylized Beveridge curve that was estimated using data on unemployment and vacancy rates for the period prior to the start of the recession. In a series of separate charts they then plot disaggregated views of these same two variables by duration of unemployment, age group, industry, education, and blue- versus white-collar workers. The authors analyze and compare each view with a similar plot for the period from January 1960 to December 1988. The Conference Board's help wanted index is used to construct the vacancy rate for the earlier period, following the method suggested by Zargosky (1998).
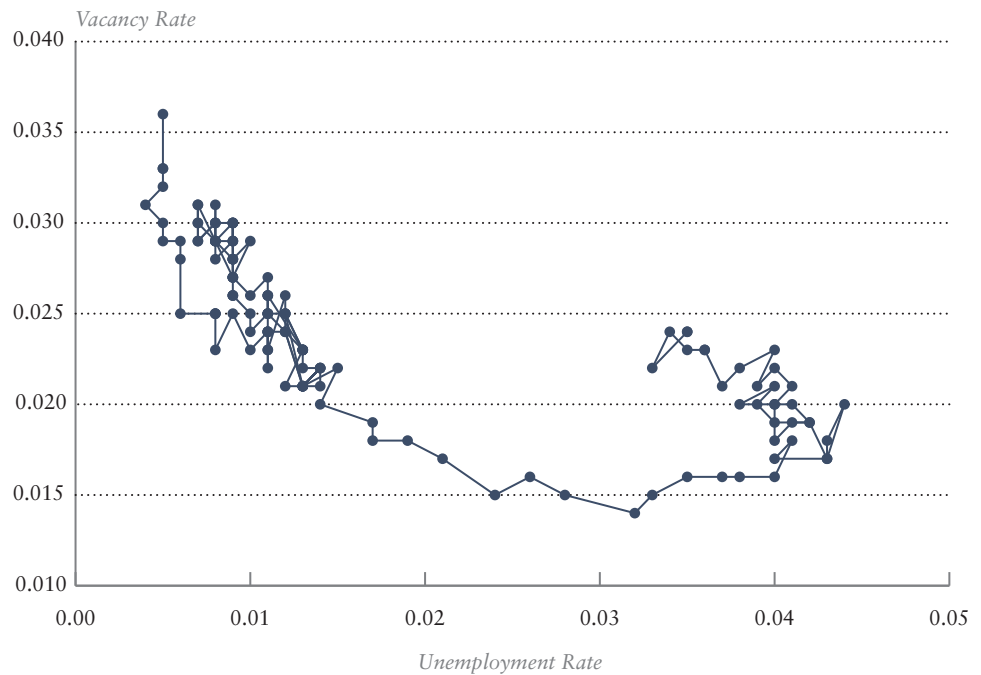
Monthly Vacancy and Unemployment Rates Using Unemployed Persons with Duration Less Than 27 Weeks
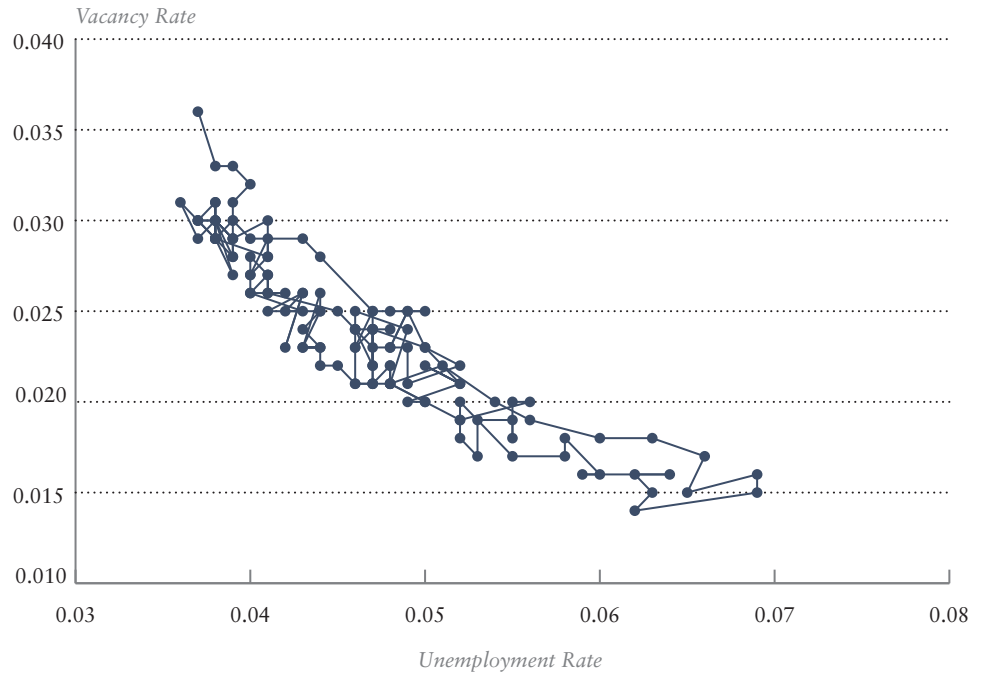
Source: CPS and JOLTS. Data are monthly rates, span the period 2001:M1–2012:M6, and are seasonally adjusted.

