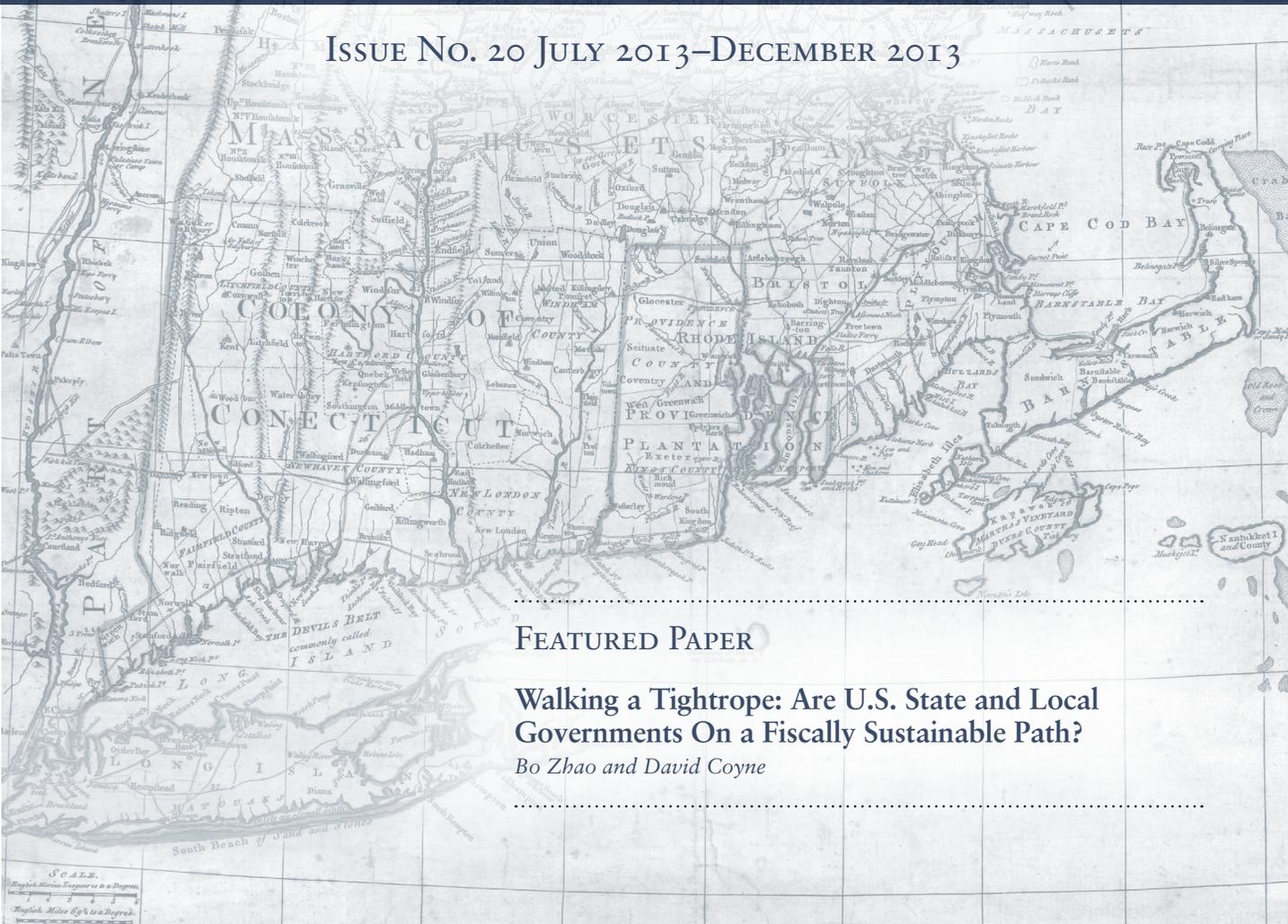


RESEARCH REVIEW

ISSUE No. 20 JULY 2013–DECEMBER 2013



FEATURED PAPER

Walking a Tightrope: Are U.S. State and Local Governments On a Fiscally Sustainable Path?

Bo Zhao and David Coyne

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p-13-5

The Role of Banks in the Transmission of Monetary Policy

by Joe Peek and Eric S. Rosengren

abstract and complete text: <http://www.bostonfed.org/economic/ppdp/2013/ppdp1305.htm>

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MOTIVATION FOR THE RESEARCH

The importance of the credit channel in augmenting the impact of monetary policy on the economy has gained credibility over the past two decades, although the traditional interest rate channel for the transmission of monetary policy remains intact. While the broad credit channel version has gained widespread acceptance, the narrower bank lending channel remains somewhat controversial. The main points of contention are whether a shift in monetary policy affects bank loan supply, and, if it does, to what extent a change in bank loan supply can affect economic activity. In this paper the authors describe the mechanisms by which the banking system transmits changes in monetary policy and provide an overview of the evidence on whether bank lending plays an important role in determining the magnitude of the effect that monetary policy has on the economy.

Several factors may explain the renewed interest in the role of bank lending in the transmission of monetary policy. First, financial innovations shifted the focus of monetary policy away from money aggregates to interest rates as the Federal Reserve transitioned to relying on the federal funds rate as its main policy instrument—until this rate hit the zero lower bound in the recent financial crisis. Second, in the early 1990s, the United States experienced significant banking problems that resulted in banks limiting their lending because of capital constraints. Similar concerns about a bank “capital crunch” help to explain why monetary policymakers in countries as diverse as Japan, Sweden, and Argentina reacted as they did to their own banking problems. Third, episodes of liquidity problems in the United States, such as those associated with the failure of the Penn Central railroad, the 1987 stock crash, the Long-Term Capital Management crisis, the events of 9/11, and the Lehman failure, highlighted the important role of bank lending during liquidity and financial crises. Fourth, the concerns about repeating the bank capital crunch of the early 1990s surfaced once again when numerous banks and nonbank lending institutions became capital constrained as a result of the credit problems that became apparent in August 2007 and formed the backdrop to the ensuing financial crisis.

RESEARCH APPROACH

The authors describe the mechanisms by which monetary policy is transmitted to the economy through the banking sector and examine the empirical evidence on how bank lending responds to changes in monetary policy. In particular, the authors discuss the evidence concerning which banks and which firms are likely to play key roles in transmitting monetary policy to the macroeconomy through the bank lending channel and how the effects emanating from the bank lending channel can be derailed by capital constraints that limit the extent to which banks are able to expand their balance sheets in response to an easing of monetary policy. The authors briefly review some of the literature on the role of banks in other countries,

many of which are far more dependent on bank lending than is the United States, discuss how the role of bank lending may have been altered by recent financial innovations, provide observations on the implications of the events associated with the recent financial crisis for the effectiveness of the bank lending channel, and draw conclusions.

KEY POINTS

- The traditional interest rate (or money) view of monetary policy transmission focuses on the liability side of bank balance sheets. The transmission mechanism functions as follows: When the monetary authority undertakes open-market operations in order to tighten monetary policy (by selling securities), the banking industry experiences a decline in reserves. The fractional reserve system then forces banks (as a whole) to reduce reservable deposits in order to continue to meet the reserve requirement. This shock constrains bank behavior. To induce households to hold smaller amounts of reservable deposits (transactions accounts), interest rates on other deposits and nondeposit alternatives must rise. As the increase in the short-term interest rate is transmitted to longer-term interest rates, aggregate demand declines. However, with the substantial expansion of excess reserves in the U.S. banking system during the recent financial crisis and the consequent failure of the reserve requirement to serve as a binding constraint on most institutions, the important role of alternative transmission mechanisms has received increasing attention.
- The broad credit channel, also referred to as the balance sheet effect or financial accelerator, posits that an increase in interest rates associated with a tightening of monetary policy causes a deterioration in a firm's financial health in terms of both net income and net worth. A firm's net income is impaired because its interest costs rise and its revenues deteriorate as the tighter monetary policy slows the economy. As a result, the premium the firm must pay for all sources of external finance increases, resulting in a reduction in aggregate demand beyond that due to the increase in the risk-free interest rate associated with the interest-rate channel of monetary policy transmission.
- The effects of the bank lending channel are distinct from the effects of the broad credit channel to the extent that borrowers do not consider nonbank sources of credit to be perfect substitutes for bank loans. To the degree that they do consider these two credit sources as perfect substitutes, borrowers will substitute nonbank credit for bank loans when tighter monetary policy reduces bank loan availability. In this case, one would observe no impact on aggregate demand from the reduction in bank credit beyond that resulting from the increase in the external finance premium associated with the broad credit channel. In actuality, although alternative sources of credit do exist, these are not perfect substitutes for bank credit for a variety of institutional reasons.
- While substantial evidence supports the existence of an operational bank lending channel that amplifies the transmission of monetary policy, recent studies suggest that the lending channel may have been weakened in recent years by developments in financial markets that allow banks to depend less on reservable deposits to fund their lending. Banking organizations with international operations can, at least partially, insulate themselves from domestic liquidity shocks through the cross-border operation of their internal capital markets. On the other hand, this mechanism also suggests that the total effect of the bank lending channel has been understated by focusing only on domestic lending, since changes in monetary policy can be propagated internationally through global banks' internal capital markets.

- The second important characteristic of banks that can affect the extent to which the bank lending channel is operative is whether banks face a binding capital constraint. A variety of authors have examined the impact that significant bank health problems can have on the transmission of monetary policy. For example, previous research has found that banks facing a binding capital constraint are limited in altering the size of their balance sheet, and this restricts their ability to respond to monetary policy shocks. Moreover, banks can become capital constrained as a result of changes in capital regulations as well as due to adverse capital shocks.
- The evidence from studies based on individual nonfinancial firms supports the proposition that many firms are dependent on bank financing, and that their economic activity is adversely affected by reductions in bank loan supply. While other financial intermediaries provide external finance to firms, this credit tends to be directed to specific types of loans. Finance companies tend to focus on asset-backed lending, such as receivables, while insurance companies tend to make longer-duration loans that match more closely the duration of their liabilities. Thus, banks remain the primary source of funding for smaller firms that lack ready access to external finance from other sources.
- The role of banks in transmitting monetary policy is potentially more relevant in many other countries because their economies rely more heavily on bank financing than does the United States. A good example is Japan, where banks continue to play a significant role in financing large as well as small companies, although because Japanese bond markets have been deregulated, the nation's largest companies are increasingly able to tap directly into financial markets. Japan's economy is also particularly interesting because bank-firm ties are especially close there. Research has found that even before the full impact of the Japanese banking problems that began in the early 1990s, the share of bank loans relative to insurance company loans declined when monetary policy tightened. Furthermore, when monetary policy tightened and bank credit became less available, firm liquidity was a more important determinant of investment for Japanese firms that were less closely connected to banks than for those more closely connected.
- Given the relative importance of bank lending as a source of credit in Japan, it is likely that Japan's severe banking problems weakened its bank lending channel and contributed to the country's prolonged economic malaise throughout the 1990s and early 2000s, even though monetary policy reduced interest rates to near zero. This effect was magnified by distortions that had a broader adverse impact on the Japanese economy. These distortions had their source in a combination of the prevailing lending relationships and the perverse incentives faced by banks that led to a misallocation of much of the credit that banks provided.
- The evidence suggests that when other Asian countries experienced financial difficulties in the late 1990s, deteriorating bank health created similar problems. The consolidation of the banking sector in emerging Asian and Latin American economies has tended to weaken the bank lending channel of monetary policy transmission. Moreover, the rise in foreign bank penetration in emerging markets has been another factor weakening the lending channel, given that foreign banks respond less strongly than domestic banks to host country monetary policy shocks, since the foreign banks' access to funding from their parent organizations can insulate them from an adverse host-country liquidity shock.

- European economies fall somewhere between Japan and the United States in terms of bank dependence. European firms have not had the same direct access to financial markets as many U.S. firms. However, the conversion to the euro and the consequent integration and deepening of European financial markets have moved the eurozone to a more market-based model of corporate finance, improving the access of European firms to credit. Although bank lending is more important in Europe than in the United States, the evidence on the European bank lending channel is mixed.
- The so-called originate-to-distribute model, whereby financial intermediaries make loans that are securitized while retaining a small portion of the loan, turned out to be a particularly unstable source of financing during the financial crisis. This experience disproved the frequently held assumption that collateralized credit would be stable in a crisis because lenders would remain comfortable lending on a fully collateralized basis. While securitization can expand the supply of bank loans, it can also increase the cyclicity of the supply of credit and expose highly levered banks to a disruption in the securitization market. In particular, a drying up of the securitization pipeline can put pressure on bank liquidity, impair new bank lending, and potentially cause fire sales of securities.

IMPLICATIONS

As a result of the experiences during the recent financial crisis, there is now a better appreciation of the importance of financial intermediaries, regarding both their role in the transmission of monetary policy and their impact on financial stability more generally. It is virtually certain that banks will continue to play an important, although changing, role in the transmission of monetary policy as financial markets continue to evolve.

Prior to the financial crisis, most standard macroeconomic models omitted an important role for financial institutions, and this turned out to be a significant flaw in our understanding of macroeconomic dynamics. This realization has stimulated research in this area. Moreover, there has been a significant re-evaluation of the critical role that financial intermediaries can play in the transmission of monetary policy and in amplifying the impact of financial shocks more generally.

Banks that were funded by deposits expanded their credit as customers drew down their lines of credit, while market-based credit and securitization declined significantly as a result of the financial crisis. Going forward, this experience implies that the strength of the bank lending channel will depend in part on how bank funding models evolve in the wake of the financial crisis, as well as on how new bank regulatory regimes, such as the increasing regulatory attention being placed on the over-reliance on wholesale funding by banks, evolve.

The large-scale asset purchases undertaken by the Federal Reserve and other central banks have provided substantial excess reserves to the banking system and removed the efficacy of the reserve requirement as a binding constraint on bank behavior. Therefore, bank lending behavior will likely be governed by capital requirements and the effect of interest rates on the banks' cost of funds and profitability of lending. Recent studies have emphasized a risk-taking channel for monetary policy that places more emphasis on the willingness of banks to expand their balance sheets. This connection between bank risk-taking and monetary policy will be an important topic for future research, highlighting the role of banks in the conduct of monetary policy, as well as for broader financial stability issues.

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Changes in U.S. Household Balance Sheet Behavior after the Housing Bust and Great Recession: Evidence from Panel Data

by Daniel Cooper

abstract and complete text: <http://www.bostonfed.org/economic/ppdp/2013/ppdp1306.htm>
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MOTIVATION FOR THE RESEARCH

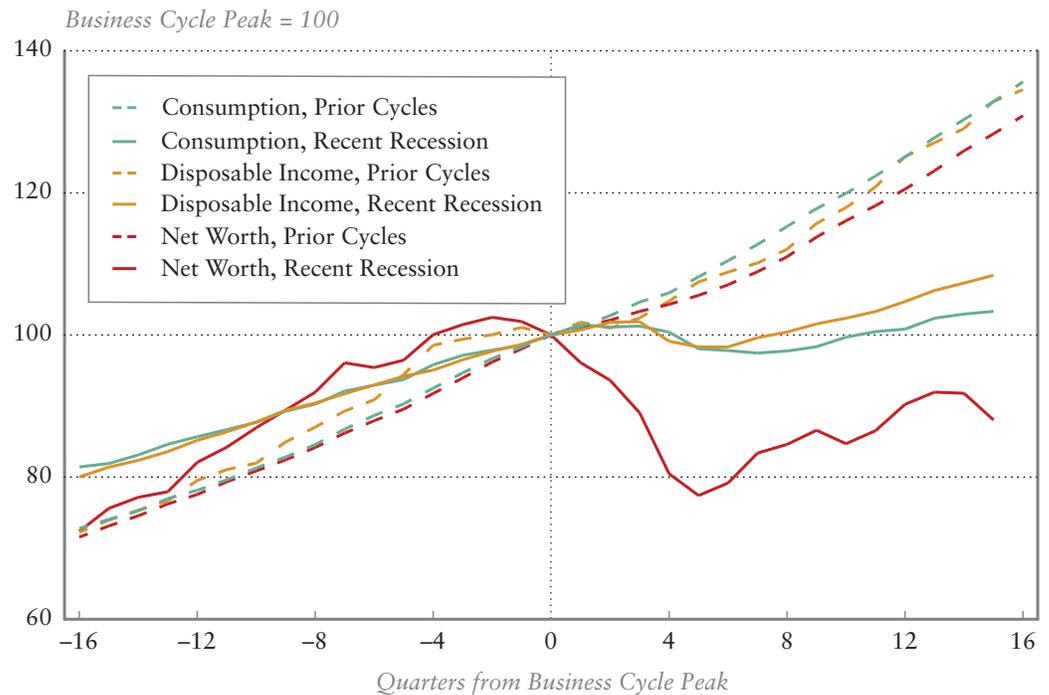
Between late 2007 and late 2009, the United States experienced its deepest financial crisis and business cycle downturn since the Great Depression. According to the Survey of Consumer Finances, median household wealth fell over 38 percent and median household income, adjusted for inflation, fell almost 8 percent between 2007 and 2010. In the wake of the Great Recession, many U.S. households were left with negative housing equity (homes worth less than the outstanding mortgage) and/or substantially reduced retirement accounts and financial wealth. This drop in wealth and income, combined with some households having extremely high debt levels prior to the Great Recession—often due to mortgage debt tied to the housing boom—left many U.S. households with substantially damaged balance sheets. One explanation advanced for the historically slow recovery from the Great Recession is that households have engaged in a concerted effort to repair their balance sheets. There are three main ways that households can restructure their balance sheets: 1) by repaying outstanding debt (a practice also called deleveraging), 2) by shifting the composition of their existing portfolios by adjusting their asset holdings, and/or 3) by adjusting their rate of saving.

This paper explores whether balance sheet adjustments by U.S. households have been substantial enough to affect consumer demand and hence the pace of the economic recovery. An individual household's response likely depends on its particular circumstances, such as whether it cares more about its debt-to-asset ratio or about the amount of risk in its portfolio, as well as any changes in its outlook for the future. A careful examination of balance sheet adjustments can help enhance micro-founded models of how household risk-taking and portfolio choice have responded to the Great Recession. Concerns about the financial stability of many U.S. households can also be informed by gaining a better understanding of their balance sheet behavior.

RESEARCH APPROACH

Using longitudinal data from the Panel Study of Income Dynamics (PSID), a household-level survey, this paper documents the actual adjustments that PSID households made to the asset and liability sides of their balance sheets in response to the financial crisis and the onset of the Great Recession. Using the biennial PSID data that began in 1999 (prior to that year, household wealth and saving data were collected just once every five years) and the 1999 to 2011 waves of the PSID, the analysis focuses primarily on repayment of nonhousing debt, which is an interesting and less-studied margin of household deleveraging. As shown by Bhutta (2013), much of the drop in overall U.S. household debt resulted from households reducing

The Great Recession Compared to Previous U.S. Recessions Occurring Between 1970 and 2001



their amount of new borrowing rather than making abnormally high debt repayments. The analysis pays particular attention to potential differences in balance sheet behavior across different household groups, such as highly leveraged homeowners and households that were heavily invested in the financial markets on the eve of the crisis.

In addition to detailed household demographic and income data, the PSID contains data on self-reported house values and outstanding mortgage debt, including first and second liens, making it possible to calculate a household's housing equity. The PSID maintains Geocode Match Files that link the main PSID data to other datasets; this paper matches the PSID data for a given household to the metropolitan statistical area (MSA) data on real house-price growth from CoreLogic. The MSA-level house-price data are used to rank a household's exposure to price swings during the boom and bust in the U.S. housing market. In the so-called wealth supplements, the PSID has detailed financial wealth information, including data on a household's cash holdings, bond holdings, stock holdings, retirement accounts, business or farm equity, vehicle values, and nonprimary residence real estate holdings. The wealth supplements also contain data on a household's nonhousing (noncollateralized) debt holdings, such as credit card debt and student loans, and active saving behavior, meaning how much the household saves out of current income excluding (passive) capital gains. Data on households' active saving are constructed following the approach in Juster et al. (2006) and are measured between PSID wealth supplements. The sample used for the paper's analysis includes all PSID households except in the cases where the results are restricted to homeowners and/or renters or other household groups. Outliers are removed to minimize their impact on the results.

KEY FINDINGS

- Among highly leveraged homeowners, a greater percentage of households shifted from increasing their saving to decreasing their saving. Debt repayment by high-debt households rose roughly 2 percentage points faster than income between 2007 and 2011, or about \$350 annually, and the rate of debt increase fell by about \$860 annually. Since highly indebted homeowners experienced wealth losses averaging over \$55,000, these changes are unlikely to quickly restore their balance sheets. These results are also inconsistent with the theory that a large debt overhang in the U.S. economy has prompted households to dramatically alter their balance sheets.
- There is little evidence that U.S. households shifted the composition of their assets enough to contribute to the slow economic recovery. Many of the small shifts that did occur, such as an increase in cash holdings in 2009, appear transitory. In 2009, shares of liquid risky assets fell and shares of nonrisky liquid wealth rose, but this was seemingly a temporary reduction in portfolio risk. By 2011, the liquid risky asset share returned.
- There were small and transitory changes to the composition of household saving during and following the Great Recession. The share of saving in cash and retirement accounts jumped in 2009, likely because many of these contributions are automatically deducted from paychecks, so as total household saving fell, the relative share going to retirement accounts increased. The share of saving invested in stocks declined between 2009 and 2011, albeit from a relatively small initial level, a behavioral pattern consistent with households experiencing stock market losses between 2007 and 2009.
- There is also some evidence that high-debt renters and the long-term unemployed altered their saving behavior in response to the Great Recession. Between 2007 and 2011, a majority of highly indebted households who rented their home shifted from decreasing to increasing their savings, as did the majority of households headed by a person who experienced an extended period of unemployment (defined in this paper as longer than six weeks). Yet these two groups represent a relatively small share of the overall U.S. population, so their behavior is likely not a good representation of how the recent financial crisis and recession altered household saving behavior in the United States

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The findings suggest that it was leverage in general, not necessarily high leverage combined with housing losses, that led some U.S. households to adjust their behavior.
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IMPLICATIONS

This paper finds that the majority of U.S. households did not engage in substantial balance sheet adjustments in response to the financial crisis and the Great Recession. Consistent with the existing literature, the results suggest that the biggest change in U.S. households' debt behavior since the onset of the Great Recession is decreased new borrowing rather than substantially increased debt repayment (outside of foreclosures). Overall, the findings suggest that it was leverage in general, not necessarily high leverage combined with housing losses, that led some U.S. households to adjust their behavior. Yet it is possible that even using 2011 data, it is too soon to observe substantial household balance sheet restructuring in response to the housing-induced financial crisis and recession. For example, households that experienced a large drop in housing prices may also have suffered a long spell of unemployment and thus lacked the resources to repair their balance sheets by paying down debt or increasing their saving. However, such households could have adjusted the risk and/or liquidity of their existing portfolios, and the data offer limited evidence that such behavior has occurred. Therefore, it seems that the Great Recession did not substantially alter U.S. households' desired level of portfolio risk or balance sheet liquidity. The results of this analysis provide

relevant empirical moments for use in future theoretical work examining the impact of financial crises and negative wealth shocks on households' portfolio choices.

About the Author

Daniel Cooper is a senior economist in the research department at the Federal Reserve Bank of Boston.

p-13-7

The Credit Card Act of 2009: What Did Banks Do?

by Vikram Jambulapati and Joanna Stavins

abstract and complete text: <http://www.bostonfed.org/economic/ppdp/2013/ppdp1307.htm>
e-mail: vikjam@mit.edu, joanna.stavins@bos.frb.org

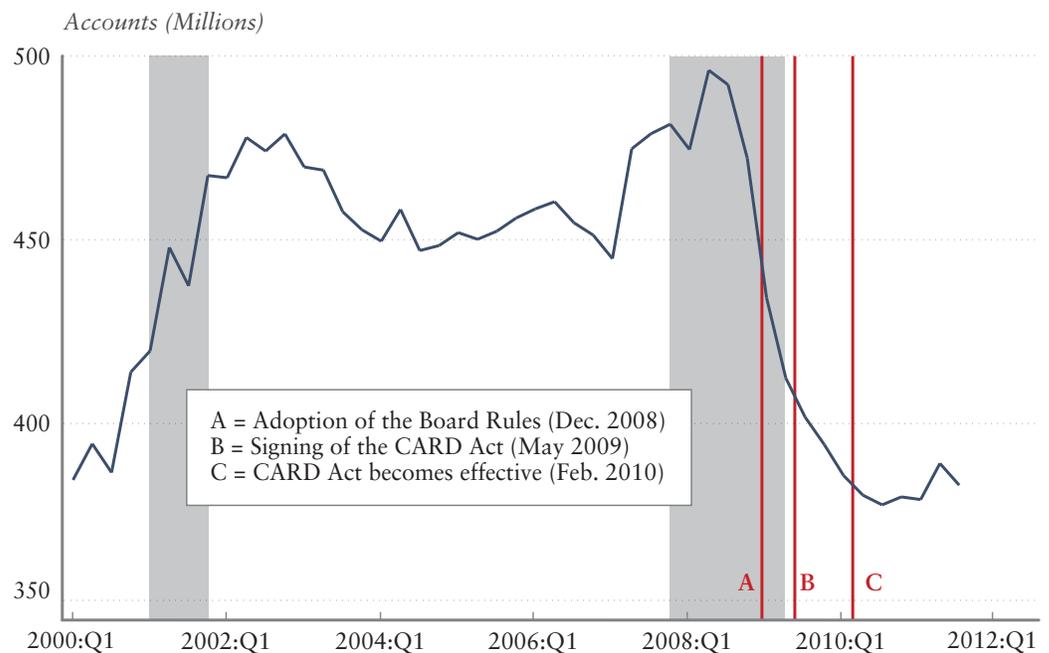
MOTIVATION FOR THE RESEARCH

The Credit CARD Act of 2009 was intended to prevent practices in the credit card industry that lawmakers viewed as deceptive and abusive. Among other provisions, the CARD Act restricted issuers' account closure policies, eliminated certain fees, and made it more difficult for issuers to change terms on credit card plans. The Act was signed into law in May 2009, and the majority of its provisions became effective nine months after its passage—in February 2010. Critics argued that because of the long lag between approval and implementation of the law, issuing banks would be able to take preemptive actions that might disadvantage cardholders before the law could take effect. However, the signing of the law was preceded by a series of events that made the changes almost certain long before May 2009. In particular, at the end of 2008 the Federal Reserve Board adopted final rules pertaining to credit cards in order to protect consumers from unfair acts or practices with respect to consumer credit card accounts. The effective date for the Fed rules was several months after the CARD Act was to become effective. Therefore, the CARD Act superseded the Board's proposed rules, but by 2008—and possibly as early as 2007—issuing banks knew that the rules governing disclosure and rate increases were about to change. In this paper the authors investigate whether just before the CARD Act was passed, banks may have acted preemptively by closing customers' credit card accounts or otherwise restricting access to credit beyond what was warranted by economic conditions.