Monthly Vacancy and Unemployment Rates Using Unemployed Persons with Duration Greater Than or Equal to 27 Weeks

Source: CPS and JOLTS. Data are monthly rates, span the period 2001:M1–2012:M6, and are seasonally adjusted.

Key Findings

- In the recovery from the most recent recession, job vacancies have grown considerably without producing the normal decline in unemployment. By September 2009, the vacancy-unemployment points started to deviate from the fitted curve in a counterclockwise direction, indicating a higher unemployment rate at any given level of job openings.

- One notable difference between the recent U.S. experience and what happened in the 1970s is the rapidity with which this change took place. In the 1970s it took eight years for the outward shift of the Beveridge curve to occur, whereas the recent shift (about half the size of the 1970's shift) took less than a year, with most of the change occurring in the last six months of 2009. Another notable difference is the very high level of long-term unemployment that has characterized the recent U.S. experience.

- There does not appear to have been any change in the relationship between the aggregate vacancy rate and the short-run (particularly 5–14 and 15–26 weeks) unemployment rate. Hence, evidence from the experience of individuals with unemployment spells shorter than 26 weeks does not explain what is depicted in the aggregate plot.

- However, when the relationship is plotted using the fraction of the U.S. labor force that has been unemployed for more than 26 weeks, the plot reveals a counterclockwise outward shift that is consistent with what is shown when using the aggregate unemployment rate. Moreover, in addition to the shift, the pattern shows that the vacancy and unemployment points for the group experiencing long-term unemployment start to shift outward at the same time as the aggregate vacancy-unemployment relationship breaks down.

The different dynamics suggest that the short-term unemployed benefit far more from the increase in the vacancy rate than the long-term unemployed.

- Looking at how events have unfolded over time, the vacancy-unemployment points for the short-term unemployment group cycle inward in a clockwise pattern, while those for the long-term unemployment group move in an outward counter-clockwise manner. At the aggregate level, counterclockwise movements are common to all recessions because vacancies typically adjust before unemployment does to changes in labor demand. The different dynamics of the short- and long-term unemployment-vacancy relationships suggest that the short-term unemployed benefit from the increase in the vacancy rate far more than the long-term unemployed do.

- The Beveridge curves for both the short-term and the long-term unemployment groups plotted with data covering the 1960–1988 period shifted outward at the same time as the start of the outward movement of the aggregate curve. This contrasts with the current period, in which the breakdown in the vacancy-unemployment relationship is evident only for the long-term unemployed. The plots show a breakdown in the vacancy-unemployment relationship across all industries, age groups, education levels, and across blue- or white-collar workers at the time the aggregate Beveridge curve was moving outward.

- The pattern in the current recession is different from the outward shift in the Beveridge curve during 1973–1985. At that time there was little, if any, shift in the Beveridge curve for white-collar workers, but a large shift for blue-collar workers.

Implications

It is widely thought that the outward shift in the Beveridge curve in the 1970s reflected a worsening of matching efficiency—that it was hard to get suitable workers and jobs

together—and that this worsened the overall unemployment rate. It may be the case that one reason the Beveridge curve relationship for the long-term unemployed has apparently shifted has been a change in how employers view the desirability of hiring long-term unemployed workers. However, if this is the case why do we not see some outward shift in the short-term relationship as well? Further, the mismatch hypothesis is called into question by the fact that the vacancy-unemployment relationship has shifted in all industries, while in the 1970s only the workers who were previously employed in blue-collar industries were affected. Another possibility is that the long-term unemployed in this most recent recession may be searching less intensively—either because jobs are much harder to find or because of the availability of unprecedented amounts and durations of unemployment benefits. This seems to be a more likely explanation, although if a drop in search intensity is due only to the difficulty of finding jobs, it again raises the question why we would not see that phenomenon at play during shorter spells of unemployment as well.

Contributing Authors

Marco Angrisani is an associate economist at the RAND Corporation and a professor at the Pardee RAND Graduate School. http://www.rand.org/about/people/a/angrisani_marco.html

Rüdiger Bachmann is a full professor and chair of the economics department at RWTH Aachen University, a faculty research fellow at the National Bureau of Economic Research, a CESifo research associate, and an Ifo research professor. http://www.vwlmac.rwth-aachen.de/team/bachmann

Susanto Basu is a professor in the economics department of Boston College, a research associate in the National Bureau of Economic Research, and a former visiting scholar in the research department at the Federal Reserve Bank of Boston. http://fmwww.bc.edu/ec/basu.php

Anat Bracha is an economist in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/bracha.htm

Tamás Briglevics is a research associate in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/recruit/RAs/meet-the-ras.htm