RESEARCH APPROACH

The authors examined individual-level credit bureau data from Equifax for 2006:Q2 through the end of 2012 on credit card accounts, credit limits, and balances held, as well as repayment behavior from a 5-percent sample of all U.S. consumers who had a credit history with Equifax. The Equifax data also provided each consumer's risk score, a measure of the probability of default closely correlated with (but computed separately from) the FICO score. Although the only demographic variable in the Equifax data is the respondent's age, individual consumer data enabled the authors to analyze account closings for consumers with the same credit card balances and delinquency status over time, thereby distinguishing issuers' account closing decisions based on those factors from account closing decisions based on the anticipated CARD Act. Using the Equifax data, the authors estimated how the probability of having a credit card account closed changed with time, while controlling for credit card activity and debt status.

Number of Credit Card Accounts in the United States



Source: NY Federal Reserve Consumer Credit Panel / Equifax.
 Note: Shaded areas indicate recession.

Although the Equifax data lack information on who initiated the credit card account closures—whether the consumer voluntarily closed the account or whether the issuing bank closed it—the two scenarios have different causes and implications. If accounts were closed in anticipation of the upcoming CARD Act reform, the closings are more likely to have been involuntary account closings initiated by the banks, because consumers had no reason to close their own accounts just because of the pending credit card reforms. However, some cardholders may have decided to close their accounts in reaction to some changes in their credit card plans that were made by their banks in anticipation of the card reform. Therefore, either voluntary or involuntary closures may be related to the reforms. Account closings related to the recession may have been requested by the cardholder as part of household deleveraging, although a bank may also have decided to close an inactive account when a cardholder stopped using the card because of a loss in income.

To try to distinguish account closures related to the recession from account closures related to the CARD Act and to examine whether consumers were more likely to have their credit card accounts closed and/or the terms of their credit card plans changed in anticipation of the CARD Act, the Consumer Payments Research Center (CPRC) of the Federal Reserve Bank of Boston added a series of questions to the Consumer Finance Monthly (CFM) survey administered since 2005 by the Center for Human Resource Research at the Ohio State University. The CFM survey is conducted each month with a sample of 300–500 households selected through random digit dialing. Responses are stratified based on income, race, age, and homeownership in accordance with the Current Population Survey. The resulting dataset provides a series of nationally representative monthly cross-sections of the U.S. population and contains responses to a wide range of questions related to household finances, including

all categories of debt, income, assets, and savings. The detailed questions about consumer credit card holding and borrowing are designed to resemble the detailed questions included in the Survey of Consumer Finances.

The authors' questions were added to the CFM between March 2010 and December 2011, and sought information about the preceding 12 months, thus covering the period just after the Federal Reserve regulations were approved. The added questions addressed changes in employment status and hours worked, for both the respondent and his or her spouse, in addition to many detailed questions about credit card account closures and changes to the respondent's credit card plans.

The authors divided the sample into two periods: up to and including February 2011, and after February 2011 in order to test whether changes that occurred prior to February 2010 differed significantly from changes that took place after February 2010. They were able to do this because they had asked respondents about changes to their credit card plans during the preceding 12 months, although the responses may have included some overlap because the questions asked about the entire period of the preceding 12 months.

Since the authors wanted to assess whether and to what extent credit card account closures were related to the recession, they added several questions about respondents' employment status. However, fewer than 50 percent of the CFM sample reported being employed at the time of the survey. Because this number is substantially lower than the employed share in the U.S. data, the CFM sample does not seem to be representative of the U.S. population. Yet because the authors are able to control for socio-demographic variables, their micro data approach may still be useful for assessing whether consumers reported changes in the way issuing banks altered the terms on credit card plans. The authors tested whether these employment or income changes had a significant effect on the likelihood of the respondent's bank changing the terms on credit card plans.

KEY FINDINGS

- The authors found evidence that the fraction of consumers with fewer accounts rose sharply starting in 2008:Q3—long before the CARD Act was signed into law but around the time of the Federal Reserve Board's adoption of the final rules on credit cards in December 2008. While the Equifax data do not support the hypothesis that credit card issuers closed accounts specifically in anticipation of the CARD ACT taking effect, the results are consistent with the hypothesis that the increase in credit card account closures is correlated with the adoption of the Federal Reserve credit card rules.
- Banks do not appear to have closed accounts at a higher rate between May 2009, when the CARD Act was signed, and when most of its provisions took effect in February 2010, based on analysis of aggregate U.S. data and data from a monthly survey of U.S. consumers, the Consumer Finance Monthly (CFM). Among the CFM survey respondents whose bank accounts were closed during that period, account holders were much more likely to have closed their own credit card accounts than to have had them closed by their card issuers. However, banks do appear to have changed terms on credit card plans during this period, especially by lowering credit limits.
- Yet banks may have taken action in anticipation of the passing of the CARD Act long before it was enacted. The evidence shows that a higher fraction of credit card accounts were closed immediately following the Federal Reserve Board's adoption of its rules con-

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The fraction of consumers with fewer credit card accounts rose sharply starting in the third quarter of 2008—long before the CARD Act was signed but about the time of the Federal Reserve Board's adoption of final rules on credit cards.
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cerning credit cards than in the period between the law's passage and its effective date. This earlier period coincides with the recession, making it difficult to identify clearly whether the main reason for these closures was the economic downturn or preemptive action taken by banks in anticipation of the new legislation.

- None of the demographic variables were significant in predicting consumer-initiated closures. Losing a job or making a late payment during the previous year were significant predictors of bank decisions to close an account. Several variables were significant predictors of changes in the terms on credit card plans: losing a job, having hours cut, and making a late payment all raised the probability of having terms changed. Respondents with at least some higher education and those who experienced an increase in household income also witnessed a change in terms, although the terms may have changed in their favor (for example, an increase in the credit limit). The quarterly indicators show significant differences between the excluded period (2010:Q1–2010:Q2) and other periods for changes in terms on credit card plans, confirming the hypothesis that banks were more likely to change terms during the earlier part of the period covered by the sample questions.

IMPLICATIONS

Because the pre-CARD Act period coincided with the recession, it is difficult to isolate definitively the cause of any changes that took place in the credit card market during that time, even though there is evidence that a higher fraction of credit card accounts were closed immediately following adoption by the Federal Reserve Board of its rules pertaining to credit cards than in the period between passage of the law and its effective date, and consumers were more likely to have had their credit limit lowered between the time when the CARD Act was signed and when it became law.

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p-13-8

Is Monetary Policy Overburdened?

by Athanasios Orphanides

abstract and complete text: <http://www.bostonfed.org/economic/ppdp/2013/ppdp1308.htm>
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MOTIVATION FOR THE RESEARCH

Following the global financial crisis, central banks around the developed world have been called to undertake unprecedented responsibilities, and governments have high expectations that monetary policy can provide solutions to numerous problems. To some observers, monetary policy is the “only game in town.” Exceptionally low interest rates and unprecedented liquidity provision by major central banks for several years has eased the post-crisis adjustment burden. But these policies do not come without potential costs. In a number of dimensions, monetary policy has become overburdened and is expected to achieve goals that do not necessarily fit in the realm of traditional monetary policy. Despite the crucial position central

banks occupy in public policy, an overreliance on monetary policy is bound to disappoint when the appropriate policy mix for successfully resolving challenges involves other public policies and institutions.

Under present conditions, propping up the economy, facilitating an easing of financing costs for governments, and easing the pain of balance sheet repair could be seen as additional monetary policy goals. However, failing to appreciate the limits of what central banks can reliably do poses risks. Long-term adverse consequences could outweigh more immediate and more visible benefits. Careful intertemporal calculus is needed to assess the merits of continuing to overburden monetary policy going forward.

RESEARCH APPROACH

This paper looks at three issues that contribute to the overburdening of monetary policy beyond what should be understood as its primary goal—to preserve and defend price stability. The first of these public policy goals is achieving full employment and related nebulous concepts of real economic activity where outcomes over the past five years have been deemed unsatisfactory in many economies. The second is achieving fiscal sustainability, facilitating the repair of public sector balance sheets over time. And the third is the continued preservation of financial stability, taking into account the weakened private sector balance sheets in many economies, and the need to strengthen banking sectors weakened by the crisis, worldwide. For each of these issues, the apparent benefits and potential side effects of the unprecedented monetary policy that has been implemented over the past few years are discussed, looking primarily at four economies, those of the euro area, Japan, the United Kingdom, and the United States.

KEY POINTS

- Monetary policy is one of the factors that may influence employment in the short run through its broader effects on aggregate demand. However, other policies should be seen as more important, in both the short run and, crucially, in the long run. Consider, for instance, aspects of fiscal policy that can provide better incentives for job creation and investment. And consider structural and labor policies that can greatly enhance the flexibility and efficiency of labor markets. In the cases of Spain and Greece, for example, the greatest tragedy of the current record high unemployment rates is not primarily a reflection of inadequate aggregate demand, but of the deeper failure to reform dysfunctional elements in labor markets that ideally should have taken place before the crisis. The failure to correct these sources of vulnerability before the crisis added rigidity to labor markets and magnified the impact of the crisis on the unemployment rate. Although monetary policy could help to alleviate the resulting pain by inducing somewhat faster growth in aggregate demand, it cannot solve the underlying problems. Central banks cannot ensure the sustainable creation of high-quality jobs. Central banks cannot generate sustainable growth and increase the level of potential GDP. These are important public policy concerns that should be seen as belonging squarely in the sphere of other policies for which governments are responsible. During the Great Moderation, when monetary policy is considered to have been generally successful, this separation of responsibilities was usefully highlighted in the inflation targeting framework (IT). Practiced by a large number of central banks over the past quarter century, IT has been impressive in helping central banks to achieve an environment of well-anchored inflation expectations and has been crucial for ensuring the credibility of central banks when exceptional measures had to be taken during the crisis. The essence of IT is that IT regimes specify that the only primary objective of monetary

policy should be price stability. Subject to achieving price stability, to the extent possible, monetary policy can help in other dimensions, but only to the extent that the primacy of price stability is not compromised in the medium term. This focus on a single objective is what has provided the clarity and simplicity that allows the monetary authority to be a credible defender of price stability in a symmetric manner, and this singular focus protects the central bank from doubts that it could be captured in the pursuit of other objectives.

- At the zero bound, the line between monetary and fiscal policy becomes blurred, as high-powered money and risk-free short-term government debt become indistinguishable. Viewed in conjunction with the unresolved fiscal challenges facing these governments, concerns about the fiscal implications of the current and future stance of monetary policy are difficult to avoid. Yet there is a way to implement unconventional monetary policy and enlarge the central bank's balance sheet with a smaller risk of inviting fiscal dominance. The expansion could be engineered through the purchase of foreign assets instead of through the purchase of domestic government bonds (or their acceptance for long-term repo operations). Monetary policy can facilitate the financing of government debt in a number of ways. Low interest rates directly benefit all borrowers with access to cheap credit, including governments. The large purchases of government debt associated with quantitative easing provide another almost-as-direct benefit to governments, and one that is not available to private borrowers. But there is risk associated with unconventional monetary policy. The greatest risk for monetization of the debt may be associated with the inflationary consequences of a delayed withdrawal of the exceptional monetary accommodation now in place. Accepting the risk of overshooting the desired price level path may be a necessary by-product of the massive unconventional monetary policy necessary to help the economy recover. But the situation creates the temptation for governments to attempt to capture the monetary policy process, as monetizing the debt may prove politically much easier than the alternatives as a means of restoring fiscal sustainability. Even absent these concerns, the availability of cheap credit may have significant adverse effects on the incentives for political authorities to correct fiscal problems. When the central bank provides all the financing a government needs at near zero cost, it is easier to postpone dealing with a problem rather than risk the short-term political cost that would be associated with any solution. The risk of facilitating this postponement is that the fiscal problem only gets bigger when not tackled in a timely fashion.
- The third area with the potential for overburdening monetary policy concerns the role of monetary policy in maintaining financial stability. Two sides with somewhat different considerations are of interest—the preventive phase, aiming to avert crises, and the repair phase, following a crisis. Regarding crisis prevention, the global financial crisis has reaffirmed that ensuring price stability is not sufficient to avoid major financial crises and maintain financial stability. Most of the time price stability and financial stability may be thought of as reinforcing each other. However, too narrow a focus on price stability over short horizons may prove counterproductive for maintaining financial stability. Greater short-term stability in prices may raise the risks of an asset boom or bust down the road, leading to instability. Under these circumstances, the pertinent tradeoff may be viewed as comparing the risks to price stability over shorter horizons against tail risks at longer horizons. For example, persistently high credit growth may be observed together with price stability. If the high credit growth is suspected of contributing to the buildup of an imbalance, as was observed in real estate markets in some countries before the crisis, and if somewhat tighter monetary policy could effectively contain this imbalance, then tighter

monetary policy could be considered appropriate even if it leads to a short-run rate of inflation somewhat below the central banks' ideal target. Tighter monetary policy under these circumstances may reduce the probability of a crash of an overheated market, which might be followed by an economic slump and the risk of deflation at a longer horizon. Under such circumstances, accepting a somewhat lower inflation rate in the short run should be seen as worthwhile to balance the risks regarding price stability over time.

IMPLICATIONS

Monetary policy is a poor substitute for other policies needed to restore economic balance around the world. Monetary policy is not a substitute for structural and labor market policies needed for sustainable job creation and growth. It is not a substitute for fiscal, pension, and healthcare reforms that are needed to ensure fiscal sustainability over the longer run. It is not a substitute for stronger capital buffers in challenged banking systems nor for correcting shortcomings in micro- and macro-prudential supervision. And it is not a substitute for the political and governance reforms that may be needed to restore the functioning of a monetary union facing an existential crisis.

Overburdening the central bank by requiring explicit targeting of a real variable such as employment or output would likely do more harm than good. In the short run, the temptation to see the central bank step in and solve sovereign debt sustainability problems can be great. Such a temptation, however, has significant and potentially unpleasant intertemporal political economy implications.

The overall risks of future financial crises can be reduced by tightening regulatory requirements regarding banks so as to demand more and higher-quality capital than was suggested by the Basle II framework, and by reducing the scope for banks to use risk-weighting to evade stronger capital buffers. These micro-prudential measures could lead to considerably stronger capital positions, and it has been argued that the cost of moving in that direction may be small (Admati and Hellwig, 2013).

Ultimately, overburdening monetary policy may lead to the repoliticization of central banking. As more responsibilities are allocated to the central bank, the incentives for political capture and misuse by governments increase. Overburdening monetary policy may eventually diminish and compromise the independence and credibility of a central bank, thereby reducing its effectiveness to preserve price stability and contribute to crisis management.

About the Author

Athanasios Orphanides is a professor of the practice of global economics and management at the Massachusetts Institute of Technology. He was a visiting scholar in the research department of the Federal Reserve Bank of Boston when this paper was written.

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Security of Retail Payments: The New Strategic Objective

by Joanna Stavins

abstract and complete text: <http://www.bostonfed.org/economic/ppdp/2013/ppdp1309.htm>
e-mail: joanna.stavins@bos.frb.org

MOTIVATION FOR THE RESEARCH

The Federal Reserve Financial Services Strategic Plan for 2012–2016 specifies five main goals for its financial services policy. The second of these goals is to “Maintain public confidence in the end-to-end safety and security of clearing and settlement systems.” Because consumers consider security the most important feature of payment methods as reflected in each annual Federal Reserve Bank of Boston’s Survey of Consumer Payment Choice (SCPC), it seems that the strategic plan is consistent with the consumers’ stated preferences. However, there is little information on how these stated preferences correspond to actual consumer payment behavior, which reveals consumers’ actual preferences.

Because the strategic plan might lead to spending real resources on enhancing the security of the nation’s payment system, it is worth analyzing in greater detail what aspects of security consumers view as strengths or deficiencies, and to what extent the perceived security of payments affects consumers’ actual behavior. This paper analyzes the extent to which the judgments consumers make, as indicated in consumer survey responses, are reflected in their actual payment behavior.

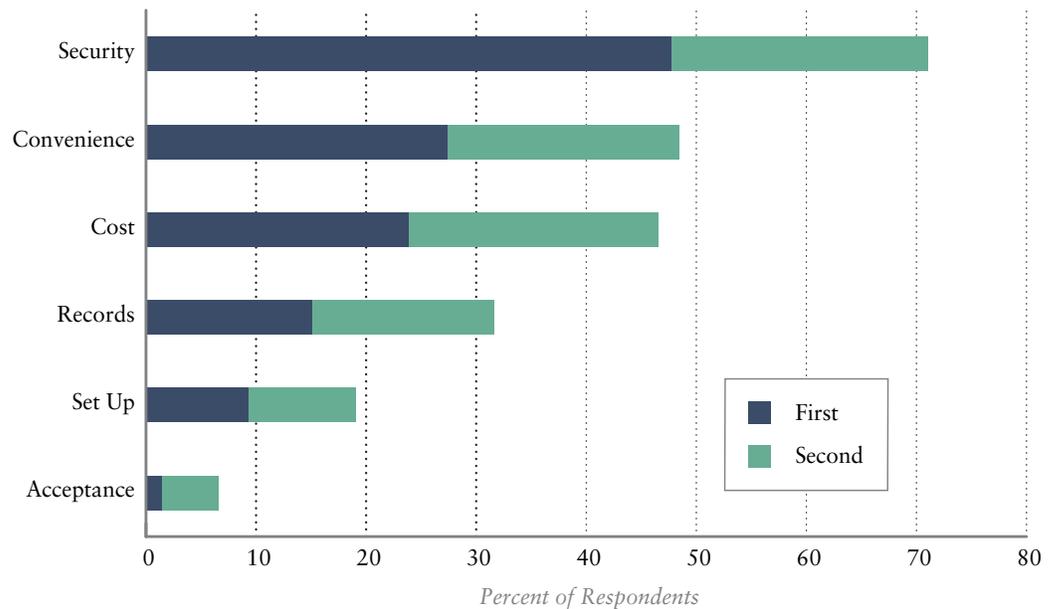
Furthermore, although the Federal Reserve’s new strategic plan recognizes the importance end-users place on security, it does not identify whether and how future policy changes might affect specific payment methods. This study also shows how changes in perceived security resulting from the Fed’s security improvements might affect the actual payment behavior of end users in the United States.

RESEARCH APPROACH

Using data from the 2010 Survey of Consumer Payment Choice (SCPC) conducted by the Federal Reserve Bank of Boston, the author compared consumers’ responses regarding their perceived risk of payment methods and payment locations to the consumers’ actual payment behavior, including testing whether consumers are more likely to use payment methods they consider more secure.

The data contain adoption rates, incidence of use, and number of payments by consumers for nine common payment instruments: cash, checks, money orders, travelers’ checks, debit cards, credit cards, prepaid cards, online banking bill payments (OBBP), and bank account number payments (BANP). The characteristics of payment instruments have been found to be important to consumers when deciding whether to adopt and/or use these instruments (Schuh and Stavins 2010, 2013). Respondents were asked to rate each payment instrument’s characteristics, including cost, speed, and security, on a 5-point Likert scale from least desirable (for example, most risky, most costly) to most desirable (for example, safest, cheapest) and to rank the importance of each of the six payment characteristics that were included in the survey, from the most important to the least important.

Consumer Ratings of Most Important Attributes of Payment Instruments



Source: 2010 Survey of Consumer Payment Choice (SCPC).

To test which demographic and financial attributes affect consumers’ perceived importance of security, the author estimated an ordered probit regression, where the dependent variable was each respondent’s rating of the importance of security: most important, second most important, and so on through least important.

The author then compared respondents’ rating of PIN and signature debit security to their preferred way of conducting debit transactions. Next, she tested how a consumer’s preferred type of debit is reflected in the way the consumer actually pays. The debit card use in the SCPC is not broken down into PIN and signature debit. However, the 2010 Diary of Consumer Payment Choice (DCPC) collected debit card use information broken down by PIN and signature for a subset of the SCPC sample.

To test whether consumers’ perceived security of each payment instrument significantly affects their payment decisions, the author estimated Heckman two-stage regressions of adoption and use of payments, similar to Schuh and Stavins (2010, 2013). Consumers decide whether or not to adopt a payment method in stage 1, and—conditional on adoption—decide how intensively to use the payment method in stage 2. In the author’s model, adoption of a payment method is a function of various characteristics of the payment method, as well as demographic and financial attributes of the consumer.

In order to test whether taking into account the relative importance of security changed the results, the author weighted all the characteristic variables by their importance ranking to each respondent. As a result, a characteristic that a consumer considered very important—such as security—was weighted more heavily in the regressions than a characteristic that was considered less important.

To test whether consumers' perceived security of payment location significantly affected their payment use, the author included the perceived security of point-of-sale transactions in the point-of-sale use regression, and the perceived security of online transactions in the online purchase and online bill use regressions.

Finally, to determine how consumer payment behavior would change if the security of payments improved, the author assessed the effects of potential Federal Reserve policy intervention resulting in enhanced security of one payment method at a time, while leaving the security of the remaining payment methods unchanged. She used their estimated model of adoption and use, simulating improvements in security of each of the following payment instruments: debit cards, credit cards, online banking bill payments, and bank account number payments. These four payment instruments were selected as those most likely to be the subject of either improved safeguards for online banking (thereby affecting OBBP or BANP), or the introduction of the EMV card standard (thereby affecting debit cards or credit cards). Although cash and checks could also become more secure, she assumed it less likely that the Federal Reserve would focus on these two payment instruments. These simulations assume that consumers would be aware of and value any improvements in payment security that the Federal Reserve might implement.

KEY FINDINGS

- Security was ranked as the most important or the second-most important characteristic by over 70 percent of respondents, but the ranking varied across the sample. Older consumers were significantly more likely than younger consumers to consider security as the most important characteristic, while males and higher-income (and to a lesser extent higher net worth) consumers were significantly less likely to view security as an important characteristic of payments. Gender has a strong effect on the perception of security: Men consider almost all payment methods except cash more secure than women do. Consumers over 65 years of age consider checks, bank account number payments, and online banking bill payments to be more secure, 25-to-34 year-olds consider debit and credit cards as significantly more secure. Respondents with the lowest level of education (less than high school) consider checks and online banking bill payments less secure, while those with a high school diploma view debit cards as more secure, but online banking bill payments less secure. Lowest-income consumers (annual income below \$25K) view online banking as less secure, while highest-income consumers (above \$100K) view checks as significantly more secure and prepaid cards as less secure. Household net worth has no significant effect on the perceived security when controlling for income. Single individuals rate credit cards as more secure.
- On average, online banking bill payments received the highest average rating, although it is only slightly higher than the security rating for credit cards, the next highest rated payment method. The average credit card and debit card ratings were not statistically significantly different from each other. A relatively large fraction of respondents view cash at the extremes of “very risky” or “very secure.” This could be caused by the variation in how consumers interpret security—as financial loss or as loss of privacy. Checks and debit cards were least likely to be considered very risky.
- Younger people were much more comfortable with mobile payments than older people. In contrast, older consumers viewed transactions conducted by mail as significantly more

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Improved security would increase adoption of some payment instruments but have little effect on the use of adopted instruments.
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Consumers see only small differences in security among payment instruments.
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secure than younger consumers did. Age did not have a significant effect on the security rating of online payments. Instead, less-educated and lower-income respondents were significantly more likely to rate online payments as risky, while higher-income individuals were significantly more likely to rate online transactions as secure. The lowest-educated consumers were significantly more likely to rate transactions conducted by phone as secure.

- For every payment method, consumers who considered it secure or very secure used that method more intensively than those who considered it risky or very risky. The location of transactions also mattered to consumers, regardless of the payment method used. The respondents who rated online transactions as very secure paid a significantly higher share of their bills online (12.4 percent), than respondents who rated online transactions as very risky (6.8 percent).
- Consumers' behavior was consistent with their stated preferences: Consumers who preferred PIN debit used PIN debit more than twice as often as signature debit, and consumers who preferred signature debit used signature debit over three times as often as PIN. Those consumers who considered debit secure or very secure used debit cards more intensively than those who considered debit more risky.
- Although consumers viewed security as the most important payment attribute, other features seem to have influenced their adoption decisions more heavily. However, it is difficult to interpret the quantitative results because the numerical 1–5 ratings are not related to any objectively measureable factors. One can only discuss the relative importance of the various features on consumers' payment decisions.
- Concerns about security create an obstacle to the adoption of some of the bank account-based payments, but once a payment method was adopted there was no significant effect of the security rating on the use of those payment instruments. The reverse was found for more established payment methods: consumers' perception of security did not influence adoption, but it affected their actual payment use.
- Even when the relative importance of security was incorporated into the regression, security significantly affected selected consumer payment decisions, but the estimated effects of security on payment method adoption and use were not as high as the estimated effects of the other characteristics.
- The policy simulation predicts that an improvement in security that might result in shifting consumers' perception from "very risky" to "risky" or from "secure" to "very secure" would increase the adoption of some payment instruments, but once the payment method had been adopted, would have only a small effect on the use of those payments. Debit cards are one of the payment methods whose adoption would be positively affected by improved security.
- Even though consumers consider security to be the most important feature of payments they perceive differences in security among payment instruments to be relatively small. Consumers base their payment decisions on the other characteristics as much or even more than on the perceived security of the various payment methods.

IMPLICATIONS

The fact that debit cards are one of the payment methods whose adoption would be positively affected by improved security implies that the inclusion of the incentive to financial institutions to implement fraud reduction policies in the Federal Reserve Board rules written in response to the Durbin Amendment was warranted. The results from including online payments (OBPP and BANP) in the simulated policy experiment suggest that addressing technology risk as part of the security enhancements might help consumers overcome their resistance to adopting those payment methods. More detailed data on what types of risk consumers are concerned with would help pinpoint where the resources to improve security might best be spent.

About the Author

Joanna Stavins is a senior economist and policy advisor in the research department of the Federal Reserve Bank of Boston and a member of the Consumer Payments Research Center.

WORKING PAPERS

w-13-6

Payment Choice with Consumer Panel Data

by Michael Cohen and Marc Rysman

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1306.htm>
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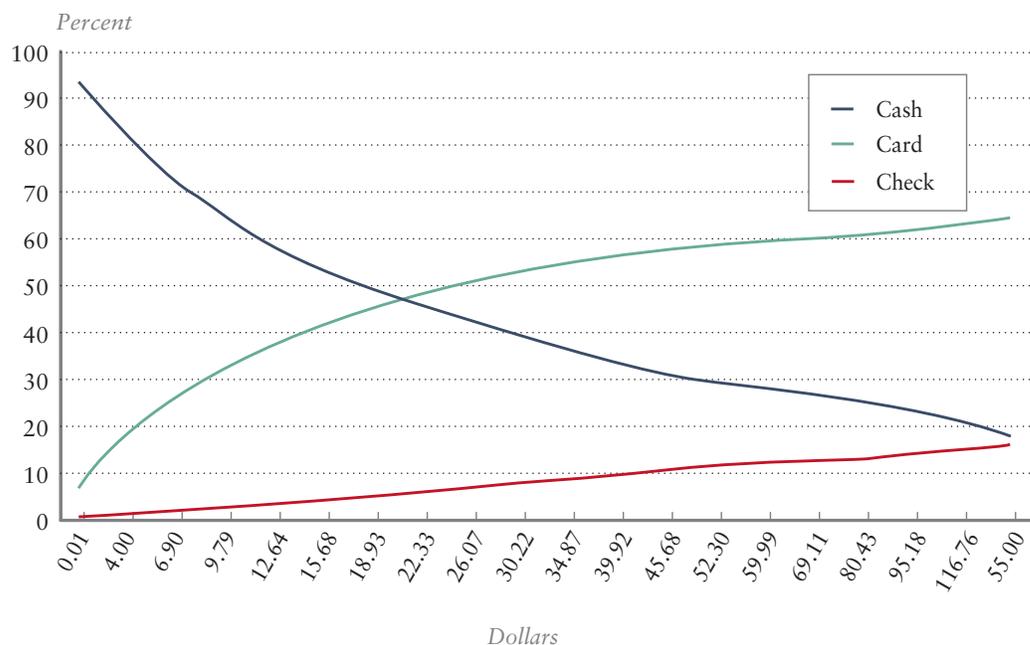
MOTIVATION FOR THE RESEARCH

Over the past several decades, the U.S. payments system has shifted from paper payment instruments, namely cash and check, to digital instruments, such as debit cards and credit cards. This shift is important since digital payments are typically regarded as superior in most dimensions: they are faster and cheaper to process, and they are easier to track and less subject to crime. The shift to digital payments is far from complete however, as cash and check still play a large role in the economy, particularly in some sectors.

A number of studies aim to identify the determinants of payment choice. However, the ability to do so is hampered by data constraints. It is difficult to track the payments of individual households, particularly with regard to cash. One method for tracking payment choice is to survey consumers retrospectively. However, this method makes it difficult to study the determinants of each individual choice, or why choice varies across shopping trips. Another method is to ask survey participants to fill out a diary of payment behavior. This is an important contribution, although Jonker and Kosse (2009) raises questions about the accuracy of these surveys, showing that the daily number of transactions in seven-day surveys is significantly less than in one-day surveys, which suggests a form of “diary fatigue.”

A solution to this problem is to obtain data directly from consumer bank accounts. However, these studies typically provide no information on how the consumer uses cash, and consumers may use multiple accounts for transactions, some of which may not show up in the available transaction record.

Payment Type By Transaction Size



Source: Author's calculations based on A.C. Nielsen Homescan Data.

The idea behind this paper is to leverage an existing scanner dataset used for marketing studies to obtain and analyze transaction-level data on consumer payment choice. The authors focus on grocery purchases. Nielsen maintains a household panel that tracks in great detail these households' purchase choices of grocery products. Nielsen also tracks the payment method of each purchase, and the authors obtained those data for this paper. To the authors' knowledge, no previous academic study has used such data to study payment choice.

There are important advantages to using scanner data over alternatives. Most importantly, one can observe individual household decisions continuously for a period of several years, something no existing diary dataset can come close to matching, and one can observe which member of the household made each purchase as well as important demographics such as household size and income.

RESEARCH APPROACH

The authors exploit scanner data to track payment choice for grocery purchases for a large panel of households over three years. They focus particularly on the role of expenditure size in determining payment choice. While the use of a long panel for these purposes is novel, the introduction of controls for household heterogeneity has little effect on the estimates.

The authors also use the data to characterize the extent of single-homing; that is, to understand the extent to which consumers concentrate payments on a single payment method as opposed to spreading them across methods. The length of the panel makes it possible to observe when households that practice single-homing switch their favorite payment method.

The authors draw their dataset from the Homescan database maintained by A.C. Nielsen. The dataset covers the years from 2006 through 2008 for 16 Designated Marketing Areas (DMAs), which are geographical regions somewhat larger than the average metropolitan

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Consumers use cash for almost all of the smallest transactions, and cards—and to some extent checks—for larger amounts.
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statistical area and are meant to denote television markets. Participating households receive a universal product code (UPC) scanner that they use to scan all of their grocery purchases; the resulting scans are the basic source of the dataset. In addition, participants receive a keypad device with which they record purchases of products without UPC codes, such as fruit. They also enter their payment choice for each purchase via this device. Consumers send in receipts as well, which Nielsen uses to verify the consumer's purchase behavior. Consumers are asked to report all purchases of food for consumption at home.

These data have important limitations. First, the authors observe only grocery purchases, a small subset of any household's budget. However, groceries are an important touchpoint for payment choice, and have been a focus of the payments industry. Second, the method that Nielsen Homescan used to track payments is not perfect for the authors' purposes, as they essentially cannot distinguish between debit and credit card use. But importantly, they can distinguish between cash, check, and card, and they can observe transaction size, which is the focus of this paper.

The authors are interested in the determinants of payment choice, particularly the effect of transaction size, and specifically in controlling for individual heterogeneity via fixed effects, an approach that has not been explored in previous work. The authors employ linear models in the analysis, since these models properly identify the conditional expectation function, which is often the primary object of interest.

KEY FINDINGS

- Transaction size is an important determinant of payment choice, not only across households but within households as well, with consumers using cash for almost all of the smallest transactions, but cards and to a certain extent checks, for larger transactions.
- Changes in income predict changes in payment choice; particularly, higher income leads to more card use. Surprisingly, the results for check and card are the opposite of those for income: employment leads to greater check use and less card use. However, the magnitude of the changes for employment is not large.
- Households rarely use more than two payment types to pay for groceries: 75 percent of households paid more than 98 percent of their transaction value with their favorite two types, and 95 percent paid more than 87 percent with their favorite two types. Among households that used two payment types, 85 percent preferred cash and card (including both credit and debit, due to data limitations) to any other combination.
- Households exhibit persistence over time in their payment choices; there is only very limited switching of favorite payment choices over time.

IMPLICATIONS

This study highlights the importance of expenditure size in determining payment choice. The robustness of the result on expenditure size is surprising and suggests that the prevalence of cash use is common across the population and is not due to some subset of consumers with particular preferences. The finding that transaction size governs payment choice not only across households but also within households provides guidance to policymakers interested in such topics as interchange fee regulation or encouraging digital payments.

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w-13-7

The Value to Banks of Small Business Lending

by Dmytro Holod and Joe Peek

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1307.htm>
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MOTIVATION FOR THE RESEARCH

The development of long-term relationships between banks and firms should provide benefits by reducing informational asymmetries, particularly when the borrowers are smaller, more opaque firms. Less clear, however, is how these benefits are allocated between the lenders and the borrowers. While small firms can potentially benefit from increased credit availability on better terms, relationship lenders potentially can exploit their informational monopoly over these firms by subjecting them to “hold-up” costs, whereby lenders extract the benefits for themselves by making loans on noncompetitive terms to relationship borrowers. Although an extensive literature has established convincingly that borrowers accrue substantial benefits, little direct evidence exists about the value of lending relationships to lenders. Instead, studies that do focus on the benefits to lenders tend to provide only indirect evidence about the value-enhancing effects of lending relationships on the banks. The key hypothesis tested in this study is that relationship lending by banking organizations in the form of small business loans is value enhancing, both in absolute terms and relative to the large loans held by the same banking organizations.

RESEARCH APPROACH

Using data from the small business loan survey contained in the June bank-level Consolidated Reports of Condition and Income (call reports) supplemented with data from the Federal Reserve’s National Information Center database (NIC) and the Center for Research in Security Prices (CRSP), the authors estimate the relationship between the book and market values of banks’ small business loan portfolios in order to identify the contribution of lending relationships to the market value of banking organizations. The sample consists of the set of publicly traded U.S. banking organizations, whether standalone banks, bank holding companies, or, more recently, financial services holding companies, for which market capitalization information is available. Since data on small business loans are available only at the individual bank level and most publicly traded banking organizations are holding companies, the small business loan data must be aggregated to the holding company level. The authors provide context by beginning with a brief discussion of relationship lending, summarizing the literature that investigates the sources and magnitudes of any such value.

KEY FINDINGS

- For commercial and industrial (CI) loans, small business lending does, in fact, add value to banking organizations, both overall and relative to large CI loans. Furthermore, the effect comes primarily from the smallest category of small CI loans, those with original amounts

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Relationship banking enhances the value of smaller banking organizations. Consolidation in the banking industry may be value-destroying to the acquirer.
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of \$100,000 or less. On the other hand, small commercial real estate (CRE) loans, being transactional rather than relational in nature, do not contribute additional value to banking organizations beyond that produced by CRE loans generally.

- The value-adding effect emanates primarily from small and mid-sized banking organizations. For small and perhaps medium-sized bank holding companies, it appears that their expertise in originating and monitoring small CI loans does add to their market value, as these banks exploit the private information about smaller, opaque borrowers accumulated over the course of long-term relationships. Because one would expect relationship lending to be much less prevalent at the largest banks, which tend to use credit scoring models, a transactions technology, to originate many of their small CI loans, it is not surprising that the value-enhancing effects occur predominantly at the smaller banking organizations.

IMPLICATIONS

The authors' direct evidence that small business lending is a profitable market niche for small and possibly for medium-sized publicly traded banking organizations in the United States suggests that such banks should actively participate in lending to small businesses.

The finding that relationship lending enhances the value of smaller banking organizations has important implications for bank behavior. For example, given the well-known inverse relationship between bank size and the portfolio share of small business loans, the ongoing consolidation in the banking industry will, with the consequent increase in bank size, tend to shrink the share of small business loans in the loan portfolio of the combined banking organization. This consolidation may be value destroying for the acquirer to the extent that value-enhancing small business lending by acquired banks with a particular expertise in small business lending may be de-emphasized as a result of the acquisition, and thus not be in the best interests of the acquirer's shareholders.

About the Authors

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w-13-8

The Effect of Unemployment Duration on Future Earnings and Other Outcomes

by Daniel Cooper

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abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1308.htm>
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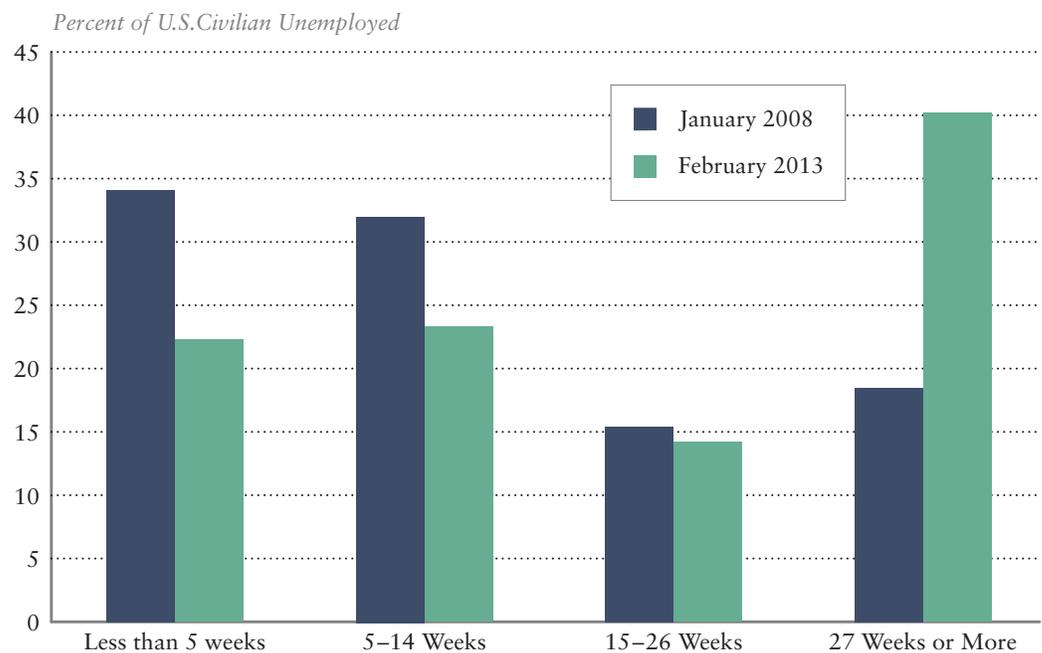
MOTIVATION FOR THE RESEARCH

A distinguishing feature of the Great Recession and the slow recovery has been the large increase in the long-term unemployed, defined in the United States as those individuals who have been out of work for over 26 weeks and who are seeking a job. Relative to the conditions present at the start of the Great Recession, the overall U.S. unemployment distribution has become heavily skewed to long jobless spells. In January 2008, long-duration unemployment characterized 18.5 percent of jobless U.S. workers, but by February 2013 this classification described 40.2 percent of unemployed workers.

The standard job search models contend that a longer search process results in a better employer-employee match, and in this context longer-duration unemployment is associated with higher future earnings. These standard models assume that bad job matches are destroyed and good matches are created. But the labor market literature has another set of studies that attribute lower wages resulting from a job loss to reduced human capital and firm-specific skills. This research shows that the longer a worker is unemployed, the more his or her skills depreciate, a situation that translates into receiving lower initial wages at a new job. In this context, a job displacement affects initial re-employment wages, mainly because human capital is often firm-specific, and a new position will often pay a lower wage until the worker acquires skills that the new employer values. A related strand of thought argues that there may be a stigma associated with long-term unemployment that impacts individuals' ability to find a new job and/or earn their pre-unemployment wage.

Yet very few studies consider how the length of an unemployment spell impacts earning losses over the long run, and a crucial question is whether the wage ever catches up to where it would have been in the absence of a job loss. The recent research that does focus on this issue uses European or other non-U.S. data. Using earnings and job loss data from the United States that span a 30-year period, this paper compares the income over time of displaced and nondisplaced workers and the differences in earnings paths of workers who experience short-term versus long-term unemployment. Also examined is how unemployment and its duration impacts other long-term outcomes, such as homeownership and household wealth accumulation. The consideration of whether long-duration unemployment impacts an individual's long-term economic prospects beyond any potential earnings effect is an issue that is not discussed in the previous literature.

Distribution of Unemployment Duration in January 2008 and in February 2013



Source: Bureau of Labor Statistics/Haver Analytics.

RESEARCH APPROACH

The paper uses data from the Panel Study of Income Dynamics (PSID), a household-level survey begun in 1968 and administered annually through 1997 and biennially since 1999. Using a cross-national sample from the 48 contiguous states and a national sample of low-income families from the Survey of Economic Opportunity, the PSID follows households and their offspring over time. While the PSID tracks the labor market status and earnings of the household head and his or her spouse (if any), along with the industry and occupation that provides employment, this paper analyzes only the heads of household because their labor income and employment records tend to be more complete and stable over time. The author's estimation approach uses a series of equations that are a modified version of the standard Mincerian earnings function. Specifically, an individual's earnings at a particular time are assumed to be a function of the individual's education, work experience, ability, and job type. A vector of additional controls includes a cubic term for a worker's age, race, and sex, and state fixed effects. Age is another indicator of worker experience, and earnings, race, and sex capture potential wage differentials across worker types and may proxy in part for worker quality; the state level controls capture any regional differences in wages.

The estimation sample is restricted to heads of household between 25 and 65 years of age and consists of 2,454 individuals. Earnings and labor market status are reported for the year prior to the survey year. Job tenure is calculated based on how long a worker reports being with his or her current employer. Unemployment episodes are recorded between 1977 and 2000 (the 2001 survey year), and the most recent spell of unemployment is used if an individual had more than one episode of unemployment. Since the paper seeks to understand the long-term effect of unemployment on subsequent earnings, individuals with unemployment spells that occurred after 2001 are excluded from the analysis. Labor income is measured as of 2004 (recorded in the 2005 survey), as this maximizes the potential length of time since an individual's unemployment spells and avoids any confounding effects due to the housing market bust and the start of the Great Recession. Individuals report the number of weeks or the number of hours they were unemployed, and household heads are divided based on whether in a given year they were out of work for more than 26 weeks or this duration's hourly equivalent. This 26-week split for determining short-term versus long-term unemployment stems from the fact that in the United States, standard unemployment insurance lasts only 26 weeks, although Congress often extends it during periods of particularly high unemployment. The 26-week demarcation provides a specific nonlinear functional form at the end of 26 weeks that is potentially better for identifying the effects from unemployment duration. The author's estimates account for observable factors such as whether or not a worker has changed industries since his or her last spell of unemployment and this helps control for the effects of unobserved worker quality that might otherwise account for a long episode of unemployment.

KEY FINDINGS

- The results show a negative relationship between past spells of unemployment and individuals' earnings as of 2004. Unemployment spells have a large negative impact on earnings, which are roughly 31 percent lower on impact for displaced workers compared with the earnings of those individuals who do not experience a spell of unemployment. This negative earnings effect dissipates over time, as an individual's income recovers almost 2 percent a year after the initial drop. Yet 10 years after a period of unemployment, a worker's labor income is almost 14 percent lower than it would have been in the absence of a job loss. Displaced workers' incomes recover fully only after about 19 years, somewhat faster than the recovery time found in Davis and Wachter (2011).

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Ten years after a worker suffered a long-term unemployment spell, s/he earns 32 percent less than nondisplaced workers, while the wages of workers who endured a short-term unemployment spell are only about 9 percent lower.
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- There is a relatively large differential effect on future earnings for short-duration versus long-duration unemployment. Past unemployment lowers wages on impact by about 24 percent for short-term unemployed workers, compared with a 67 percent drop for the long-term unemployed. Ten years after a worker suffered a long-term spell of unemployment, s/he earns 32 percent less than nondisplaced workers, while the wages of workers who endured a short-term unemployment spell are only about 9 percent lower. The earnings gap closes about three or four years sooner for short-term unemployed individuals than for long-term unemployed individuals. While within both duration categories the wage loss increases with additional weeks of unemployment, the main duration effect comes from separating individuals based on whether they were unemployed for 27 weeks or more.
- Wages are lower the more unemployment spells a worker experiences, and are nearly 10 percent lower, on average, for workers employed in a different industry than the one they worked in prior to their last episode of unemployment. Lower wages due to a worker's changing industries are likely related to firm-specific skill loss and/or to an individual's being unable to find a better re-employment job match. An example of this would be a worker formerly employed in manufacturing having to switch to a job in the service sector due to the factory job being outsourced to another country.
- After controlling for an individual's income, wealth, past homeownership status, and other factors that likely impact housing tenure decisions, past unemployment spells have a negative effect on current homeownership status. Specifically, individuals who experience a period of unemployment have roughly a 10 to 12 percentage point lower predicted probability of homeownership than do individuals who did not experience a jobless spell. Similar to the earnings gap, this homeownership gap closes over time, as it is halved after 10 years and nonexistent after 20 years.

IMPLICATIONS

This paper documents how long-duration unemployment exacts lasting costs on the affected workers—costs that should be factored into evaluations of government policies designed to stimulate the economic recovery. Given that the sluggish U.S. recovery has been characterized by a persistently high rate of unemployment and extended spells of unemployment for many jobless workers, mitigating the adverse effects of long-term unemployment is a particularly relevant consideration when determining economic and monetary policy.

About the Author

Daniel Cooper is a senior economist in the research department at the Federal Reserve Bank of Boston.

Occupation-Level Income Shocks and Asset Returns: Their Covariance and Implications for Portfolio Choice

by *Steven J. Davis and Paul S. Willen*

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1309.htm>
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MOTIVATION FOR THE RESEARCH

This paper develops and applies a simple graphical approach to portfolio selection that accounts for covariance between asset returns and an investor's labor income. The approach is designed to handle income shocks that are partly, but not fully, hedgeable, multiple risky assets, many periods, and lifecycle considerations.

RESEARCH APPROACH

The authors begin by showing how covariance between income shocks and asset returns and persistence in the shocks affect portfolio choice over the life cycle. Next, they estimate the covariance and persistence parameters for occupation-level components of individual income using data from repeated cross sections of the Current Population Survey. After extracting the occupation-level components of individual income innovations, they investigate their covariance with aggregate equity and bond returns, selected industry-level equity returns, and the returns on portfolios formed on firm size and book-to-market equity values. They then apply the theoretical framework to the empirical results to calculate optimal portfolio allocations over the life cycle for selected occupations.

The graphical approach developed in this paper captures several factors that influence portfolio choice over the life cycle: the drawdown of human capital as a worker ages, the impact of labor income innovations on the present value of lifetime resources, the increase in an investor's effective risk aversion as income smoothing ability declines with age, and systematic life cycle variation in the covariance between labor income shocks and asset returns. Each of these factors affects an investor's optimal level of risky asset holdings, as the paper shows.

Although the authors' approach shares many features with textbook mean-variance analysis, it is fundamentally different. Rather than considering the mean and variance of a portfolio of risky assets, they consider the mean and variance of consumption. They use this method because standard mean-variance analysis gives wrong answers when labor income is correlated with asset returns.

According to the two-fund separation principle of traditional mean-variance portfolio analysis, every investor holds risky financial assets in the same proportions—only the level of holdings differs among investors. The authors show why and how that principle breaks down when an investor has a risky income stream (from work or business ownership) that is correlated with asset returns. They quantify this breakdown and identify several contributory factors.

Previous empirical research on the covariance between income shocks and asset returns relies on panel data sets or synthetic panels constructed from repeated cross sections. This paper pursues a somewhat different empirical approach. In particular, it relies on the repeated cross-section structure of the Current Population Survey to extract mean occupation-level

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The results show large predicted levels of risky asset holdings compared with observed levels.
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income shocks, while controlling for a host of observable worker characteristics. The empirical approach taken here has less demanding data requirements than panel-based approaches. It is also highly flexible in the sense that one can easily focus the empirical lens on any type of income shock that can be tied to observable characteristics of individuals, households, or businesses. The authors consider occupation-level income shocks in this paper, but the same method can be applied to income shocks related to industry, location, firm size, and worker characteristics like education, experience, and job tenure. Because its starting point is a standard human capital earnings regression fit to cross-sectional data, the authors' approach offers a natural bridge between labor economics and finance.

KEY FINDINGS

- Using annual data from 1968 to 1994, the authors find little evidence that occupation-level income innovations are correlated with aggregate equity returns, but a portfolio formed on firm size is significantly correlated with income innovations for several occupations, and so are selected industry-level equity portfolios.
- An application of the theory to the empirical results shows (1) large predicted levels of risky asset holdings compared with observed levels, (b) considerable variation in optimal portfolio allocations over the life cycle, and (c) large departures from the two-fund separation principle.
- As mentioned above, the two-fund separation principle that governs optimal portfolio choice in a traditional mean-variance setting breaks down when investors have endowed exposures to risky assets. In simple terms, an investor's optimal portfolio can be calculated as the difference between her desired exposure to risky assets and her endowed exposure. Because investors typically differ in their endowed exposures, they also differ in their optimal portfolio allocations (levels and shares), even when they have the same tolerance for risk and the same beliefs about asset returns.

IMPLICATIONS

Even moderate covariances between income shocks and asset returns can drive large differences between optimal portfolio shares and the shares implied by a more traditional approach that ignores labor income or other sources of income from nonmarketable assets.

The finding of no correlation between aggregate equity returns and occupation-level income, together with similar findings in other work, present something of a puzzle for standard equilibrium models of fluctuations, growth, and asset pricing. Given rational asset-pricing behavior, frictionless financial markets, and standard specifications of the aggregate production technology, dynamic equilibrium models imply a high correlation between aggregate equity returns and the value of human capital. That implication finds little support in this paper's empirical results.

Applying the estimated covariances to their portfolio choice framework, the authors find sizable departures from the two-fund separation principle for plausible assumptions about expected asset returns and investor risk aversion. It is likely that future empirical research will more fully uncover the covariance structure between labor income and asset returns. If so, then the gap between optimal portfolio allocations and the uniform portfolio shares implied by the two-fund separation principle will also be larger.

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Because investors differ in endowed exposures, they also differ in optimal portfolio exposures, even with identical risk tolerances and beliefs about asset returns.
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About the Authors

Steven J. Davis is the William H. Abbot Professor of International Business and Economics at the Booth School of Business at the University of Chicago and a research associate at the NBER. Paul S. Willen is a senior economist and policy advisor in the research department of the Federal Reserve Bank of Boston and a faculty research fellow at the NBER.

w-13-10

Enforcement and Immigrant Location Choice

by Tara Watson

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1310.htm>
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MOTIVATION FOR THE RESEARCH

Although the recent recession stemmed the tide of immigration into the United States, the estimated foreign-born population exceeds 38 million individuals, representing more than 12 percent of the U.S. population. Immigrants play an important role in local labor markets, both because they constitute a substantial portion of the workforce (15.8 percent in 2010) and because they are a key driver of workforce growth. Moreover, immigrants' location decisions are more responsive than those of native-born workers to local labor market conditions, and they help to equilibrate differences across labor markets within the United States (Borjas 2001). A sizable literature explores the location choices of immigrants within the United States. However, little is known about how the policy environment affects where immigrants choose to live within the United States.