Brent Bundick is a graduate student in the economics department at Boston College. https://www2.bc.edu/brent-bundick

Lynn Conell-Price is a senior research assistant in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/recruit/RAs/meet-the-ras.htm

Daniel H. Cooper is a senior economist in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/cooper.htm

William T. Dickens is a University Distinguished Professor in the department of economics at Northeastern University, a nonresident senior fellow at the Brookings Institution, and a visiting scholar in the research department at the Federal Reserve Bank of Boston. http://www.economics.neu.edu/people/william_dickens

Federico J. Díez is an economist in the research department of the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/diez.htm

Emmanuel Farhi is a professor of economics at Harvard University. http://scholar.harvard.edu/farhi

Chaim Fershtman is a professor of economics at Tel Aviv University, and a research fellow at the Centre for Economic Policy Research and at the Tinbergen Institute. http://www.tau.ac.il/~fersht

Christopher L. Foote is a senior economist and policy advisor in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/foote.htm

Jeffrey C. Fuhrer is an executive vice president and senior monetary policy advisor at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/fuhrer.htm

Andreas Fuster is an economist in the capital markets function of the Federal Reserve Bank of New York. http://www.newyorkfed.org/research/economists/fuster/index.html

Kristopher S. Gerardi is a financial economist and an associate policy advisor in the research department at the Federal Reserve Bank of Atlanta.
http://www.frbatlanta.org/research/economists/kristopher_gerardi.cfm

Rand Ghayad is a Ph.D. candidate at Northeastern University and a visiting graduate fellow at the Federal Reserve Bank of Boston. http://ghayad.wordpress.com/about

Uri Gneezy is a professor at the University of California at San Diego, where he is the Arthur Brody Endowed Chair in Behavioral Economics at the Rady School of Management.
http://rady.ucsd.edu/faculty/directory/gneezy

Gita Gopinath is a professor of economics at Harvard University, a visiting scholar at the Federal Reserve Bank of Boston, and a research associate at the National Bureau of Economic Research. http://www.economics.harvard.edu/faculty/gopinath

Yasushi Hamao is an associate professor of finance and business economics at the USC Marshall School of Business. http://www.marshall.usc.edu/faculty/directory/hamao

Oleg Itskhoki is an assistant professor of economics at Princeton University, and a visiting professor in the economics department at the University of Chicago for the 2012–2013 academic year. http://www.princeton.edu/~itskhoki

Julian C. Jamison is a senior economist at the Consumer Financial Protection Bureau. When this paper was written he was an economist at the Federal Reserve Bank of Boston.

Arie Kapteyn is a senior economist at RAND, director of RAND's Labor and Population Program, and a professor at the Pardee RAND Graduate School.
http://www.rand.org/about/people/k/kapteyn_arie.html

Sergei Koulayev is an economist with Keystone Strategy, LLC. http://www.sergeikoulayev.com

Kenji Kutsuna is a professor of entrepreneurial finance at Kobe University.
http://www.b.kobe-u.ac.jp/en/staff/kutsuna.html

Ali K. Ozdagli is an economist in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/ozdagli.htm

Joe Peek is a vice president and economist in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/peek.htm

Demian Pouzo is an assistant professor in the department of economics at the University of California, Berkeley. http://emlab.berkeley.edu/~dpouzo

Ignacio Presno is an economist in the research department of the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/presno.htm

Eric Rosenblatt is vice president of credit risk analytics and reporting at Fannie Mae.

Richard W. Ryan is a graduate student in the economics department at the University of Michigan.

Marc Rysman is a professor of economics at Boston University and a visiting scholar in the research department at the Federal Reserve Bank of Boston. http://people.bu.edu/mrysman

Scott Schuh is director of the Consumer Payments Research Center and a senior economist and policy advisor in the research department of the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/schuh.htm

Oz Shy is a senior economist with the Consumer Payments Research Center in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/shy.htm

Alan C. Spearot is an assistant professor of economics at the University of California at Santa Cruz. http://economics.ucsc.edu/faculty/singleton.php?&singleton=true&cruz_id=aspearot

Joanna Stavins is a senior economist and policy advisor with the Consumer Payments Research Center in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/stavins.htm

Robert K. Triest is a vice president and economist at the Federal Reserve Bank of Boston, where he oversees the research department's macroeconomic applications and policy studies section. http://www.bostonfed.org/economic/econbios/triest.htm

Elke U. Weber is the Jerome A. Chazen Professor of International Business at Columbia Business School and Professor of Psychology and Earth Institute Professor at Columbia University. http://www.columbia.edu/cu/psychology/fac-bios/Weber/faculty.html

Paul S. Willen is a senior economist and policy advisor in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/econbios/willen.htm

Vincent W. Yao is a director of credit portfolio management at Fannie Mae.

Yifan Yu is a research assistant in the research department at the Federal Reserve Bank of Boston. http://www.bostonfed.org/economic/recruit/RAs/meet-the-ras.htm