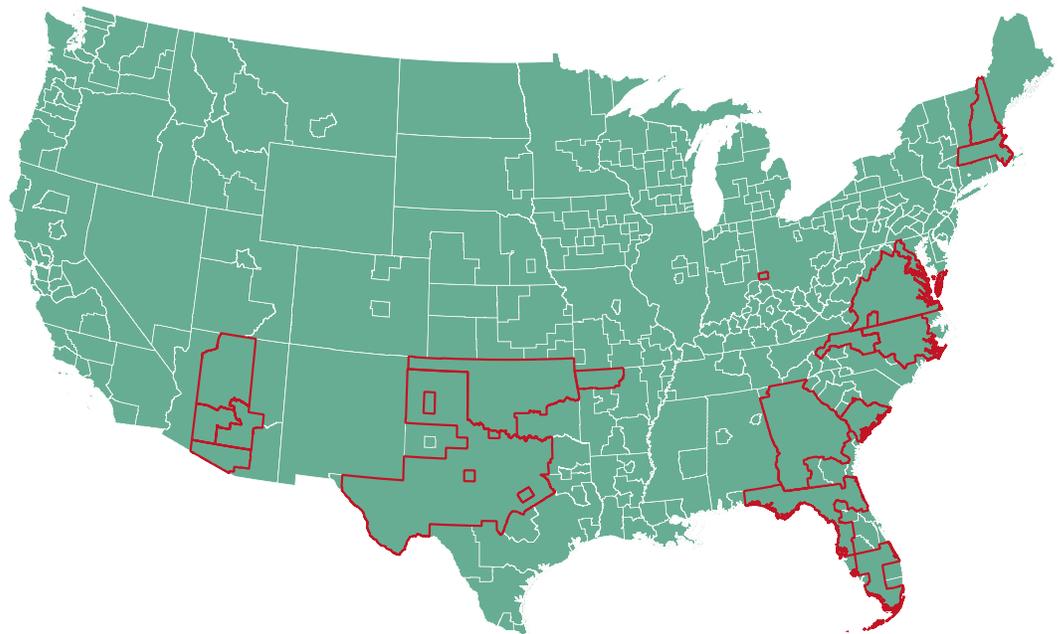
As the nation debates immigration policy, understanding the impact of enforcement on immigrants' behavior is critically important. The effect of immigration-related policies on residential choice is also of interest to local policymakers. If regions seek to boost labor force growth or change the local skill mix by changing the foreign-born population, it is important to understand what policies facilitate or discourage immigrant inflows. Conversely, as states and local law enforcement agencies consider adopting immigration-related policies, it is important to know the implications of these policies on the composition of the local labor force. Enforcement activity in other parts of the country may also have direct implications for projected foreign-born inflows to areas with less-aggressive enforcement activity. These effects will be of particular interest to employers who rely on foreign-born labor.

The analysis presented here focuses on the underrepresented role of local immigration policy, specifically the devolution of enforcement to local law enforcement that has occurred in the last decade under section 287(g) of the 1996 Immigration and Nationality Act. Since 2002, almost 80 state and local law enforcement agencies have signed 287(g) agreements. There are three types of 287(g) agreements: local task force, local jail enforcement, and statewide. In some cases, these agreements are signed with the explicit intent of reducing the local immigrant population. Because enforcement decisions are made at a local level, these may influence where immigrants decide to settle in the United States.

RESEARCH APPROACH

This paper uses data from the American Community Survey (ACS) to examine migration responses to local enforcement. The ACS collects information on birthplace, citizenship, and residence in the year prior to the survey. Thus, it is possible to construct one-year migration

Local Areas with Task Force Locations Outlined in Red



Source: U.S. Census Bureau and author's calculations.

estimates for six cohorts (2005–2010) and to observe detailed migration decisions of immigrants living in the United States for two consecutive years.

The aggregate analysis presented first offers a bird's eye view of migration. One can estimate cross-national inflows to and outflows from an area as well as outflows from the entire nation by comparing the number of immigrants in a local area in a given year, the number of immigrants remaining in the United States in the following year who indicate that they lived in the local area in the previous year, and the number of immigrants in the local area who said they lived abroad in the previous year. The second part of the analysis exploits the individual-level micro-data, allowing one to observe migration decisions of individuals who were living within the United States for two consecutive years. The third part of the analysis employs a conditional logit analysis of individual decisionmaking that examines how enforcement affects an individual's probability of choosing a particular destination. Rather than examining the determinants of migration directly, the conditional logit model estimates the characteristics of places that immigrants find attractive, regardless of whether they already live in those locations. Because the results are sensitive to the inclusion of Maricopa County, Arizona—a local area with extreme levels of enforcement—estimates are shown with and without this area included.

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Except for the extreme case of Maricopa County, Arizona, international migrations flows are unaffected by local enforcement.
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KEY FINDINGS

- Once the extreme case of Maricopa County is excluded, international migration flows are not affected by local enforcement. In most circumstances, immigrants responding to local enforcement relocate within the United States rather than leaving the country.
- The degree of local enforcement affects the decision to leave an area but does not deter foreign-born immigrants from coming to an area from elsewhere in the United States or abroad.

- Immigrants respond only to the task force model of 287(g) enforcement, which emphasizes street-level enforcement. There is no evidence that jail enforcement or statewide agreements cause migration out of a local area. The impact of full task force coverage on internal migration is similar to that of a 15 percent decline in predicted employment demand.
- Noncitizens who are more educated are more responsive to task force enforcement than less-educated noncitizens. (The Obama administration curtailed the task force agreements at the end of 2012.)

IMPLICATIONS

The fact that the effect of task force agreements on state and divisional migration is of comparable magnitude to local area migration implies that those immigrants who are induced to leave their local area typically leave the Census division entirely. Those immigrants most affected by task forces agreements, who tend to be noncitizens who are more educated, are more likely to be documented (although their legal status is not observable in the data), suggesting that 287(g) policies may be missing their intended targets.

About the Author

Tara Watson is an associate professor of economics at Williams College and a research associate at the NBER. She was a visiting scholar at the New England Public Policy Center in the research department of the Federal Reserve Bank of Boston when this paper was written.

w-13-11

How Low Can You Go? Charity Reporting When Donations Signal Income and Generosity

by Anat Bracha and Lise Vesterlund

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1311.htm>
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MOTIVATION FOR THE RESEARCH

Over the past 20 years economists have examined nonprofit fundraising practices in order to understand what strategies are effective for increasing donations. Upon completion of a campaign or project, a common practice employed by many organizations is publicly disclosing who the individual donors are and the amount of their contribution (perhaps indicated by a range of values, like \$5,000–\$10,000). The economic literature that studies status acquisition and philanthropy finds that charitable giving can confer status by signaling that the donor possesses socially desirable attributes, such as professional success, monetary wealth, and generosity. If individuals can acquire social status by making donations, the incentive to give increases when contributions are visible: the larger the amount of money given, the more status accrues to the donor. This conclusion helps to explain why fundraising efforts are perceived to benefit from announcing the amount that an individual donor contributes.

Prior experimental studies have largely confirmed that individuals tend to contribute more when their individual donations are publicized. Yet this general assumption rests on the idea that the donation signal is one-dimensional. For example, Glazer and Konrad (1996) maintain that people gain status from wealth and that charitable donations reflect only income, and in the existing experimental studies donations signal only generosity. Since the existing

economics literature centers on one-dimensional status acquisition and the amount given is seen as showcasing only one positive attribute like income or generosity, status must necessarily increase as the contribution increases.

In this paper, the authors argue that past positive results on donation-visibility do not necessarily hold. This is because when a contribution can signal more than one attribute, status may not be monotonic in giving—depending on the environment, higher status could result from lower donation amounts, and thus overall giving may decline. The results and implications from this paper challenge the conventional wisdom that has been drawn from the previous literature.

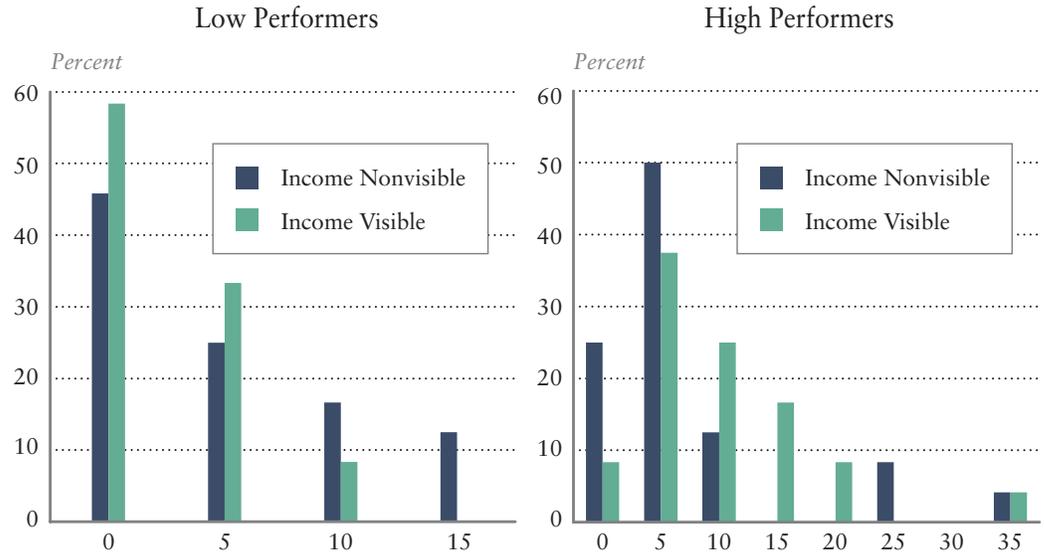
RESEARCH APPROACH

To understand better how donation-visibility affects charitable giving, the authors examine an environment in which contributions can signal both a donor's income and generosity. Building on previous theoretical and experimental work, they begin by presenting a formal example of how a potential donor's concern with status affects charitable giving. Donations generate both "warm-glow" (Andreoni 1989, 1990) and status, which has a consumption value. There are two channels through which status increases the incentive to give: the stock of status and the marginal return from status acquisition (how fast donations result in a change in status). A higher-status stock lowers the marginal utility of consumption and thus the cost of giving and, similarly, a higher marginal return from status acquisition also lowers the cost of giving. While the previous literature has focused on one-dimensional status acquisition that leads to status increasing monotonically in giving, the authors' example shows that when donations signal multiple attributes it is not clear how status may be affected. If contributions signal both income and generosity, and if generosity is judged, at least partially, as a share of income, then a larger donation that increases the perception of income may lower the perception of generosity. That is, a larger contribution could lead a donor to be perceived as rich yet stingy. Therefore, giving could result in a negative status return if generosity is valued more highly than income.

The authors use this formal example to derive hypotheses and then test these in a two-stage donation (lab) experiment. In this experiment, income endowment among donors was varied and the visibility of income and donations varied according to four different treatments: non-visible income and nonvisible donations; visible income and nonvisible donations; nonvisible income and visible donations; and visible income and visible donations. All the experimental sessions were conducted in the Pittsburgh Experimental Economics Laboratory located at the University of Pittsburgh.

Participants were seated together in groups of six, and each group member was assigned a number to enable easy identification. The experiment's first stage had the participants earn income by completing a 10-minute computerized math task. The compensation depended on how well each participant performed on this task relative to the other group members. The three highest-scoring participants in a group each earned \$35 and identification as a "Best Performer," while the three lowest scorers each earned \$15 and identification as a "Not Best Performer." In the nonvisible-income treatments, participants knew only their own income and the overall income distribution. In the two visible-income treatments they also learned each member's specific income; the information provided in these treatments eliminated any uncertainty about a member's type and conferred high-income status on the three highest performers and low-income status on the three lowest performers, as one could not use a large donation to acquire income-status.

When Donations Are Nonvisible, Income Visibility Increases the Donation Gap Between Low and High Performers



Source: Author's calculations.

After each participant learned his or her income, the experiment's second stage offered participants the opportunity to make a charitable contribution. Each participant was paired with a child whose house was extensively damaged by fire. Participants were asked to contribute funds to purchase books for the children they were matched with, told that these would be delivered by the American Red Cross, and told (truthfully) that no other organization would provide the children with books to help them cope with the disaster. Each participant chose how much to give to the child with whom s/he was paired. Donations could be made in \$5 increments, meaning \$0, \$5, \$10, and so on, but could not exceed the participant's earnings from the performance task (either \$15 or \$35). There were a total of 32 groups and 192 participants; 45 percent were male, and the participants' mean age was 19.6 years. The average individual's earnings from the study, net of donation, were \$19.90, plus an additional \$6 fee for attending.

The experimental design first identified whether there is evidence that income status influences contribution behavior. When donations were not observed by others, the variation in income-visibility allowed for an examination of income status. Then, the authors determined how contribution behavior responded to income visibility when donations were visible, to help assess the role played by generosity status. Finally, after providing evidence that both income status and generosity status exist, the authors examined the effect of donation visibility on giving when donation may signal both income and generosity.

Income status does affect donation behavior, and income visibility increases the donation gap between high and low performers.

KEY FINDINGS

- Income-status is part of the reason to give. When donations were not visible, income-visibility increased the high-performers' mean donation from \$7.30 to \$10, while it reduced the low-performers' mean contribution from \$4.80 to \$2.50. Likewise, the fraction of high performers who made a donation went up from 75 percent to 91.7 percent, while the fraction of low performers who made a donation decreased from 54.2 percent to 41.7 percent. The 37 percent increase in contributions from high performers differs substantially from the 48 percent

decline in the contributions made by low performers. These results establish that income status does affect donation behavior, and that income-visibility increases the donation gap between high and low performers. This differential response is consistent with a model in which an individual cares about others' knowing his or her relative income ranking, and where the potential benefit of acquiring status is a substitute for the individual's private consumption.

- Generosity-status is part of the reason to give. This finding is best illustrated by looking at the donation behavior of the low performers. When donations were nonvisible, low performers reduced their average contribution in response to income visibility. Yet when donations were visible, the change in income-visibility did not decrease their mean giving. Among the low performers, this differential response to income-visibility when donations are and are not visible offers evidence for the existence of generosity status.
- The effect of donation-visibility does not have a positive effect on giving when both income-status and generosity-status are present. The authors find a slight (insignificant) negative effect of donation visibility when income is nonvisible and heterogeneous. This result is mainly due to the reaction of low performers: in response to donation visibility, the low performers' average contribution concentrated around the \$5 level, reducing the instances of giving more than \$5.

IMPLICATIONS

This paper provides an example where donation-visibility does not have a positive effect, counter to the consensus in the literature based on previous studies. The point is that the studies conducted thus far considered only one source of status—either income status or generosity status—yet when several sources of status are considered, as is characteristic of many real-life situations, this positive relationship may not hold.

These results may help to explain why some charities choose not to announce donations at the end of a fundraising campaign. Organizations that solicit in circles where the names of donors do not confer information on individual incomes may fare better by not publicly disclosing individual contributions. If they choose to do so, they may benefit from including in the announcement the individual's job title or residential neighborhood, as these details may be taken as proxy indications of income.

More generally, this paper provides an example illustrating how false inference may be drawn when the relevant type space has multiple dimensions yet the analysis is restricted to only one of those dimensions. Although this point is illustrated in charitable giving, this conclusion likely holds in other environments as well.

About the Authors

Anat Bracha is a senior economist in the research department at the Federal Reserve Bank of Boston. Lise Vesterlund is the Andrew W. Mellon Professor of Economics at the University of Pittsburgh and a research associate at the National Bureau of Economic Research.

The Effect of Foreclosure on Boston Public School Student Academic Performance

by Katharine Bradbury, Mary A. Burke, and Robert K. Triest

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1312.htm>
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MOTIVATION FOR THE RESEARCH

Although the housing bust and subsequent Great Recession triggered many adverse consequences, the defining characteristic of the crisis was arguably the wave of mortgage foreclosures. Mortgage delinquencies and foreclosures increased much more sharply than is typically the case during a recession and early stages of economic expansion, and these were accompanied by a great deal of economic hardship. For example, as others have documented, foreclosures resulted in costly displacement of households and contributed to neighborhood blight in the form of vacant, ill-maintained homes. One study argues that foreclosures had negative impacts on health, suggesting that foreclosures may have had other non-obvious, adverse consequences. This paper investigates one potentially important channel through which foreclosures may have had additional negative consequences on foreclosed households: by affecting the academic performance of students whose families experienced a foreclosure, whether as homeowners or as tenants in foreclosed properties.

Mortgage delinquencies and foreclosures are typically precipitated by a combination of negative equity in a house and a negative shock to the homeowner's finances (for example, job loss, uninsured medical expenses, or divorce). Therefore, in investigating the potential negative effects on student outcomes, one faces the challenge of distinguishing between any direct impacts of foreclosures on academic achievement and the potential impact of unobserved economic shocks that precipitate (and precede) foreclosures. In drawing policy implications from their research, the authors are mindful of this problem and suggest that similar confounding might apply more broadly to investigations of the social welfare consequences of the foreclosure crisis.

RESEARCH APPROACH

The authors examine the effects of economic stress and foreclosures on school-age children who were directly affected by foreclosure between July 1, 2004 and June 30, 2010. They use a unique dataset that matches information on the academic performance of Boston Public School (BPS) students with real estate records indicating whether the student lived at an address involved in foreclosure and whether that student's parent or guardian was the property's owner or a tenant. The authors briefly discuss three important institutional factors relevant to this research: the composition of Boston's housing stock, the foreclosure process, and Boston's school assignment policy. They then estimate the effect of foreclosures on measures of academic performance, indicated by both standardized test scores and attendance.

Based on standard models of student performance and expecting that foreclosures disrupt students' lives similarly to other family economic shocks documented in the literature, the authors estimate regressions with student performance measures (test scores or attendance) as the dependent variable and, at a minimum, foreclosure measures and student characteristics as explanatory variables. In order to incorporate and examine some of the details regarding school assignment and housing mix that are idiosyncratic to Boston, they also sequentially control for students' housing and tenure type, school characteristics and neighborhood characteristics, and add as

explanatory variables measures of residential moves and student school changes over the summer and during the school year. After estimating simple linear regressions to explore partial correlations between student performance and the other included variables, the authors employ a lagged dependent variable specification and a student fixed effects specification to better control for student heterogeneity and arguably come closer to identifying causal relationships. Finding that leads as well as lags on foreclosure petitions are negatively correlated with school performance and that the lagged dependent variable specification reduces the size of the foreclosure coefficients close to zero, the authors infer that both the foreclosure and the drop in performance are likely attributable to economic stress or an economic shock affecting the student's family. The authors also explore the potential endogeneity of students changing schools by adding one-year leads of the October-to-June school change variables to the lagged dependent variable and student fixed effects specifications. In addition, the authors conduct a series of other robustness checks and conclude by discussing the implications of their results.

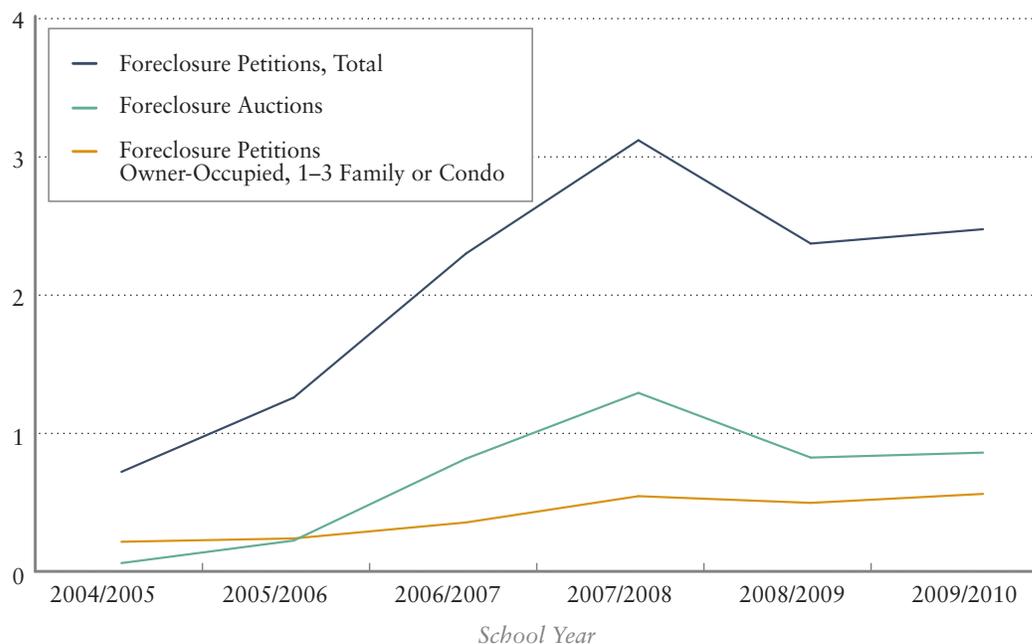
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Rather than having direct effects on student outcomes, foreclosure events stem from economic stress in the family, which also leads to lower test scores and spottier attendance.
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KEY FINDINGS

- Foreclosures are associated with slightly lower test scores and attendance, controlling for the previous-year's test score or attendance, other student characteristics, and environmental factors. The results suggest that rather than having direct causal impacts on student outcomes, foreclosure events stem from economic stress in the family, which also leads to lower test scores and spottier attendance for the children of such families.
- In addition, foreclosures may lead indirectly to more substantial negative impacts on student outcomes if the affected student changes schools during the school year as a result of the foreclosure, since the results indicate that school changes during the year—independently of foreclosures—have sizable negative effects on student performance. Although a completed foreclosure almost certainly precipitates a change of residence for the student, under Boston's broad-zone school assignment policies a residential move by a student does not necessarily mean that the student must change schools. Consequently, the authors can control separately for residential moves and school changes in the analysis. Interestingly, residential moves alone exert negligible effects on student outcomes, and therefore the policy that in some cases allows students to stay in the same school after a residential move—at least until the end of the school year—may reduce the cost of such moves relative to policies that link school assignment more strongly to residential location.
- While a foreclosure petition at a student's home is associated with a drop of about 0.05 standard deviation in the student's math or English language arts (ELA) test score (with the year in which that drop occurs differing between math and ELA), a school change between October and June typically reduces a test score by about one-fifth of a standard deviation. Thus, a student who experiences a foreclosure and then changes schools during the school year would see an average drop of about one-quarter of a standard deviation in his/her test score. However, this larger effect applies only to the 5 percent of students receiving foreclosure petitions who also change schools during that school year. This fraction is only slightly higher than the corresponding fraction of non-foreclosure-affected students who experience an October-to-June school change.
- Possibly because the authors cannot separately observe residential moves motivated by economic duress from other residential moves, the estimated effect of residential moves on test scores is insignificant. As a result, the estimates indicate that moves add to the eventual impact of foreclosures only insofar as they lead to nonstructural school changes.

Time Trends of Foreclosure Events Among BPS Students

Percent of BPS Students with Math or ELA Test Score Who Experienced a Foreclosure Event



Source: Author’s calculations based on data from the Boston Public Schools, the City of Boston Assessing Department, the Warren Group (foreclosure petitions), and Lauren and Timothy Lambie-Hanson (foreclosure auctions).

IMPLICATIONS

The regression results in this paper suggest that Boston Public School students who directly experience a foreclosure have slightly lower test scores and attendance, controlling for the student’s previous-year test score or attendance. The timing of this association is mixed, with math scores mostly lower in the year before a foreclosure petition, ELA scores weaker in the year after a foreclosure petition, and attendance lower in the year of or the year following the petition.

Using only BPS data, the authors have almost no independent indicators that might show whether economic stress such as parental job loss occurring before or along with the foreclosure (and perhaps its cause) affects individual students and their families; such indicators might enable them to distinguish foreclosures from other stresses. While it is reasonable to assume that different types of serious economic stress (job loss, illness, divorce, foreclosure) might have similar effects on test scores, the magnitude of the authors’ estimates based on observed foreclosure petitions is likely a downward-biased estimator of the true economic stress effect, because the authors are not “observing” and hence cannot control for any of the other serious stresses that are likely to reduce the test scores of BPS students who experience them. Although additional research is needed to sort out the channels through which foreclosures and other economic shocks may affect student school performance, the findings suggest that interventions to mitigate negative family economic shocks may have positive effects on students’ test scores.

School changes during the school year—independently of foreclosures—have sizable negative effects on student performance.

Furthermore, the more substantial negative relationship between changing schools and student performance suggests that foreclosure mitigation policy and or other policies to alleviate economic shocks might improve student performance by helping to reduce residential moves and hence school changes. By the same token, changes in Boston’s school assignment process—and associated transportation policies—will have implications for the incidence of school changes during the school year, and potentially for performance.

About the Authors

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w-13-13

How Many Cards Do You Use?

by Oz Shy

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1313.htm>
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MOTIVATION FOR THE RESEARCH

“Homing” is a term developed in the literature on payment methods and telecommunications to describe the practice of consistently using a single vehicle to conduct transactions when a number of alternatives are available. This article develops a method of measuring the extent of homing on a particular card type (debit, credit, or prepaid) as well as the extent of homing on a particular card network (Visa, MasterCard, American Express, or Discover). This investigation allows one to gain insight into the process by which consumers decide on which payment method to use, a process that is not directly observable by the researcher.

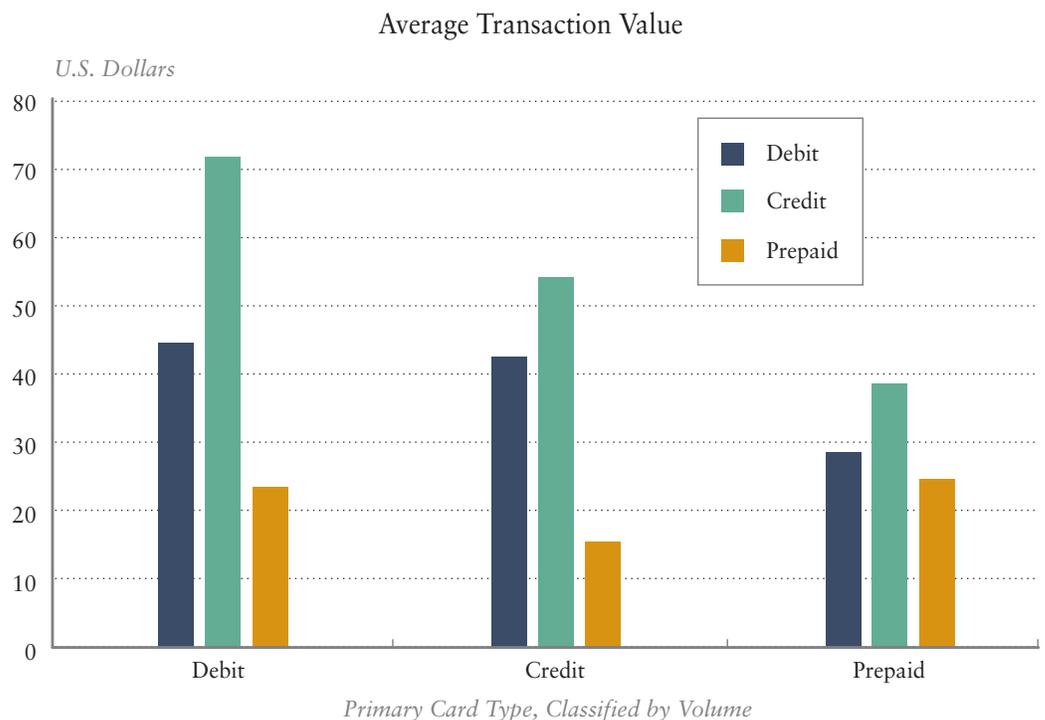
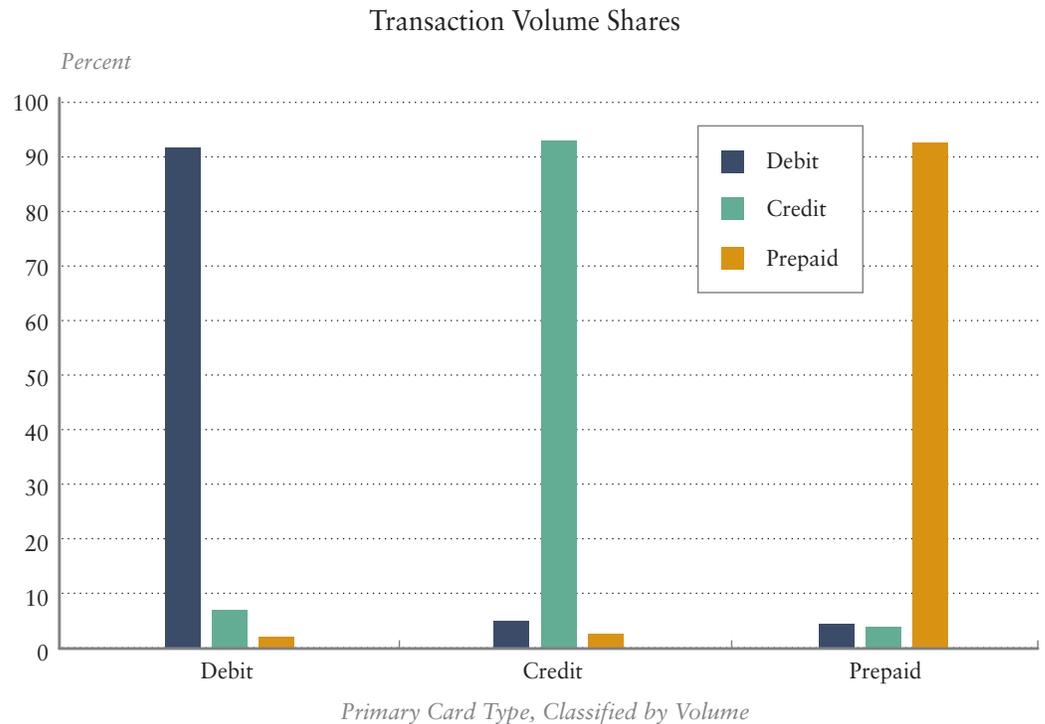
RESEARCH APPROACH

This paper uses transaction-level data and analytical techniques to investigate how individual consumers (not businesses) allocate their transactions among the three types of cards. The investigation concerns card use (how many times each card type is used in a given period), which is distinct from card adoption (the types of card a consumer possesses, regardless of use). The framework for the analysis is the author’s definition of the primary card type by the number of transactions (volume) and by the dollar value of transactions for the three types of cards. He extends the analysis to examine homing behavior on the card networks. Because the decision to use one type of card versus another type is related to the decision to adopt a card type, he also examines the connection between card use and card adoption. Finally, using probit regressions, the author investigates whether homing behavior is uniform throughout the U.S. population or whether specific groups of consumers home on a specific card type more than other groups.

The data used in this analysis were taken from the Boston Fed’s Diary of Consumer Payment Choice (DCPC), administered in October 2012. The DCPC collects data on the dollar value, payment instrument used, and type of expense (consumer expenditure category) of each purchase and bill payment, to complement the information in the Survey of Consumer Payment Choice (Foster et al. 2011). Matching across the two datasets was possible because all the diary respondents also participated in the SCPC, coded with a unique respondent identification number.

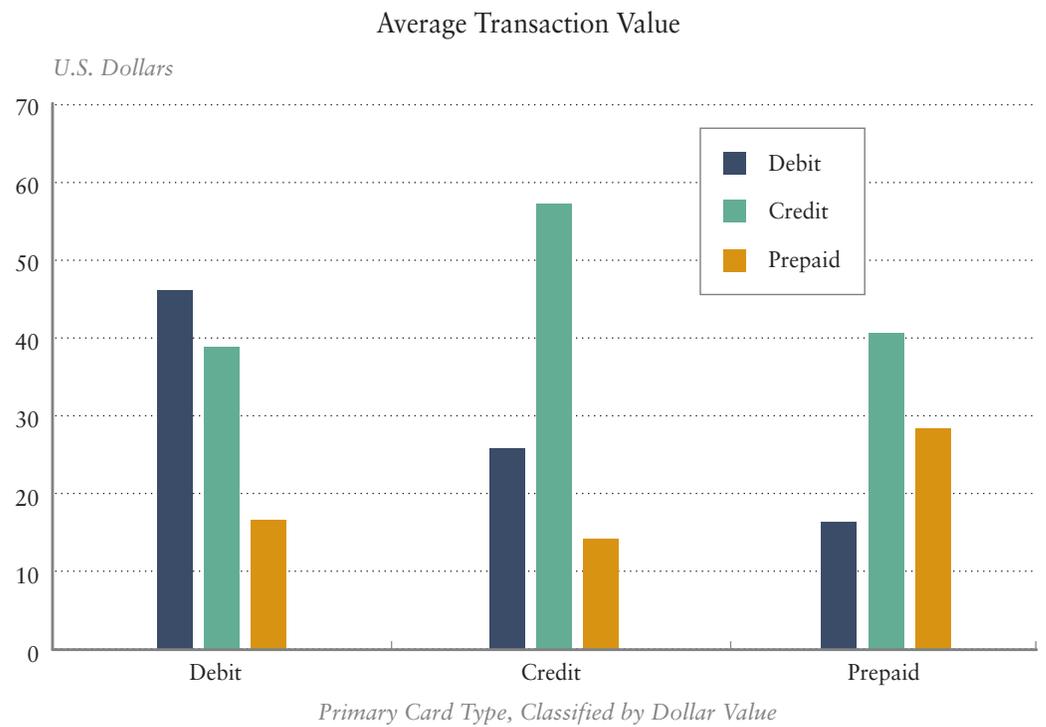
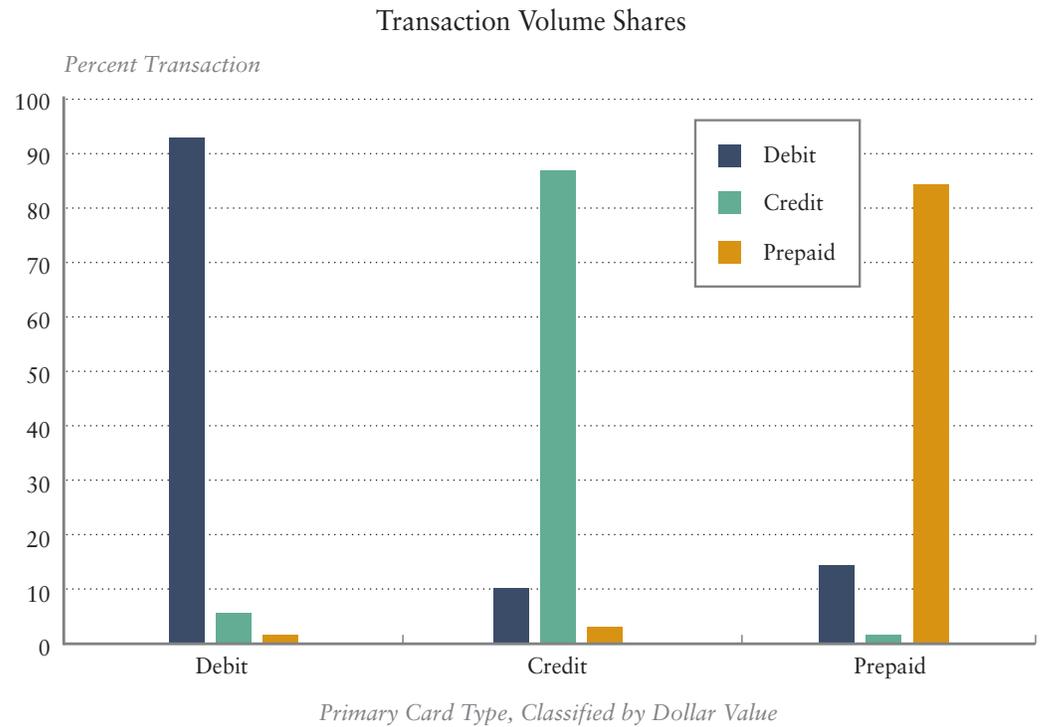
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Around 80 percent of card users concentrated all of their transactions on their primary card. On average, all consumer groups paid their highest-value transactions with credit, mid-value with debit, and lowest-value with prepaid.
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Transaction Volume Shares and Average Transaction Value of Primary Cards Over a Three-Day Period, as Defined by Highest Number of Transactions



Source: Author's calculations based on the 2012 Diary of Consumer Payment Choice.

Transaction Volume Shares and Average Transaction Value of Primary Cards Over a Three-Day Period, as Defined by Largest Dollar Value



Source: Author's calculations based on the 2012 Diary of Consumer Payment Choice.

KEY FINDINGS

- The majority (around 80 percent) of card users concentrated all of their transactions on their primary card. The results are similar when primary cards are defined by dollar value rather than by the number of transactions.
- If we define a consumer's primary card as the one used most by volume, then, on average, (a) consumers concentrated 91 to 92.3 percent of their transactions on their primary card type (either debit, credit, or prepaid); (b) consumers whose primary card type was either debit or credit placed the smallest share of transactions on prepaid cards (2 to 2.7 percent); and (c) consumers whose primary type was a prepaid card placed a slightly higher share of transactions on debit cards than on credit cards (4.4 percent versus 3.8 percent).
- Regardless of a consumer's primary card type, all consumer groups, on average, paid for their highest-value transactions with credit, their mid-value transactions with debit, and their low-value transactions with prepaid cards. This may be because consumers prefer not to be charged immediately for high-value transactions but do prefer to be charged immediately for small transactions. All three results are significant at the 95- or 99-percent levels.
- Looking at homing on card networks, where the primary network is defined by the number of transactions (volume), buyers placed more than 95 percent of their debit card transactions and more than 85 percent of their credit card transactions on a single network. Specifically, the percentage of debit card transactions placed on the consumer's primary network by volume, on average, for the relevant networks was 95.2 percent for Visa, 95.8 percent for MasterCard, and 100 for no logo (prepaid) cards. The percentage of credit card transactions placed on the consumer's primary network by volume, on average, for the relevant networks studied was 88.5 percent for Visa, 87.8 percent for MasterCard, 89.3 percent for Discover, and 86.5 percent for American Express cards.

IMPLICATIONS

One possible conclusion from observing consumers' homing tendency might be that consumers prefer to organize their card payment behavior around a single set of attributes that are associated with a particular card type. Policymakers and regulators could learn from this because even if the aggregate data show that the three types of cards are substitutes, this paper shows that the degree of substitution at the individual level is low because an individual consumer tends to single-home on one card type that has the consumer's most preferred set of attributes.

If single-homing behavior is caused by a consumer's need to select only one set of attributes that is associated with only one card type, future research would benefit from consumer surveys that ask respondents to rank among sets (bundles) of card attributes. Most surveys ask consumers to rank the degree of importance of each payment attribute separately. However, in reality, consumers cannot gain from an attribute that is not available on a particular card type. Similar to the choice among cable-TV providers (where each provider may offer only a limited set of TV channels), a consumer's choice to home on a single card type is restricted to one of only limited sets of attributes.

About the Author

Oz Shy is a senior economist in the Consumer Payments Research Center in the research department at the Federal Reserve Bank of Boston.

Affirmative Action and Stereotype Threat

by Anat Bracha, Alma Cohen, and Lynn Conell-Price

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1314.htm>
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MOTIVATION FOR THE RESEARCH

The share of U.S. women pursuing higher education increased dramatically in the twentieth century, a rise that is strongly associated with affirmative action programs. During the period when the federal government first promoted affirmative action, the representation of females in the undergraduate population increased from around 35 percent in 1959 to over 50 percent in 1979. Despite the apparent success of affirmative action policies in the past and the use of such policies today to encourage women's advancement in the fields of science, technology, engineering, and math (STEM), where they are still severely underrepresented, many object to affirmative action. The main arguments against affirmative action are that the cost of obtaining proportional representation through preferential policies is too high, it reduces the quality of selected groups, and it stigmatizes members of the protected class. Affirmative action policies may harm the group they intend to help by producing a stereotype threat, which can put the individual at risk of conforming to a negative stereotype. A stereotype threat can be induced by priming—exposing people to a stimulus (prime) that reminds them of negative stereotypes associated with their group. For example, subjects might be asked to indicate their gender or may be told or reminded about achievement differences across groups on the relevant task. Since affirmative action policies are designed to single out disadvantaged groups for preferential treatment, such efforts may unintentionally remind beneficiaries of relevant negative stereotypes and induce a stereotype threat. While the existing experimental studies that have investigated affirmative action find that such policies have positive effects, these studies have used an abstract environment or a real-effort task that renders it unlikely that a prime analogous to a real-life potential stereotype threat will be present. This paper adds to the experimental literature by using a real-life potential prime and a math task used in the graduate admission process, to investigate whether affirmative action policies may trigger a stereotype threat effect.

RESEARCH APPROACH

The experiment tested whether affirmative action affects how subjects perform on a test composed of questions taken from past quantitative portions of the Graduate Record Exam (GRE), a standardized test that is used in actual admissions decisions. Men stereotypically and in actuality perform better than women on the GRE's quantitative portion. In this incentivized setting, participants were paid for each correct answer and penalized for each incorrect answer, per the usual practice for scoring exams such as the GRE. To further examine whether affirmative action may serve as a prime that generates stereotype threat, the treatments for gender-based affirmative action varied in whether information about men's, on average, superior performance on such quantitative exams was presented to the participants assigned to these treatments.

The experiment consisted of three rounds of 10-minute math exams. After completing the last round, the participants filled out a questionnaire that asked them to self-report their quantitative and verbal SAT scores, their major, and the extent to which they exerted effort on the exam. The first round had noncompetitive incentives, so the score for this round was used as a proxy for the individual subject's baseline ability. In the second round, which is the

main focus of the analysis, participants were randomly assigned to groups composed of two men and two women, and they competed for a \$10 monetary prize, which simulated admission to graduate school. The groups competing in the second-round exam were randomly assigned to one of three conditions: the control condition, which had no affirmative action treatment; the affirmative action treatment condition; or the affirmative action and informational prime condition. In the control condition the \$10 prize was awarded to the group's top two performers, regardless of gender, while the two treatment conditions imposed a gender quota where at least one winner must be a woman. The affirmative action and prime condition gave an informational stereotype prompt to the subjects before they began the math exam. This manipulation was used in order to compare the effect of the quota policy alone, which may convey information that acts as a stereotype prime, to a direct stereotype threat prime that is similar to primes used in previous studies. The authors analyzed the second-round scores separately for each gender, controlling for ability using first-round scores, age, self-reported SAT scores, and major. In the third and last round, the subjects were paid according to their score, as was done in the first round. The experiment was run on computers in the Harvard Decision Science Lab and all the participants were undergraduate or graduate students attending Harvard University. A total of 248 subjects participated in the study, 80 in the control condition, and 84 in each of the two treatment conditions.

KEY FINDINGS

- Women with low baseline ability perform significantly better under affirmative action, while women with high baseline ability perform significantly worse. Affirmative action has no effect on men's performance.
- Affirmative action's negative effect on the performance of high-ability women is surprising, given that there is no evidence this result is driven by a response to a single-gender competition or by reduced effort. Instead, this result is due to a reduced success rate under affirmative action, which nicely illustrates the effect of stereotype threat. The fact that it is found among high-ability women and not lower-ability women may be a result of this latter group of women receiving an encouragement effect—a real chance for success—that overcomes the negative effect of the stereotype threat. High-ability women do not enjoy the same encouragement effect: since affirmative action does not alter their marginal probability of winning, they are left with only the negative effect.
- With and without the quota, there was no statistically significant difference in the winners' second-round average test scores. This result suggests that implementing the gender-based quota does not lower the quality of the group of winners.

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The negative effect on the performance of high-ability women is due to a reduced success rate under affirmative action, which nicely illustrates the effect of stereotype threat.
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IMPLICATIONS

Using a laboratory setting for an incentivized and competitive environment that is analogous to a real-life situation, the results show that affirmative action affects how women perform on the quantitative portion of the GRE. But since this is the first study to examine the question of affirmative action and stereotype threat, the implications for the consequences of affirmative action should be taken with caution.

About the Authors

Anat Bracha is a senior economist in the research department at the Federal Reserve Bank of Boston. Alma Cohen is a professor at the Eitan Berglas School of Economics at Tel Aviv University, and Lynn Conell-Price is a Ph.D. candidate at Carnegie Mellon University.

Modeling Anchoring Effects in Sequential Likert Scale Questions

by *Marcin Hitczenko*

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1315.htm>

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MOTIVATION FOR THE RESEARCH

The prevailing attitudes among the individuals of a population are of interest to researchers in a variety of fields, from economics to psychology to public opinion research. Examples include a consumer's opinion of a product or a potential voter's stance on government policy. Such quantifications of individual beliefs are most often measured in surveys through Likert-scale questions (Likert 1932), which ask respondents to map their opinions onto a discrete set of polytomous, and usually ordinal, responses. For example, one might be asked to assess the degree to which one agrees with a statement on a scale of five response options ranging from "disagree strongly" to "agree strongly." It is often the case that a survey asks respondents to provide Likert-scale responses to a consecutive series of related questions.

Cognitive science research has produced an impressive body of work showing that virtually all aspects of a Likert-scale question influence the survey responses. How the questions are worded, response option, and the number of ratings made available to the respondent have all been shown to be important factors. In addition, survey methodologists have long been aware of "context effects," or survey-response biases that result from the interaction of the survey instrument with a respondent's cognitive process. Context effects take on many forms.

One type of context effect, generally referred to as an "anchoring effect," occurs when initial information is subsequently used by an individual, usually subconsciously, to inform judgments. Changes in the initial information tend to change the response outcomes. This paper focuses on a particular form of anchoring effect specific to a sequence of Likert-scale questions. The effect, which the author dubs "sequential anchoring," manifests itself by having the response to one question serve as an anchor for the response to the subsequent question. In the presence of sequential anchoring, the order of the questions matters, since a different series of anchors likely leads to different results. Sequential anchoring is a source of measurement error, which could result in a systematic bias in sample results. Much of the work that has identified the various sources of bias in survey questions has also provided insight into the effective design of such questions in order to best eliminate, or at least minimize, the bias. Virtually all of these efforts focus on surveying techniques and data collection. Overall, the effectiveness of these techniques is uncertain and seems to depend on the particular context. Interestingly, there is little research on quantitative methods to identify and measure the extent of the measurement bias after the data have already been collected. Though useful in practice, conducting such analysis is often difficult because context effects are hard to quantify. The nature of sequential anchoring, however, makes it well suited for statistical analysis, as it induces different distributions of responses for different question orderings.

The overall goal of this paper is to develop a stochastic model for a set of responses to a sequence of Likert-scale questions. Within this goal, the primary objective is to identify the presence of sequential anchoring, and a secondary objective is to measure the magnitude of its effect.

RESEARCH APPROACH

In this paper the author develops a latent Gaussian variable framework for question responses that capitalizes on different question orderings in the survey to identify the presence of sequential anchoring. He proposes a parameter estimation algorithm and runs simulations to test its effectiveness for different data generating processes, sample sizes, and orderings. Finally, he applies the model to data in which eight payment instruments are rated on a five-point scale for each of six payment characteristics in the 2012 Survey of Consumer Payment Choice (SCPC). In 2012, the characteristics rated were: acceptance, cost, convenience, security, ease of setting up, and access to payment records. Each instrument was to be rated on a five-point ordered scale. The author focuses exclusively on the assessment of instrument characteristics data and is less interested in making population-based estimates than in identifying a surveying phenomenon. Accordingly, he treats the sample of respondents in the SCPC as representative of the population of survey-takers rather than as representative of broader populations of interest such as the overall U.S. population.

KEY FINDINGS

- Although limited in scope, the simulation results suggest that the author's approach does well in rejecting the notion of sequential anchoring when it is not present. In addition, with data generated through the latent Gaussian model, the algorithm does well in identifying all parameters. However, the latent Gaussian model cannot correspond to all rating distributions. In the cases in which it does not, the accuracy of the estimated sequential anchoring effect will likely depend on how closely the model corresponds to the data.
- The simulations suggest that not many different orderings are necessary to determine the presence of sequential anchoring, although larger sample sizes inevitably help with parameter estimation.
- Fitting the model to the data for six payment characteristics from the 2012 SCPC shows evidence of sequential anchoring in all six cases, resulting in sizable differences in the properties of relative ratings for certain instruments. The quality of fit for the latent Gaussian model varies across payment characteristics as do the estimates of the sequential anchoring effect. The magnitude of the effect likely depends on the topic, so it is important to be careful in generalizing these results to a broader class of surveys. Nevertheless, the results suggest that sequential anchoring is generally present and that its effects on the sample data can be significant.

IMPLICATIONS

The potential for sequential anchoring bias is an aspect every researcher should be aware of when designing and analyzing a questionnaire. To this effect, the author highly recommends the randomization of the item ordering in Likert-scale sequences. Randomizing the ordering of items allows the researcher to test for sequential anchoring and possibly adjust certain sample statistics for its effects. If no evidence is found of sequential anchoring, the orderings can be ignored, and there is no inherent harm in the randomization.

Ideally, survey techniques that reduce or eliminate sequential anchoring could be developed. One option, for example, is to pose each question on a separate page or screen. However, sequential anchoring is only one of many potential context effects, and any change in the questionnaire could introduce discrepancies in the results.

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A natural extension of this work is to consider more complicated model structures for the latent process and the anchoring effect. Perhaps the most obvious step involves dropping the assumption that the sequential anchoring effect is fixed across individuals in the population. Allowing variation in the anchoring effect, either across classes of respondents or at the individual level, would presumably help to identify the low-variation individuals. Of course, this makes parameter estimation much more difficult, and it is likely that strong assumptions about the distribution of the anchoring effects would be needed.

About the Author

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w-13-16

Optimal Recall Period Length in Consumer Payment Surveys

by Marcin Hitczenko

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1316.htm>
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MOTIVATION FOR THE RESEARCH

Many academic fields, especially in the social sciences, rely on surveys to collect data to be used for inference about a population of interest. While the surveys themselves naturally vary in topic and mode, a particular class of question common to many is one that targets the frequency of a particular behavior among individuals.

With respect to behavioral frequency, there are two general approaches to data collection. The first approach asks for an occurrence rate over a generic period of time: for example, the number of purchases made in a typical week. The second approach asks for the number of times an event occurred in a specific period of time: for example, the number of purchases made in the past week. The properties and relative advantages of each technique have been studied and debated. This paper addresses only the latter approach, which appeals more directly to an individual's ability to recall.

What a respondent reports in a survey is not necessarily the truth, but rather the truth filtered through that individual's cognitive process. It is a given that there will be errors associated with recall. Survey responses have been shown to be influenced by virtually every aspect of the questionnaire design; if different recall periods tend to have different effects on the reported values, choosing one recall period over another could lead to less reliable results. This paper focuses on the relationship between the length of the recall period, and the accuracy of estimates based on the resulting survey data, in the context of consumer payment surveys. A consensus conclusion of existing research on the effect of the recall period on survey-based statistics seems to be that the optimal recall period varies with the behavior being surveyed. Therefore, one objective of this paper is to extend the analysis to the case of payment instrument use among U.S. consumers. The paper also studies the consistency of individuals' diary-reported cash activity with recalled cash activity for different recall periods, with the hope of using demographic information to predict optimal recall periods for each individual and, in turn, improving the efficiency of population estimates.

RESEARCH APPROACH

The analysis in this work involves combining data from an experiment on recall of payment use with data gathered by having consumers track payment activity in a diary for each of the four most frequently used payment instruments: cash, credit cards, debit cards, and checks. For the purpose of evaluating the quality of recall it would be ideal to pair recalled values with corresponding daily records of true behavior for the same periods of time, at least whenever possible. While there is hope of constructing such a dataset, no such database exists currently. Instead, the author relies on data combined from two different, but related, datasets, derived from the RAND Corporation's American Life Panel (ALP). The ALP is composed of individuals from other respondent pools who expressed interest in taking surveys on a variety of topics, and at the time of sampling consisted of around 5,000 recruits.

The Payment Recall Data (PRD), collected in an experiment co-designed by the Consumer Payments Research Center (CPRC) and the RAND Corporation, asks individuals to recall payment behavior over a variety of recall periods for each of the four major payment instruments. The experiment in its entirety incorporates several experimental factors into the design, so the resulting dataset allows for a wide range of analyses.

The PRD recruited 3,285 members of the ALP to complete an online survey five times, once every three months from July 2011 to September 2012 (each three-month period is called a phase). In each phase of the survey, the respondent was asked to assess the number as well as the dollar value of payments made with each of the four major payment instruments for four different recall periods. The result is 32 observations per individual: 16 corresponding to the number of payments made and 16 corresponding to the dollar value of those payments. The recall periods correspond to a day, week, month, and year. The "recall framework" changed from phase to phase for each individual. In the first phase, respondents were randomly assigned one of two frameworks: the first framed the questions in terms of number of payments within a "typical" time period, the second asked the respondent for behavior in a specified period of time. For the most part, the framework of each survey then alternated in the following phases of the study.

By comparing diary-based use data gathered in the 2012 Diary of Consumer Payment Choice (DCPC) with recalled estimates of the number of payments for various periods of time in the PRD experiment, the author studied the efficiency of estimates of the mean population use frequency as a function of the recall period length. The analysis was done under the assumption of a simple random sample from the population of interest and according to a model of payment behavior with variation resulting from day-of-week effects. The author compared mean-squared errors and biases of population estimates based on recall from four different recall periods.

The second major component of this work involved inference about the relationship between recalled values and an individual's mean behavior, for different recall periods. The intent was to see whether expected deviations of estimates based on different recall periods for individual frequencies could be related to individuals' demographic information. A strong relationship of this nature might suggest a sampling design based on assigning individuals different recall periods that could decrease the error of a sample-based estimate of the population frequency. This part of the analysis was done only for payments made with cash.

KEY FINDINGS

- Overall, optimal recall periods differed across instruments. Perhaps most interestingly, the daily recall proved not to be optimal for any of the instruments, and, other than for cash, was the worst by a sizable margin. As the mean-squared error is dominated by the squared bias for sufficiently large sample sizes, this is somewhat surprising, as one might expect shorter recall periods to yield less-biased results, since it is easier to enumerate events. Nevertheless, this phenomenon is consistent with other studies that show that recalled data often exceed diary-based estimates on topics as diverse as household food consumption, length of hospital visits, and extent of exercise.
- Hurd and Rohwedder (2009) explicitly suggest that the optimal recall period is related to the frequency of a behavior, with shorter recall periods better suited for more frequent behaviors. While the author finds consistent overestimation with daily recall, which was not measured in the aforementioned authors' study, the results for the other three recall periods seem consistent with this hypothesis.
- The author found no evidence of a demographic variable that is highly correlated with the accuracy of a recall period. Consequently, the results suggest that, at least for cash, a design in which everyone is asked for weekly recall is optimal. Although in a different context, Sudman and Bradburn (1973) found that in terms of recalling sick leave, only age, out of a set of measured demographic variables, was related to the quality of memory.

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For cash, a design in which everyone is asked for weekly recall is optimal. No evidence was found of a demographic variable that is highly correlated with the accuracy of the recall period.
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IMPLICATIONS

While the individual-level analysis did not yield a methodology for improving the efficiency of population frequency estimates, it does relate to a modeling framework that could potentially yield insights into the cognitive recall process. Specifically, it could illuminate the balance between reliance on enumeration of events and rate-based recall for different recall periods as well as the biases associated with each type of recall feature in the model.

An extension of the model to payment instruments other than checks requires the incorporation of a new variable corresponding to adoption of a payment instrument, since other than cash, anywhere from 10 to 25 percent of individuals identify themselves as people who never use a payment instrument. This variable is sure to influence use (in an obvious way) as well as recall.

The results in this work are based on the use of two distinct datasets. While both are taken from the American Life Panel and there is a significant degree of overlap in respondents, there is a possibility that a discrepancy in the samples may contribute to differences in recalled averages and diary-reported averages, thus affecting the conclusions. Similarly, the fact that recall occurs and relates to different portions of time than the three-day diary period could have the same effect. For these reasons, it would be beneficial to conduct the analysis for one sample in which recall and true payment behavior are recorded for each individual over the same period of time. As noted, the use of the diary as a proxy for the truth could also lead to false conclusions if diary results are systematically introducing a bias as well. Data based on official records are being sought for those payment instruments for which they exist.

About the Author

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Is Bank Debt Special for the Transmission of Monetary Policy? Evidence from the Stock Market

by *Filippo Ippolito, Ali K. Ozdagli, and Ander Perez*

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1317.htm>
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MOTIVATION FOR THE RESEARCH

While ample evidence exists that monetary policy has important effects on real investment, consumption, the valuation of financial assets, and aggregate economic performance more generally, there is no consensus on the precise channels through which the interest rate decisions of central banks bear implications for the real economy. An important strand of the finance and macroeconomics literature has been devoted to exploring the role of financial intermediaries in these channels, given their pre-eminent role in implementing monetary policy and in intermediating aggregate savings. Many of the empirical studies in this literature use variation across firms as a source of evidence, and their main challenge lies in identifying the degree to which individual firms use debt financed by banks.

This paper contributes to our understanding of the importance of financial intermediaries for the transmission of monetary policy by studying whether the stock prices of firms become more responsive to monetary policy shocks as their use of bank debt increases.

RESEARCH APPROACH

The authors employ a new direct measure of a firm's use of bank financing, computed as the ratio of a firm's bank debt to its total assets for publicly listed U.S. firms between 2003 and 2008. Combined with data on bank financial health, bank-firm linkages, firm financial constraints, and a novel database on interest rate hedging activities, this new measure enables them to provide evidence on the channels through which a bank-centered transmission mechanism might operate. The sample dataset consist of U.S. firms covered by Capital IQ (CIQ), CRSP, and Compustat from 2003 to 2008, excluding utilities (SIC codes 4900–4949) and financials (SIC codes 6000–6999). The authors focus on this period because they do not have wide coverage of bank debt data before 2003 and there is no widely accepted measure of monetary policy shocks after the federal funds target rate hit the zero lower bound in June 2008.

The authors explore two channels through which a firm's use of bank financing might influence the sensitivity of its stock price to monetary policy. The first channel, typically referred to as the bank lending channel, is based on theories arguing that financial frictions faced by banks amplify the impact of monetary policy shocks. These theories rely on some failure of the Modigliani-Miller theorem for banks, in the sense that the supply of credit by banks is affected by variations in the strength of their balance sheets, which themselves might depend on the stance of monetary policy. An implicit assumption of the bank lending channel is that some firms are unable to substitute alternative sources of financing at a low cost for their banking relationships. The authors provide evidence that the use of debt financed by banks affects the sensitivity of stock returns to monetary policy surprises more strongly for unrated and young firms, which are more likely to have limited access to alternative sources of finance. To test for the existence of a bank lending channel, the authors follow Kashyap and Stein (2000), Kishan and Opiela (2000), and Jimenez et al. (2012) and use bank size and the bank capital ratio as measures of bank financial health. They address the potential endogeneity in firm-bank relationships by investigating which firm

characteristics are relevant for the match between firms and banks. Additionally, they instrument for bank financial health using the instrumental variables approach proposed by Ashcraft (2008), Berger et al. (2005), and Berger and Bouwman (2013).

The second channel is based on the widespread use of floating-rate agreements in bank loans and the prevalence of fixed-rate agreements in nonbank liabilities. As monetary policy changes have a direct impact on the reference rates used in the floating-rate agreements, one would expect these changes to be reflected mechanically in the cost of existing bank loans for firms. This suggests that bank debt may be special for the transmission of monetary policy because, for firms that use bank debt extensively, a variation in federal funds rates is more likely to affect interest rate expenses and therefore profits. The authors call this channel the interest rate pass-through channel. In the presence of financing frictions, the impact of this channel could be amplified by the effect that higher interest expenses have on the firm's liquidity position and net worth. The authors test the interest rate pass-through channel by exploiting the fact that many firms hedge against interest rate risk by converting their floating-rate liabilities to fixed-rate liabilities through the use of interest rate swaps and other derivative contracts. They confirm the robustness of the results using an endogeneity test guided by asset pricing theory and an analysis of firm characteristics that drive the use of bank debt.

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Stock prices of firms with more bank debt are more sensitive to monetary policy. The sensitivity is greater for firms that do not hedge against interest rate risk and do not borrow from weaker banks.
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KEY FINDINGS

- The stock prices of firms with more bank debt react more strongly. In particular, the stock price of a firm with a two-standard-deviation higher value of the measure of its use of bank debt decreases by about 1 percent more in response to a 1-percentage-point surprise increase in the federal funds rate. This effect is economically very significant, as the results also show that a firm's stock price decreases by about 4 percent on average in response to a 1-percentage-point surprise increase in the federal funds rate, meaning that a two-standard-deviation greater use of bank debt strengthens the effect of monetary policy on stock prices by around 25 percent. This result is robust to controlling for firms' leverage, financial constraints, debt maturity, interest sensitivity of operating profits, and asset pricing risk factors.
- Firms' use of bank debt matters less for the monetary policy sensitivity of firms that hedge against interest rate risk than for that of those that do not hedge. These results are consistent with a channel that operates through a direct pass-through of policy rates to loans for a majority of bank debt users.

IMPLICATIONS

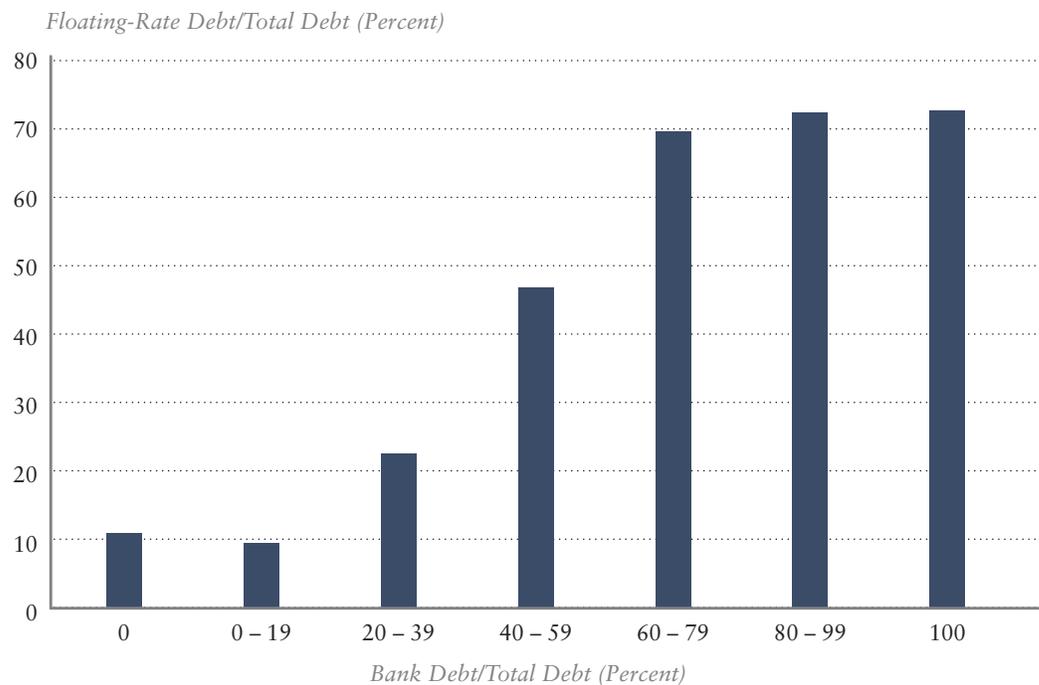
Overall, the results suggest that bank lending to firms plays an important role in the transmission of monetary policy and that there is significant heterogeneity across bank-dependent firms in their reaction to monetary policy shocks. In particular, the sensitivity of stock prices to monetary policy changes is affected by the extent to which a firm uses interest rate hedging, borrows from a financially healthy bank, or has access to other sources of debt financing besides bank borrowing. These results are important not only for academic economists and policymakers who are interested in the real effects of monetary policy, but also for investors who are interested in the exposure of their stock market portfolios to monetary policy shocks.

The results of this paper are relevant for several strands of the macroeconomics and finance literatures. They contribute to the literature that has studied cross-sectional heterogeneity in the reaction of firms to monetary policy shocks, which shows that following a monetary policy contraction, small firms' short-term borrowing declines, while large firms' borrowing

expands. Furthermore, the performance of small firms, measured by sales and inventories, deteriorates much more than that of large firms. While this evidence is consistent with a bank lending channel because small firms are more likely to be bank dependent, it is also consistent with a broader credit channel in which monetary policy contractions affect the general availability of external finance more for small firms. Other research has found that the stock prices of small, poorly rated, low cash flow, and high Tobin's q firms in the S&P 500 are relatively more responsive to monetary policy. This paper contributes to this literature by employing a direct measure of individual firms' use of bank debt that enables precise measurement of this use and that enables assessment of the quantitative importance of monetary policy transmission mechanisms that operate through bank lending. Furthermore, the authors also identify the factors that drive the heterogeneous effects of monetary policy within the sample of bank-dependent firms.

Several theories have been put forward to explain why financing frictions that affect banks may influence the transmission of monetary policy to the real economy. In each theory, monetary policy affects banks' cost of funds beyond the effect of the change in the risk-free rate, leading to an additional response in the supply of intermediated credit. In parallel, empirical work has tested the main prediction of these theories, in particular, whether financially fragile financial intermediaries contract their supply of loans relatively more following a tightening of monetary policy. Nevertheless, finding a relationship between monetary policy shocks and bank loan supply related to financing frictions at the bank level is a necessary but not sufficient condition for an operative bank lending channel. It must also be the case, as the authors' evidence suggests, that firms are unable to costlessly replace bank loans with other nonbank sources of finance. This paper thus contributes to this literature by evaluating how the financial health of a bank ultimately affects the response of its borrowers to monetary policy shocks.

The Relationship Between Bank Debt and Floating-Rate Debt



Source: Authors' calculations based on Capital IQ and Compustat data.

Addressing the importance of bank dependence, several papers have explored exogenous shocks to bank capital, such as foreign sector shocks, political events, or government policy changes, and have found that these shocks significantly affect investment spending, capital structure, or the performance of their borrowers. The results of this paper suggest that monetary policy shocks are also able to produce a sufficiently large impact on banks' balance sheet strength so that bank financial health plays an important role in the transmission of monetary policy.

Finally, with respect to contributions to the academic literature, most of the previous papers measure firms' reaction to shocks in bank loan supply using balance sheet variables such as capital expenditures, investment, or variations in bank debt. While informative, these studies might suffer from the problem that these variables are measured a long time after the bank capital shock or monetary policy event occurred, a time during which other shocks and indirect mechanisms might come into play. Most closely related to this paper in this respect are those studies that focus on the stock price reaction to bank lending supply shocks, none of which study bank lending supply shocks driven by monetary policy actions.

About the Authors

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w-13-18

Walking a Tightrope: Are U.S. State and Local Governments on a Fiscally Sustainable Path?

by Bo Zhao and David Coyne

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1318.htm>
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MOTIVATION FOR THE RESEARCH

For a number of reasons, policymakers, practitioners, researchers, and municipal bond investors alike have become increasingly concerned about the fiscal sustainability of state and local governments in the United States. First, the rapid growth in health care costs faced by state governments has exceeded the growth of these jurisdictions' revenue growth in recent decades. According to the Henry J. Kaiser Family Foundation, the nominal value of nationwide Medicaid spending grew about 10 percent annually between FY 1990 and 2004. This is much higher than the 6 percent average annual growth rate of nominal state general revenue during the same period. Consequently, Medicaid has replaced elementary and secondary education as the largest state spending category since FY 2009. It accounted for nearly 24 percent of all state expenditures in FY 2011 (National Association of State Budget Officers 2012).

Second, state and local governments face large unfunded pension and other post-employment benefits (OPEB) liabilities. Recent studies estimate that unfunded liabilities nationwide are around \$3 trillion for state-administered pension plans and \$1 trillion for state and local OPEB plans (Novy-Marx and Rauh 2009, State Budget Crisis Task Force 2012). These unfunded retirement benefits liabilities create large demands on revenue, potentially straining state and local budgets. Novy-Marx and Rauh (2012) suggest that without policy changes,

pension contributions would have to increase to 14.1 percent of state and local governments' total own revenue in order to achieve full funding of public pension systems over the next 30 years.

Failure to achieve state and local fiscal sustainability could have several negative consequences. First, it could shift the fiscal burden to future generations of taxpayers, creating intergenerational inequity. Second, state and local governments may have to severely cut back public services at some point in the future in order to balance their budgets. Such a disruption to public services would harm residents' quality of life and the local business environment. Third, the credit ratings of state and local governments could suffer, driving up their borrowing costs. In an extreme case, a severe lack of fiscal sustainability might induce investors to flee the municipal bond market, threatening the stability of the entire financial system (Cooper and Walsh 2010).

Compared with well-studied federal fiscal sustainability, state and local fiscal sustainability is a relatively new concept, and even its meaning is unclear and open to interpretation. The authors believe that state and local fiscal sustainability should refer to the long-term ability of state and local governments to provide public services that their constituents demand and are willing to pay for. This ability should be determined by each jurisdiction's economic, social, demographic, and other fundamental characteristics. Because it is a long-term concept, the authors believe that a measure of state and local fiscal sustainability should focus on fiscal trends and should not reflect the short-term influence of business cycles. This definition and the interpretation of this definition determine how the authors model and measure state and local fiscal sustainability.

RESEARCH APPROACH

The authors develop a new measure of state and local fiscal sustainability called the "trend gap," based on socioeconomic and other fundamental factors. They then estimate the trend gap using a panel data model with state and time fixed effects and remove the short-term influence of the business cycle, employing the high-employment budget approach. A larger trend gap indicates that state and local governments have lower long-term ability to raise revenues to meet public service demand and are therefore less fiscally sustainable.

The authors obtain revenue and expenditure data for 50 states and the District of Columbia from the U.S. Census Bureau's Annual Survey of State and Local Government Finances from 1980 to 2010. They combine state and local revenues or expenditures because combined state and local data are more comparable across states than state-only or local-only data, since different states choose to divide tax authority and service responsibilities differently. They examine all categories of state and local revenues and expenditures that, taken together, are far broader than general funds. In addition to the expenditure categories, the authors include actuarially required contributions (ARCs) to public pension and other post-employment benefits (OPEB) plans. They obtain ARC data from 2001 to 2010 from the Pew Center on the States (2010 and 2011).

The paper makes several contributions to the literature. First, the authors clarify the meaning of state and local fiscal sustainability, which has been unclear to many policymakers and researchers; then, based on the clarified definition, they develop a theoretical model, which the current literature lacks. Second, the paper employs an empirical framework that is more consistent with the definition of state and local fiscal sustainability than the ones used in

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The trend gap indicates the degree of long-term imbalance between the service demand and the revenue-raising capacity of state and local governments.
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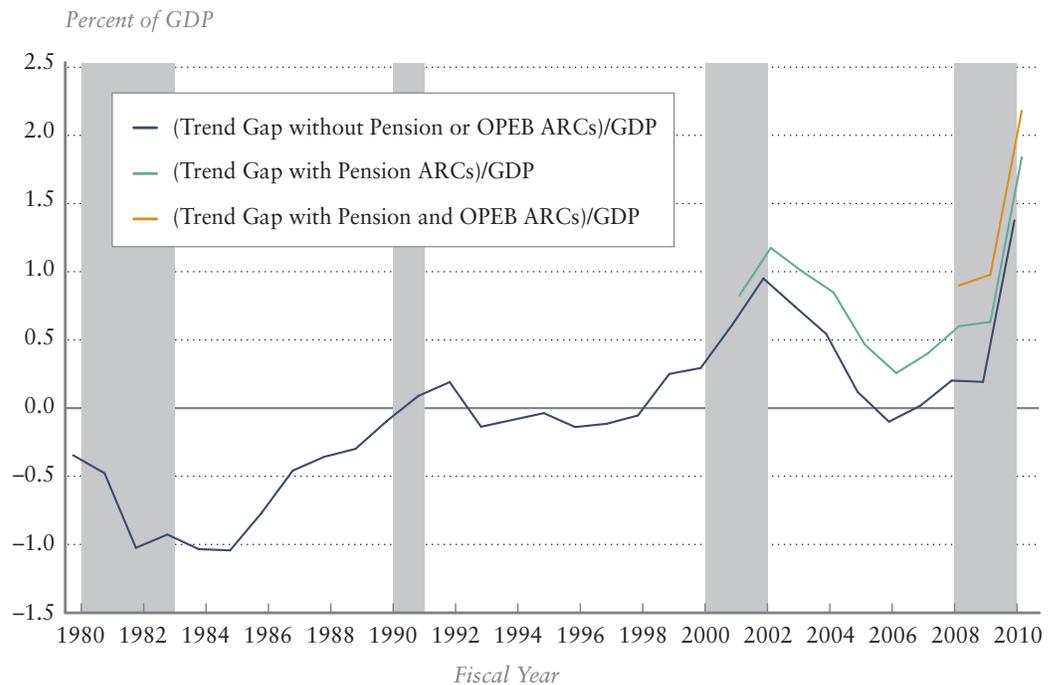
prior research; as a result of the improved methodology, the authors' findings about state and local fiscal sustainability in the United States differ from the results of previous studies. Third, this paper is the first to use ARCs to pension and OPEB plans as a component of the measure of state and local fiscal sustainability. Fourth, for the first time, the paper uses a panel data model with state and time fixed effects to estimate state and local fiscal sustainability. Finally, the paper examines disparities across regions and across states in the measure of state and local fiscal sustainability and explores factors that help to explain the disparities observed across states.

KEY FINDINGS

- Differing from GAO studies, this paper finds that the nationwide per capita trend gap has grown over the past three decades.
- The overall state and local government sector has faced a large trend gap in the last decade. The full trend gap, including pension and OPEB ARCs, reached over \$1,000 per capita in 2010. This means that excluding short-term cyclical influences, the revenue-raising capacity of state and local governments fell short of the amount needed to meet public service demand and fulfill long-term obligations by over \$1,000 per capita in 2010. Furthermore, because the method underestimates pension and OPEB ARCs, the true trend gap may be larger than the model indicates.
- Social service and income maintenance programs have played a major role in the growth of the trend gap. While pension and OPEB ARCs are still relatively small compared with other expenditure categories, they are becoming increasingly important in driving up the trend gap.

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The nationwide per capita trend gap has grown over the past three decades, with social service and income maintenance programs as a major contributor.

Trend Gap as a Percent of GDP



Source: Author's calculations, U.S. Bureau of Economic Analysis and the Pew Center on the States (2010 and 2011).

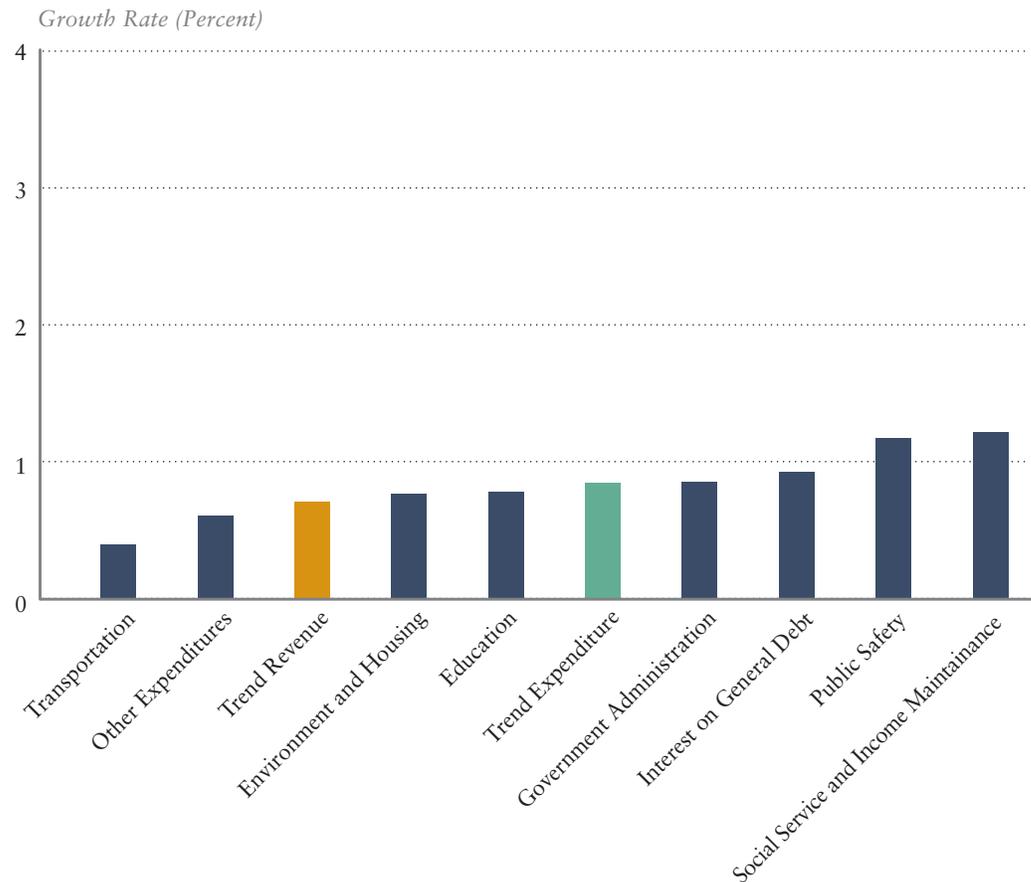
Note: Figures are U.S. population-weighted averages. Shaded areas indicate recession.

- There are large disparities across states in fiscal sustainability as measured by the trend gap. Overall, large-gap states tend to have a larger population, a higher unemployment rate, and a higher share of population that is 25 years old or older and either lacks a high school degree or holds at least a bachelor's degree.

IMPLICATIONS

This paper does not forecast future trend gaps, an area that deserves more research, given the great uncertainty surrounding ongoing pension and OPEB reform, efforts at federal deficit reduction, and the impact of implementing the Affordable Care Act. Nonetheless, this ex-post analysis is important and necessary because future projections should be based on an accurate measure of the current prospects for state and local government finances. When previous studies have projected future fiscal gaps, they have simply applied estimated long-term growth rates to actual revenues and expenditures of a base year. In so doing, they have implicitly assumed that the influence of business cycles and idiosyncratic factors in the base year will persist indefinitely. If the base year is a recession (or boom) year, such projections will likely overestimate (or underestimate) future gaps. Therefore, the authors recommend that future research employ the trend gap methodology, which would improve upon the projections made using previous approaches.

Average Annual Growth Rate of Trend Revenues and Trend Expenditures 1980–2010



Source: Authors' calculations.

Note: Figures are U.S. population-weighted average. The growth rates of pension and OPEB ARC's respectively, are calculated over the period of 2001–2010.

Because state and local governments face a number of downside risks, their fiscal sustainability may become more of a concern in the medium or even near term. First, the Congressional Budget Office expects the national economy to grow only moderately in the next 10 years. It forecasts the annual growth rate of potential GDP to be below 2 percent before 2015 and between 2 and 2.5 percent from 2015 to 2023 (CBO 2013). This is lower than its nearly 3 percent estimate of the average annual growth rate of potential GDP for the 1980-to-2008 period. Second, the CBO expects the nonaccelerating inflation rate of unemployment (NAIRU) to remain elevated for a considerably long period. It estimates that the NAIRU will remain at 5.5 percent through the end of this decade and then slowly decline to 5.3 percent in 2023 (CBO 2013). Third, federal grants to state and local governments will almost certainly be cut in the near future. The cuts in federal grants are potentially large and may cause considerable fiscal stress to state and local governments. Moreover, a larger portion of state and local pension and OPEB liabilities may turn out to be unfunded as more data are disclosed. Because these are serious downside risks and largely outside the control of state and local governments, it is unlikely that trend gaps will decline significantly in the near future.

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w-13-19

Not So Fast: High-Frequency Financial Data for Macroeconomic Event Studies

by Ali K. Ozdagli

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1319.htm>
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MOTIVATION FOR THE RESEARCH

Cleanly identifying macroeconomic shocks and their effects on the economy has been a formidable challenge facing macroeconomists, especially because of the lack of controlled experiments in macroeconomics. Since the 1970s, the main tools in macroeconomists' toolbox have been Sargent/Hansen-style structural econometrics and Sims-style vector autoregressions, which earned their respective pioneers Nobel Prizes in 2011 and 2013. However, more recently, the increased availability of high-frequency financial market data and our improved understanding of how financial markets function allow us to use the controlled release of macroeconomic news as a quasi-experiment, especially for studying the relationship between macroeconomic shocks and asset prices.

As pointed out by Gürkaynak and Wright (2013), the main identification assumption of high-frequency (intraday) event studies is that the market quickly incorporates the information from announcements into asset prices. This assumption, combined with the lumpiness and knowledge of the precise timing of the announcement, allows the researcher to specify a narrow event window around the announcement times that not only captures the full effect of the announcement, but also is free of contamination from other shocks to the economy. Because this assumption seems plausible to researchers and its implementation is relatively easy, intraday event studies have become increasingly popular over the last decade.

One implication of this assumption is that the reaction of asset prices to particular macroeconomic events should be independent of earlier news breaking on the day of the event, as the effects of earlier news should already have been incorporated into asset prices by the time of the event window. This paper tests this assumption—and hence the reliability of high-frequency event studies—by studying the reaction of asset prices to monetary policy announcements. The pre-announced timing of FOMC meetings makes these announcements especially suitable for event study analysis.

RESEARCH APPROACH

The author studies the relationship of changes in stock prices and Treasury yields to changes in federal funds future prices on FOMC announcement dates. These relationships are widely analyzed in high-frequency event studies to identify the effect of conventional monetary policy shocks on asset prices.

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Asset prices' reaction to monetary policy shocks is much stronger on FOMC announcement dates that overlap with other macroeconomic announcements earlier in the day.
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The data, which come courtesy of Refet Gürkaynak with the author's additions, consist of changes in the intraday prices of several assets on the pre-scheduled FOMC announcement dates; these dates were chosen in order to ensure that the results are not driven by timing shocks. The data include percentage changes in prices and level changes in yields for the interval of 30 minutes (–10 min, +20 min) and 60 minutes (–20 min, +40 min) around the time of the FOMC announcement. The author uses two different windows because each may be better suited to a different asset. On one hand, for more liquid assets, such as a stock price index, a tight window may be preferable because the tight window can capture most of the effect of the policy surprise on asset prices, whereas a wider window would lead to more contamination in the measured price reaction since the prices of liquid assets tend to be more volatile. On the other hand, for less liquid assets, a wider window may be preferable, to allow for the assets' delayed price reaction, resulting from the relative infrequency of these trades compared with the frequency of trades of more liquid assets.

The main regression relates the percentage change in the S&P 500 index or the percentage point change in the yield to the unexpected change in the federal funds target rate and to a dummy variable equal to one on an event date if this event date overlaps with another macroeconomic announcement, and zero otherwise.

To test the hypothesis that macroeconomic announcements released earlier on the same day might have different effects depending on how close their announcement time is to the FOMC announcement time, the author separated the announcements into different groups depending on when they occurred and checked whether those that were made later in the day, and hence closer to the time of the FOMC announcement, affected the sensitivity of asset prices to a policy surprise differently.

The author also tried a number of alternative regression specifications to refine the mechanism through which assets react to monetary policy shocks, none of which led to significant and consistent results across different assets.

KEY FINDINGS

- Asset prices have a significantly stronger reaction to monetary policy shocks on FOMC announcement dates that overlap with other macroeconomic announcements made earlier on the same day. The reaction of asset prices is stronger when markets are more volatile.

- Consistent with the earlier literature, stock prices increase by about 3 percent in response to a 1 percentage point surprise decrease in the federal funds target rate.
- There is no economically material and statistically significant additional effect of monetary policy surprises on dates that are one or two days after a macroeconomic announcement, compared with announcements on days that are not close to the dates of macroeconomic announcements.

IMPLICATIONS

These findings suggest that the limitations of investors in high-frequency markets, such as through rational inattention or asymmetric information, may matter in these event studies. Consequently, one should be cautious about arguing that high-frequency (intraday) event studies adequately address the contamination issues that plague methods that use low-frequency data.

About the Author

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w-13-20

Optimal Monetary Policy under Model Uncertainty without Commitment

by Anna Orlik and Ignacio Presno

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1320.htm>
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MOTIVATION FOR THE RESEARCH

A central bank's ability to achieve price stability depends crucially on how monetary policy helps guide what the public anticipates about future inflation, as these expectations greatly influence the path of actual inflation. The first theoretical models of monetary policy had the government setting its policy rule at time zero for all current and future periods while assuming that it had the ability to strictly adhere to this rule.

Kydland and Prescott (1977) and Calvo (1978) offered important critiques of these original models for monetary policymaking. Both studies argued that a central bank may not find it optimal to adhere to previously announced plans if it lacks a commitment device and instead chooses its policy rule sequentially. Assuming that no commitment device is available to the government seems quite realistic: monetary policies can be revised and reset quite often. Deviations from a previously announced policy would imply that the policy is time-inconsistent, thus introducing a credibility problem for the monetary authority. In equilibrium, the private sector anticipates the future policy actions that the monetary authority will actually undertake given its main objectives and therefore understands that an announced policy will not be followed; hence, there cannot be an equilibrium outcome if a profitable deviation arises in some state. Consequently, it is key that the monetary authority is presented with the right incentives, embedded in reputational concerns, to adhere to its announced policy path. It then becomes urgent for adequate policymaking to find mechanisms that could potentially substitute for commitment, or to incorporate the no-commitment feature into the economic environment, which is the direction that this paper follows.

To address the time-consistency issue, however, the literature has proceeded under the assumption that all economic agents, both the monetary policymaker and the private sector agents, hold rational expectations. Under the rational expectations paradigm, agents make the best use of the information available to take decisions. Traditionally, agents are modelled as if their beliefs about the underlying state of the economy coincide with its actual path. Agents could arrive at such beliefs, or, more precisely, the probability model embedded in them, after observing the economic dynamics for a sufficiently large number of periods, which in theory could take thousands of years. In practice, however, limited data availability makes this scenario infeasible, calling into question the validity of this assumption. Henceforth, this paper relaxes the assumption that the private sector fully trusts a single probability model that perfectly describes the evolution of the underlying state of the economy. Instead, it posits that the private sector contemplates a set of alternative probability models, which are hard to discriminate from one another given the data available. Agents will then seek decisions that perform well across all these models.

The fact that private agents may seem unable or unwilling to assign a unique probability distribution to alternative outcomes was first demonstrated in Ellsberg (1961) and later in other experimental studies, such as Halevy (2007). Also, in 2010 Chairman Bernanke noted that “the crisis should motivate economists to think further about modeling human behavior. Most economic researchers continue to work within the classical paradigm that assumes rational, self-interested behavior and the maximization of “expected utility.” . . . An important assumption of that framework is that, during the worst phase of the financial crisis, many economic actors—including investors, employers, and consumers—metaphorically threw up their hands and admitted that, given the extreme and, in some ways, unprecedented nature of the crisis, they did not know what they did not know.”

In this paper, the authors act on Bernanke’s advice that researchers should go beyond the expected utility framework used to model human behavior. Building on previous work, they develop a new theoretical model for designing optimal monetary policy. This model recognizes that private actors cannot form a unique probability model for the underlying state of the economy, so the government’s management of private beliefs becomes an integral part of monetary policymaking. To the best of the authors’ knowledge, this paper constitutes the first attempt to characterize the set of all time-consistent outcomes when agents are uncertainty averse in an infinite-horizon model.

RESEARCH APPROACH

The model builds on Chang (1998), which considers an economy populated by two types of infinitely lived economic agents, a representative household and a government. The household is averse to uncertainty and derives utility from consumption and real money holdings. The government chooses how much money to create or to withdraw from circulation by creating money to finance the transfers to households or destroying money through collecting taxes. Both taxes and transfers are distortionary. At the start of each period, the economy is hit by an exogenous shock, such as a productivity shock. The monetary authority uses a single approximating or reference probability model that is assumed to describe the evolution of this underlying shock, but the household fears that the government’s probability model is misspecified. To confront this concern, the representative household contemplates a set of alternative probability models that are statistical perturbations of the government’s model and seeks decisions that would perform well across these models. Consequently, the government wants to design an optimal monetary policy that explicitly takes into account the idea

that model uncertainty influences how the household forms its beliefs about the economy and how it forms its plans for consumption and holding money. The optimal policy is characterized for two different timing protocols for the government's policy choices: when it can commit to a policy that specifies its actions for all current and future dates and economic states, and when it chooses its policy action sequentially, period by period.

Taking insights from Kydland and Prescott (1980), the model first establishes the set of competitive equilibria when the government chooses the entire infinite sequence of money growth rates at time zero and is able to commit to this sequence. The set of competitive equilibria can be cast in a recursive fashion by using a pair of state variables that summarize all the relevant information about future policies and allocations for household decisionmaking. When maximizing its utility in any period after time zero, the government is bound by its previous-period promises of marginal utility and households' utilities. Under commitment, these promises must be delivered in the current period, a restriction that conditions the monetary authority's policy choice. The dynamics of the promised marginal utility and the household's value, which the government has to deliver in equilibrium, characterize the solution to the government's problem in this framework. This solution, known as the Ramsey plan, is typically history dependent. When the government has the power to commit, it chooses the best competitive equilibrium, meaning the one that maximizes the household's expected lifetime utility but under the monetary authority's own unique set of beliefs.

The second timing protocol assumes that instead of setting policy once and for all at time zero, the government chooses its policy at the beginning each period, a situation that potentially gives rise to credibility concerns. The household understands that the government will follow an announced policy only if it is in its own interest to do so. Since the household distrusts the government's probability model, it comes up with alternative probability distributions to guard against specification errors, as modeled by Hansen and Sargent (2007). In equilibrium, the household acts as if contemplating worst-case scenarios. The probability distributions inherited in these beliefs assign a high-probability distortion to states associated with low utility for the household, and a low-probability distortion to states associated with high utility for the household. To study optimal credible policies in this context, the authors extend the notion of sustainable plans, an idea developed by Chari and Kehoe (1990), to incorporate model uncertainty. A sustainable plan inherits sequential rationality on the government's side, while the household sector can only choose from competitive equilibrium allocations. Using the government's utility value as a third state variable, an appropriate incentive constraint for the government is constructed to complete the recursive formulation of a sustainable plan. This step gives rise to a new source of history-dependence given by the restrictions that the system of household expectations imposes on the government's policy actions in equilibrium. Recursive methods in the spirit of Abreu, Pearce, and Stacchetti (1990) and computational algorithms based on Judd, Yeltekin, and Conklin (2003) are used to fully characterize the equilibrium outcomes for a class of dynamic policy games played by the government and a representative household that distrusts the government's model. The authors use numerical examples to show how their model can be implemented to find the equilibrium value set for each state, both when the government can commit to its announced policies and when it cannot. Each equilibrium value may be supported by multiple equilibrium strategies. However, the characterization of the two equilibrium value sets and the discrepancy between them helps indicate the degree of severity of the time-inconsistency problem with and without uncertainty aversion.

KEY FINDINGS

- In the absence of misspecification doubts on the households' side, a large range of equilibrium values for the government, in general associated with a particularly low marginal utility value, or equivalently, high levels of current consumption, can be delivered only under commitment. These values are associated with monetary policies that involve alternating monetary contractions and expansions, with mild effects on the money supply, generating negative welfare implications for the households due to the accompanying tax distortions.
- The Ramsey plan is not time-consistent under rational expectations. The time inconsistency arises from the government's incentives to make the deflationary process ever more gradual in order to reduce the tax distortions that come along.
- The most striking result is that with model uncertainty the set of equilibrium values without commitment may overlap with the set of values under commitment. In contrast to the previous case, in this situation the Ramsey plan is credible and uncertainty aversion on the part of households has positive welfare implications for the government. The forces that drive these results are not triggered by the government's incentive constraints and its worst punishment values, which coincide in both economies, with and without model uncertainty, but rather by the dynamics inherent in competitive equilibria. With doubts about model misspecification, lower values of inverse money growth rates are consistent with a competitive equilibrium in this environment, and these conditions allow for more gradual monetary contractions and deflationary processes.

IMPLICATIONS

The characterization of the entire set of sustainable equilibrium values facilitates the examination of practical policy questions. When designing optimal monetary policies, accounting explicitly for the fact that households may have doubts about model misspecification can help to mitigate the time inconsistency of the Ramsey plan. The numerical examples provided by the authors suggest that government policies that account for the fact that households contemplate a set of probability distributions may lead to better outcomes.

While in this paper the authors confine their attention to the types of monetary-policy-making models cast in the spirit of Calvo (1978), their approach could be applicable to many repeated or dynamic games between a government and a representative household who distrusts the model used by the government.

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Technological Progress, “Money” in the Utility Function, and the “User Cost of Money”

by *Susanto Basu and J. Christina Wang*

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1321.htm>
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MOTIVATION FOR THE RESEARCH

The accurate measurement of service output has become increasingly important for correctly measuring gross domestic product (GDP) and productivity. Services now account for nearly 60 percent of U.S. GDP, and the share continues to grow. But measuring service output, especially with adequate quality adjustment, remains challenging. Within the service sector, financial services are among the most difficult to measure, since it is not clear how to measure nominal output, let alone real output. The main reason for this is that financial firms often do not charge explicit fees for their services. Instead, they routinely earn substantial income in the form of a positive interest margin—the spread between interest received and interest paid. This measurement problem is made even more challenging by rapid and massive expansion in the range and features of financial instruments offered by financial institutions.

In this paper, the authors study the issue of measuring financial services that are priced implicitly. To make the exposition intuitive, the services they model most closely resemble banks’ services to depositors. However, much of the paper’s logic carries over to analyzing bank services to borrowers and also applies to analyzing the services of nonbank financial institutions, such as insurance companies.

The literature that provides the theoretical foundation for this measurement method begins with Barnett (1978, 1980) and Donovan (1978). These papers, as well as those that follow, assume as a primitive that monetary assets enter consumers’ utility function directly. This assumption follows the shortcut to modeling money demand pioneered in Sidrauski’s classic paper (1967). It has been clear to monetary economists from the start of that literature that the presence of money in the utility function (MIUF) is a simplified representation of a more complex reality, where money somehow aids consumers by facilitating transactions. But without an explicit derivation giving rise to MIUF, it remained unclear whether this shortcut could ever be rigorously justified, and if so under what conditions.

Nearly 20 years later, such a derivation was finally provided. Feenstra (1986) used the tools of duality to show “functional equivalence” between money in the utility function and a class of general transaction cost functions in the budget constraint. Furthermore, he showed that those cost functions can be derived from a variety of money demand models in which money reduces the transaction costs of purchasing consumption goods.

Importantly, Feenstra (1986) showed implicitly that the MIUF formulation combines the consumer’s primitive preferences (which depend only on final consumption) with a technology for making transactions, which is assumed to be a function of consumption and real (money) balances. Both the consumer’s preferences and the transaction technology are assumed to have time-invariant functional forms. In the economics of measurement, it is standard to assume that preferences are stable over time. But it is definitely not common to assume that technologies are also constant. Indeed, one main objective of the measurement literature is to measure the growth of total factor productivity (TFP), which is typically understood to be a measure of technological change.

Feenstra's derivation leads to a natural question: in this era of massive financial innovation and deregulation, is it safe to assume that such transaction technologies are stable over time? If the transaction technology changes through technological progress in the financial sector, what are the consequences for the inspired shortcut of measuring real financial output as proportional to real balances? And if technology does vary over time, is Feenstra's functional equivalence result sufficient to guarantee that the implicitly priced real output of financial institutions will be proportional to the easily observed real balances of assets and liabilities?

RESEARCH APPROACH

The authors present a general-equilibrium model of the demand for monetary assets that follows the seminal work of Baumol (1952) and Tobin (1956), in which (1) there are transactions costs, (2) financial institutions provide services to reduce these costs, (3) providing services is costly, and (4) that cost is recouped via an interest margin. The model is set in a general-equilibrium model in order to understand how technological changes on the financial firm side affect the functional equivalence result on the consumer side. The authors use the model to analyze the conditions under which financial balances evolve in fixed proportion to financial services, and they apply the results to measurement of financial sector output, comparing their results to those of Feenstra (1986), since the Baumol-Tobin model is one of the specific cases he analyzes. In order to facilitate comparison with Feenstra's work, the authors formulate the consumer's problem similarly to Feenstra (1986), although they work in continuous time. One major difference is that Feenstra implicitly treats the demand for money—the medium of exchange in general—narrowly, as a demand for currency, whereas the authors of this paper abstract from currency altogether and model bank deposits as the sole form of money, since currency is now used for a rather small fraction of payments and accounts for an even tinier fraction of monetary assets in a modern economy.

KEY FINDINGS

- If there is either constant technology in all sectors or constant relative technological progress in banks (bank technology and goods-production technology grow at the same rate) but relative regress in other financial institutions, then there will be a one-to-one relationship between the real and implicitly priced service output of banks and the real balances of financial assets held by consumers for transaction purposes. In this case, real bank service output can be measured as proportional to real deposit balances. Unfortunately, this result is not robust.
- There is no stable MIUF representation if financial sector technology changes at a different rate than the technology for producing goods, in which case the ratio of bank service output to deposit balances becomes unstable as well. It is therefore no longer valid to use real deposit balances to construct an index of real financial output. This means that the approach proposed in studies such as Fixler and Reinsdorf (2006), although easy to implement and thus appealing, is valid only under conditions that are likely to be too restrictive. For example, one could never use output data from the asset-based approach to calculate TFP growth in financial services, since the output measure would be valid only if the relative TFP growth in banking were zero.
- Furthermore, Feenstra's (1986) functional equivalence result is not sufficient to guarantee a stable bank-service-to-deposit ratio. There are conditions under which there is a stable MIUF representation—that is, functional equivalence holds—yet the ratio of real bank services to real deposit balances varies over time. Consequently, it is not generally valid

to treat money in the utility function as a primitive and hence as the theoretical foundation for using asset balances to measure financial services output. This contrasts with the general validity of taking preferences over goods as a primitive.

- If the relative technology for producing financial services changes, then deflators, such as those implied by a set of real quantity indices of financial services—including the real output of various bank services to borrowers and depositors as traditionally measured by the Bureau of Labor Statistics (BLS) given nominal output—are unlikely to be proportional to interest rate differentials on the associated financial instruments, such as the interest rate spread between a bank's deposits and money market securities. Therefore, easily observed interest rate spreads unfortunately cannot be used as price deflators for real financial services.

IMPLICATIONS

In this era of rapid and pervasive financial industry innovations, unrealistically restrictive conditions are needed to obtain a fixed relationship between the quantity of a financial service and the volume of its associated financial instrument. This implies that a quantity index proportional to the real balance of financial assets is unlikely to be a robust proxy for the true real output of actual financial services. This conclusion is general, even though features of the transaction technology in the model are, for the sake of intuition, chosen to resemble payment services provided by real-world banks to their depositors and by mutual funds to their shareholders.

The bottom line is that using the real balances of financial assets to measure financial services output is most likely a reduced-form approximation at best. It should be utilized as a last resort if the data to construct real indices of transactions do not exist and cannot be collected. It should be regarded as the exception, but not the norm.

Therefore, instead of using real asset balances, one should construct quantity indices for financial services using the same methods used to measure other service sector outputs in general. In particular, it should be recognized that the services underlying financial transactions are qualitatively similar to professional services such as consulting and accounting. Real quantity indices can then be constructed for precisely defined financial transactions.

While these indices are typically more difficult to construct because the detailed data needed to construct the right quality-adjusted individual quantity indices are not readily available, they are strongly preferred conceptually. Furthermore, an index based on direct measures of service output yields an aggregate measure of financial services that is conceptually meaningful, whether the services are charged for implicitly or explicitly. This seems a particular advantage in an era of rapid innovation and increasing diversity in financial institutions' modes of operation.

The authors' results point to the need to reexamine the findings of a large literature analyzing the properties of banks' production technology. This literature features three approaches that differ only in what each defines as bank output. Once a type of activity is taken to be output, all three approaches invariably measure it using the deflated book value of the corresponding financial assets or liabilities. Given the substantial changes in the scope and mode of operations in banking institutions, such book-value-based output measures may have led to biased estimates of banking technology parameters, and in turn to flawed policies.

About the Authors

Susanto Basu is a professor in the department of economics at Boston College and a research associate at the National Bureau of Economic Research. J. Christina Wang is a senior economist and policy advisor in the research department of the Federal Reserve Bank of Boston.

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The Cost of Fiscal Policy Uncertainty: Industry Evidence of its Impact on the Labor Market

by J. Christina Wang

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1322.htm>
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MOTIVATION FOR THE RESEARCH

The recent government shutdown and apprehension about the realistic threat of the U.S. government defaulting on its obligations if the debt ceiling had not been increased in time raised once again the potential for serious damage to the U.S. economy from heightened uncertainty surrounding the nation's fiscal policy. A growing number of similar episodes, such as the debt-ceiling debate during the Summer of 2011, the tense fiscal cliff debate shortly before the turn of the year, and the subsequent sequestration, have been blamed for sapping the economy of momentum and contributing to the slow pace of recovery from the Great Recession. The weakness of this recovery, following an exceptionally deep recession, has surprised many, and the elevated sense of uncertainty has become a popular scapegoat explanation for the slow pace of growth. Much of the uncertainty seems focused on the federal government and related to the inability of the legislative and executive branches to reach consensus on a policy to achieve long-term fiscal sustainability.

Many existing studies of the effects of uncertainty on economic activity, especially those that rely on a structural approach, such as the use of dynamic stochastic general equilibrium (DSGE) models, focus on the impact of uncertainty on the aggregate economy. The merit of the structural approach notwithstanding, one of its potential drawbacks is that any inferences can be sensitive to model assumptions. Therefore, conclusions may be less than robust, or even erroneous, if the simplifying assumptions miss important aspects of reality. To complement those studies, this paper utilizes cross-sectional variation to help identify the impact of uncertainty, without imposing structural restrictions.

RESEARCH APPROACH

The premise underlying this paper is that cross-sectional heterogeneity in economic units' sensitivity to uncertainty—in this case, uncertainty about fiscal policy—likely leads to disparate effects across households or firms. The author uses employment data by industry—since these data are available at a monthly frequency in a timely manner, and relatively high-frequency data are presumably better able to capture the fairly short-lived impact of temporary uncertainty shocks—to study how the fraction of industry output eventually purchased by the government sector, particularly the federal government, varies across industries. Looking at episodes of heightened fiscal policy uncertainty in the period since the start of the Great Recession, the author examines whether employment growth was lower in industries that rely more on government demand than do other industries.

Since previous studies have shown that the key determinant of a firm's reaction to unexpected changes in uncertainty is the option value of waiting, the author considers two measures of employment that may be subject to different values of this real-options effect for any given degree of uncertainty. One measure counts all employees on the payroll (during each survey period), while the other counts only those classified as production and nonsupervisory workers. The former may be more sensitive to uncertainty

shocks because the option value of waiting to hire may be higher concerning workers not directly engaged in current production. For comparison, the author also examines how the adjustment dynamic of average weekly hours reacts to exogenous changes in uncertainty. Theory suggests that uncertainty should not affect firms' optimal choice of average hours once it is conditioned on the chosen number of employees, since adjusting average hours is generally understood to incur no cost.

The author explains how an industry's reliance on government demand is defined, summarizes the cross-industry pattern of this measure, illustrates the difference in employment dynamics when industries are sorted according to their reliance on federal demand, and estimates panel regressions for employees versus average weekly hours, both with and without controls for each industry's own output growth.

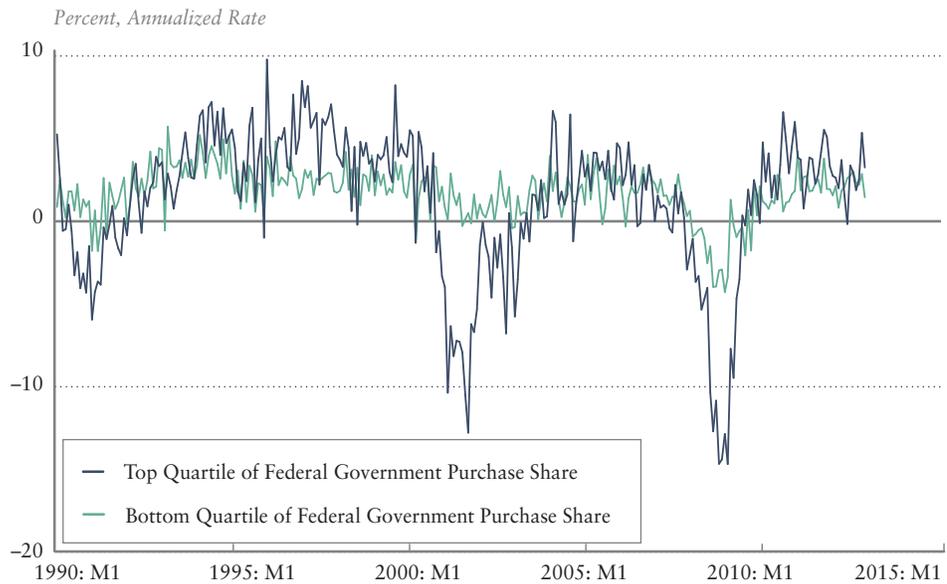
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Federal government demand counts for less than 5 percent of sales in three quarters of industries but over 20 percent of sales in a handful of industries.
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High levels of policy uncertainty retard employment growth.
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KEY FINDINGS

- Federal demand accounts for less than 5 percent of sales in up to three quarters of the industries, but for over 20 percent of sales in just a handful of industries. This suggests that the importance of federal demand and, in turn, the sensitivity to policy uncertainty, may not differ meaningfully for a large fraction of the industries. Instead, one is likely to detect significant differences in the impact of policy uncertainty only by comparing the handful of industries with a nontrivial reliance on federal demand with the remaining industries. Second, the share of ultimate industry sales to the federal government increased steadily over this period, especially between 2002 and 2010, but started to fall since 2010. This increase is somewhat skewed toward industries that are already highly ranked in terms of shares of sales to the federal government. The overall upward trend is consistent with the aggregate time-series of the share of federal government spending in GDP, and this is mostly driven by defense spending.
- Evidence shows that high levels of policy uncertainty retard employment growth. In particular, industries selling a relatively high fraction of their output directly and indirectly to the federal government tend to slow their payroll growth more than other industries when policy uncertainty is elevated, even after accounting for industry demand conditions. Moreover, this effect is nontrivial economically, although it is insufficient to fully account for the unusually slow employment growth during the Great Recession and the subsequent recovery. By comparison, the adverse effect of elevated policy uncertainty differs little across industries. There is some indication that policy uncertainty exerts a negative across-the-board influence on growth in both the number of employees and average weekly hours above and beyond what can be accounted for by output growth.
- In those manufacturing industries that sell a relatively high share of output directly and indirectly to the federal government, evidence also exists (albeit not particularly robust evidence) that increased policy uncertainty blunts firms' adjustment of the number of employees, especially those not directly engaged in current production, in response to changes of their own output. By comparison, average weekly hours become more responsive to output changes in all these industries when policy uncertainty is high. These findings are consistent with what some theories would predict: firms adjust labor input more along the intensive than the extensive margin when faced with heightened uncertainty because of the adjustment costs associated with the latter.

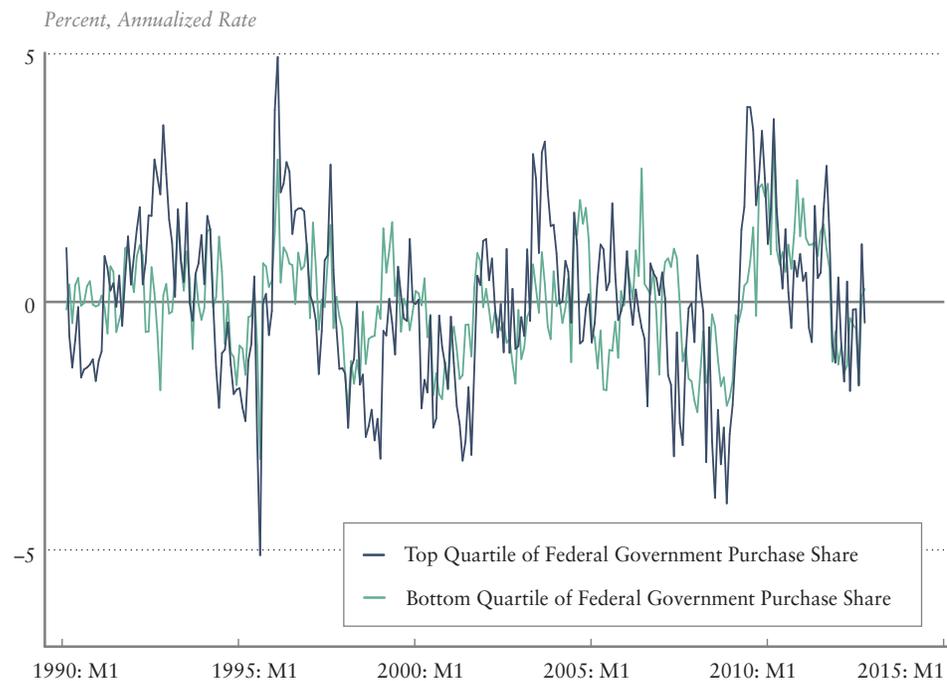
Growth Rate of Production Employees by Industry Group, February 1990 to March 2013



Source: Author's calculations.

Note: This chart compares the monthly growth of production and nonsupervisory employees between the top and the bottom quartiles of industries using the 2002–2007 average shares of direct and indirect sales to the federal government.

Growth Rate of Average Weekly Hours of Production Employees by Industry Group, February 1990 to March 2013



Source: Author's calculations.

Note: This chart compares the six-month trailing moving average of monthly growth of average weekly hours of production employees between the top and the bottom quartiles of industries using the 2002–2007 average shares of direct and indirect sales to the federal government.

IMPLICATIONS

One implication of these findings is that the government shutdown and debt-ceiling showdown in October probably created non-negligible drag on the economy in large part because these events raised policy uncertainty yet again. gyrations of stock prices around the few days when tense negotiations took place on Capitol Hill offer tangible proof of the deleterious impact of policy uncertainty. Moreover, at the time this paper was written, further harm to the economy seemed likely to result from anticipated continuing political wrangling, since the perception of uncertainty remained elevated, given that the debt ceiling was lifted only temporarily as was the extension of funding for the federal government. The most recent bipartisan budget agreement at the time this paper was written funded the federal government through the 2014 fiscal year. It did not, however, raise the debt ceiling, and thus the specter of another default scare early in 2014 remained present. Additional damage was seen to be inevitable if the political disagreement had not been resolved in time.

About the Author

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w-13-23

U.S. Consumer Demand for Cash in the Era of Low Interest Rates and Electronic Payments

by Tamás Briglevics and Scott Schuh

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1323.htm>
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MOTIVATION FOR THE RESEARCH

The new Survey of Consumer Payment Choice (SCPC) indicates that demand for cash by U.S. consumers has declined significantly during the past quarter century. The average stock of cash carried for transactions fell more than 30 percent in real terms since the mid-1980s (from \$112 to \$79) and the typical amount of a cash withdrawal fell nearly 50 percent (from \$261 to \$132). However, cash still accounts for more than one in four payments made by consumers, and the number of withdrawals actually increased.

New evidence on cash management comes at a potentially enlightening time to reevaluate money demand. During the financial crisis of 2007–2009, short-term interest rates dropped to near zero, so the opportunity cost of holding currency, rather than interest-bearing deposit accounts, essentially vanished. At the same time, consumer cash withdrawals increased and cash payments by consumers increased, according to Foster et al. (2011), even as the economy recovered. Furthermore, during the quarter century leading up to this unique period, the U.S. payment system experienced a transformation from paper instruments (cash and checks) to a wide range of payment cards and other electronic means of authorizing, clearing, and settling payments. Some technological developments affected the transactions costs of acquiring and managing cash as well. This paper estimates consumer demand for cash in an era of low interest rates and electronic payments.

RESEARCH APPROACH

Although the econometric specification in this paper is shaped by data availability, the model is quite similar to recent studies, with some differences in data sources and control variables. The econometric methodology follows recent attempts to estimate various forms of money

demand using cross-sectional micro data, as in Mulligan and Sala-i-Martin (2000), and Attanasio, Guiso, and Jappelli (2002), and especially as in Lippi and Secchi (2009).

The authors' contribution meets the challenge of Ireland (2009): "Finding additional sources of information about the limiting behavior of money demand as interest rates approach zero, whether from time-series data from other economies or from cross-sectional data as suggested by Casey B. Mulligan and Xavier Sala-i-Martin (2000), remains a critical task for sharpening existing estimates of the welfare cost of modest rates of inflation."

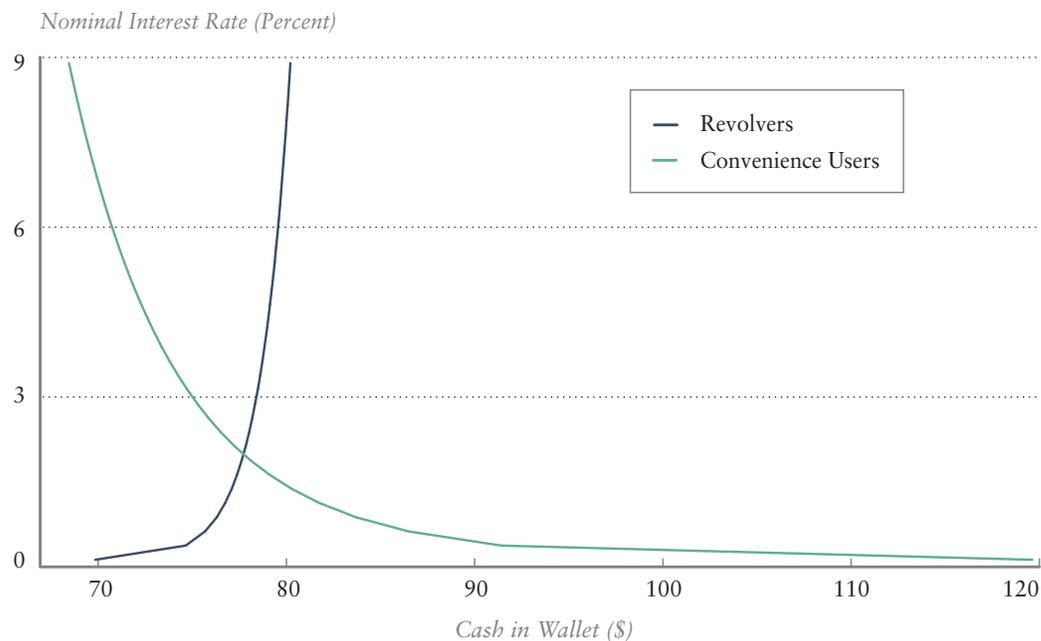
The authors' model also extends the literature in two ways. First, it incorporates a reduced-form test of the theoretical conjecture advanced by Sastry (1970) that credit card revolving debt should influence the consumer demand for money. Following the literature, estimation is based on an applied version of the Baumol (1952)–Tobin (1956) model (BT henceforth). However, the authors' econometric model separately identifies the interest elasticity of cash demand for credit card "convenience users" (those who pay their credit bill in full each month) and credit card "revolvers" (consumers who carry some credit card debt across months). Revolving debt in the United States has surged in importance since the mid-1980s, reaching \$1 trillion (a tenfold nominal increase) and 9 percent of disposable income (a threefold increase) by the time of the financial crisis. Second, the authors' econometric model controls for consumer payment choices (adoption and use of payment instruments) and cash management practices (withdrawals) that reflect technological changes and the transformation from paper to electronic means of payment.

The primary data source is the 2008–2010 SCPC, which contains comprehensive information on consumer adoption and use of all common U.S. payment instruments, including cash management practices. Each annual survey is administered to members of the American Life Panel, a representative sample of U.S. adults (18 years and older) developed by the RAND Corporation. The reporting unit is a consumer, rather than a household, although some household characteristics are included. The SCPC samples contain about 1,000 respondents in 2008 and 2,000 in 2009–2010, with a significant longitudinal component. Roughly 85 to 90 percent of respondents return each year, so the pooled time-series cross-section of SCPC data also forms an unbalanced panel with 715 panelists in all three years and about 1,900 in 2009–2010. The regression analysis focuses on the amount of cash usually withdrawn, on the cash-in-wallet measures, which may be most closely related to transactions balances, and on the number of withdrawals.

KEY FINDINGS

- Credit card borrowing seems to affect consumers' cash management practices, including the interest elasticity of cash demand, which depends directly on whether consumers carry revolving debt. Convenience users of credit cards exhibit essentially the same small, negative interest elasticity in 2008–2010 as estimated in earlier periods and with broader money measures (see, for example, Ireland 2009). In contrast, cash demand by credit card revolvers is interest inelastic. The underlying intuition of this result is simple: Convenience users take advantage of the interest-free grace period by settling more of their transactions via credit to reduce forgone interest income on cash holdings. But substitution from cash to credit is costly for revolvers, who accrue interest charges immediately after swiping their credit cards, so their cash demand may not respond when the opportunity cost rises.

Cash Demand Function of Convenience Users and Revolvers



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Revolvers' demand for cash is interest inelastic, while convenience borrowers' cash demand exhibits slight, negative interest elasticity.

Source: Authors' calculations based on the 2008–2010 Survey of Consumer Payment Choice.

- Technological factors, reflected in the transactions costs of acquiring and managing cash, have a significant impact on consumer demand for cash in the 21st century. Although the authors control for the primary cash withdrawal location, and they control for bank density or ATM diffusion as in previous studies such as Lippi and Secchi (2009), Amromin and Chakravorti (2009), and Carbó-Valverde and Rodríguez-Fernández (2009), they do not find evidence that bank density or ATM diffusion affects U.S. consumer demand for cash conditional on the primary location. However, some U.S. consumers now withdraw cash from nonbank sources, such as retail stores (cash back from a debit card purchase), financial stores (for example, check cashing), employers, and family members. These nonbank alternatives may supply cash at different transactions costs, which may influence the amount and frequency of cash withdrawals and holdings. The authors find that controlling for the consumer's source of cash in estimation is crucial to properly identifying money demand.

IMPLICATIONS

These findings may have aggregate implications for the welfare cost of inflation. Because revolvers' cash demand is interest inelastic, their demand curve is vertical and they are unlikely to reduce their cash holdings when inflation and short-term interest rates rise. And revolvers respond less to increases in the interest rate on short-term liquid accounts because that rate is significantly below the rate on credit card debt. According to the SCPC, a nontrivial share of consumers report having revolving credit card debt (29.5 percent in 2010), and these revolvers hold a nontrivial share (25.2 percent) of the stock of cash held by consumers.

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An Evaluation of the Federal Reserve Estimates of the Natural Rate of Unemployment in Real Time

by Fabià Gumbau-Brisa and Giovanni P. Olivei

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1324.htm>

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MOTIVATION FOR THE RESEARCH

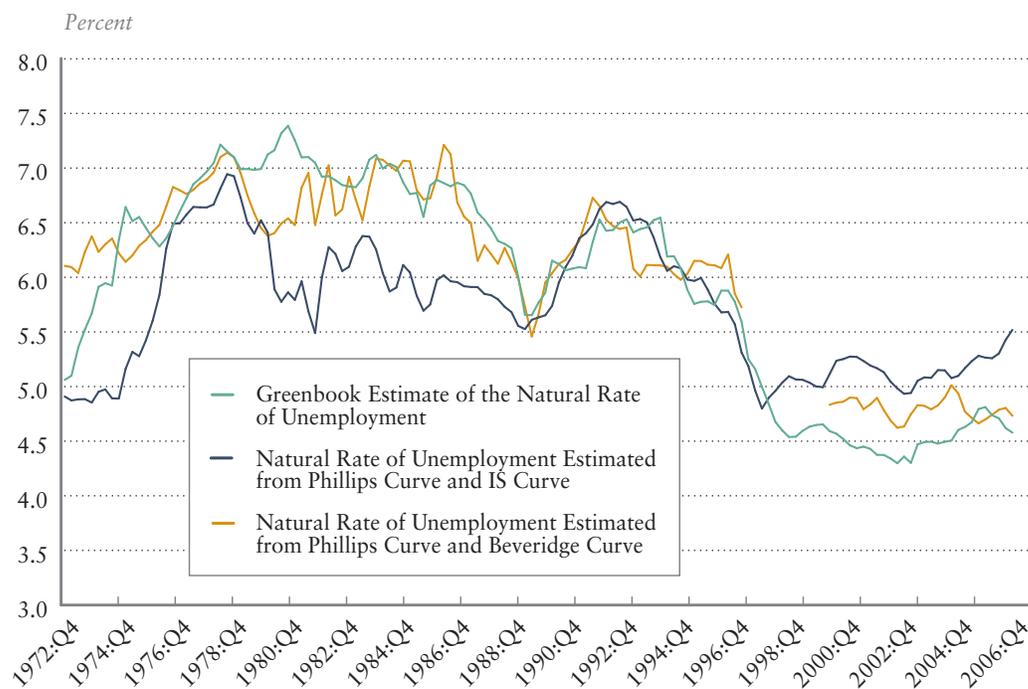
When conducting monetary policy, an important component of the inflation outlook is assessing the economy's degree of resource utilization. Yet it can be difficult to evaluate how far the economy is from the natural rate of unemployment, meaning full employment, particularly when the economy has moved markedly away from a pre-existing notion of equilibrium for an extended period of time. The persistent high unemployment rates present in the United States during the most recent recession and recovery episodes have engendered much debate on whether the natural rate of unemployment has changed as well. Inferring the degree of resource utilization has also been problematic in the past, and missteps in the conduct of monetary policy have often been attributed to an incorrect assessment of the economy's distance from full employment. The difficulties of making real-time assessments of the degree of economic slack as measured by the output gap have been extensively documented.

While real-time inference about the unemployment rate gap can be drawn from the functioning of the labor market as well as from typical aggregate macroeconomic relationships such as the Phillips curve, less work has been devoted to estimating economic slack in real time from a labor market perspective. There are some advantages to focusing on the unemployment rate gap, as GDP figures are subject to revision, while the unemployment rate does not get revised. There is also evidence that the unemployment rate has predictive power for future revisions of GDP relative to the real-time GDP reading. This paper revisits the issue of estimating activity slack by focusing on real-time measures of the natural rate of unemployment.

RESEARCH APPROACH

The authors develop a method for deriving real-time estimates of the natural rate of unemployment from the inflation forecasts contained in the Greenbook, the report produced by the Federal Reserve Board's research staff to support the Federal Open Market Committee in its monetary policy deliberations. The main premise is that the activity gap plays an economically relevant role in driving inflation, and that this relationship is reflected in how the Board staff approaches the inflation forecast. Essentially, the authors posit that the Greenbook inflation forecast can be described by a Phillips curve relationship, where the activity slack measure is defined in terms of an unemployment rate gap. Since the 1990s the Greenbook has consistently reported a real-time assessment of the natural rate of unemployment, but this assessment is not readily available for earlier periods. Hence, for earlier periods the authors must infer the staff's view of this measure by using the Greenbook's inflation forecast to back out a pseudo-estimate of the Greenbook's natural rate of unemployment, using information available in real time as explanatory variables. These pseudo-Greenbook estimates are compared with two real-time estimates of the natural rate of unemployment, one using the Phillips curve and a reduced-form IS equation, and the other using the Phillips curve and the Beveridge curve. These relationships extract information about the natural rate of unemployment from the dynamics of inflation, aggregate demand, and the functioning of the labor market.

Real-Time Estimates of the Natural Rate of Unemployment



Source: Authors' calculations based on data from the Board of Governors of the Federal Reserve System, the Bureau of Economic Analysis, and the Bureau of Labor Statistics.

The authors' analysis covers the period from 1970 through 2007. In the context of the Phillips curve relationship, the natural rate of unemployment can be considered as the unemployment rate that in the medium term stabilizes inflation at the level consistent with the perceived inflation goal. The pseudo-estimate of the Greenbook's natural rate of unemployment is modeled as a time-varying unobserved component when fitting a Phillips curve to the Greenbook's inflation forecasts. In addition to the unobserved unemployment rate gap, the fitted Phillips curve controls for inflation expectations, lagged inflation, and supply shocks. All of the variables are measured in real time, so their information content was available at the time the Greenbook inflation forecasts were made. A similar approach is used when estimating the benchmark models of the Phillips curve-IS curve, and the Phillips curve-Beveridge curve, so that the estimates of the natural rate of unemployment are comparable to estimates extracted from the Greenbook. The benchmark models are estimated on actual real-time data for inflation, while the Greenbook analysis exploits Greenbook forecasts of inflation. The estimates cover four different subsample periods: the 1970s, 1980 through 1985, 1986 to 1996, and 1997 through 2007. These periods were selected in order to account for the possibility of parameter shifts in the estimated relationships. For example, the third subsample period ends at 1996 to allow for the possibility that around that time the slope of the Phillips curve may have become flatter.

KEY FINDINGS

- All three real-time estimates show an increase in the natural rate of unemployment in the 1970s. The Greenbook estimates increase earlier than the estimates derived from the Phillips curve-IS model and catch up to the Phillips curve-Beveridge curve estimates by mid-1974. In the 1980s there is a broad correspondence between the Greenbook and the Phillips curve-Beveridge curve estimates, while the estimates obtained from the Phillips

curve-IS estimates are noticeably lower. From the late 1980s to the late 1990s, the three estimates are quite similar. From 2000 to 2007, the three estimates of the natural rate of unemployment are all low and near 5 percent, with relatively minor differences.

- When divergences arise between the two real-time estimates and the pseudo-Greenbook real-time estimates of the natural rate of unemployment, the improvement to the Greenbook inflation forecast that would have been achieved by using a different estimate is typically small.

IMPLICATIONS

In a similar study, Romer and Romer (2002) inferred the Greenbook's views about the natural rate of unemployment by using a simple back-of-the-envelope calculation linking changes in the Greenbook inflation forecast to the deviation of the unemployment rate from its natural rate. While this approach yielded noisy estimates of the natural rate of unemployment, the authors' approach imposes more structure and arguably produces a somewhat clearer picture of the Federal Reserve's real-time assessment of the natural rate of unemployment.

The results from the authors' Greenbook pseudo-estimates of the natural rate of unemployment are broadly consistent with the real-time estimates obtained from estimating a Phillips curve-IS curve, and a Phillips curve-Beveridge curve relationship. There is little evidence suggesting that the Greenbook's assessment of the natural rate of unemployment has been systematically lagging behind the two benchmark estimates.

About the Authors

Fabià Gumbau-Brisa was a senior economist in the research department at the Federal Reserve Bank of Boston at the time this paper was written. He is now a vice president at J. P. Morgan. Giovanni P. Olivei is a vice president in the research department at the Federal Reserve Bank of Boston.

w-13-25

Household Inflation Expectations and Consumer Spending: Evidence from Panel Data

by Mary A. Burke and Ali K. Ozdagli

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1325.htm>
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MOTIVATION FOR THE RESEARCH

In the United States, consumer spending accounts for about 70 percent of GDP. With nominal interest rates at the zero lower bound (ZLB), an important question for monetary policy is whether, as predicted in prior theoretical work, an increase in inflation expectations will boost current consumer spending. Since the nation's economy is still recovering from the Great Recession, some participants in recent monetary policy debates have argued that the Federal Reserve should commit to policies that raise expectations of future inflation—thereby bringing about a decline in real interest rates and encouraging more current spending. According to theory, purchases of large consumer durable goods and residential housing, items that are often financed with debt and are readily substituted across time, should be particularly sensitive to a decline in real borrowing costs, as might result from an increase

in expected inflation. The current economic environment offers an important opportunity to test the effects of variation in inflation expectations, as given the ZLB nominal rates should not be expected to move in a manner that fully offsets changes in expected inflation.

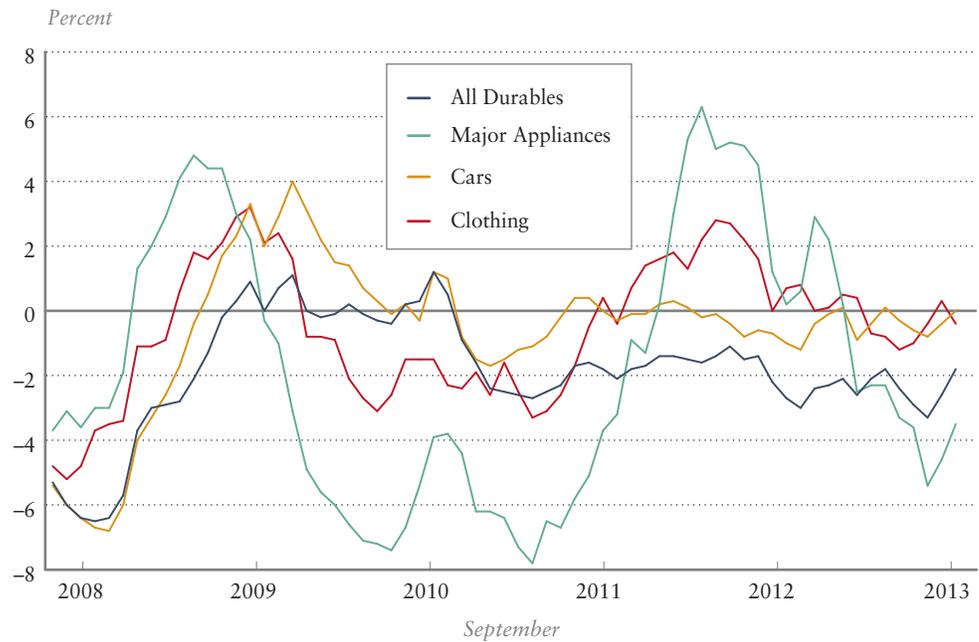
While microeconomic data are needed to identify a causal relationship between individual household inflation expectations and spending behavior, only two previous studies have used micro data to examine this relationship, but these have produced mixed results. Using data from the University of Michigan Survey of Consumers, Bachman, Berg, and Sims (2012) found no significant relationship between inflation expectations and the “readiness to spend” on durable goods. Using data from a Bank of Japan survey of consumer opinions, Ichiue and Nishiguchi (2013) found evidence supporting the prediction that in a ZLB environment, higher expected inflation boosts current spending. However, both studies relied on data with significant limitations. Bachman, Berg, and Sims (2012) used hypothetical “readiness to spend” data rather than actual spending data; though average “readiness to spend” is correlated with aggregate spending in the NIPA accounts, the relationship between individual readiness-to-spend and individual consumer spending is not observed. Ichiue and Nishiguchi (2013) used data on actual during-the-year spending changes and planned one-year-ahead spending changes, but these measures are subject to psychological biases that may limit their accuracy. Both these studies identified effects using behavioral variations across households rather than variation within households, and therefore were unable to control for unobserved heterogeneity among households. This paper uses survey panel data to examine the relationship between an individual household’s inflation expectations and its current spending, accounting for factors such as the household’s expectations for wage growth, the uncertainty surrounding its inflation expectations, macroeconomic conditions, and unobserved heterogeneity at the household level. Spending behavior is examined for large consumer durable goods and for nondurable goods and services.

RESEARCH APPROACH

The authors employ a panel survey dataset constructed from RAND’s American Life Panel (ALP). The dataset combines information from two different ALP survey modules over a set of individual households who completed both modules multiple times, resulting in an unbalanced panel of households observed over the period from April 2009 through November 2012. One survey module pertains to households’ economic expectations, including expectations of overall consumer price inflation and consumer interest rates, in addition to expectations for their own personal wage growth. The household spending measures come from a separate ALP module that polls participants about their recent spending on specific goods or categories of goods, including durable goods such as refrigerators and other appliances, as well as nondurable goods such as food and personal services. Previous-month spending on the nondurable items is observed monthly, over an unbalanced panel of individuals, for the period from April 2009 through November 2012, and the values are deflated using the overall consumer price index for all urban consumers (CPI-U) for 2012. Previous-quarter spending on the durable items is observed, again for an unbalanced panel of individuals, for the period from 2009:Q2 to 2011:Q2, and the values are deflated using the CPI-U appliances price index for 2012.

In matching the spending data for a given household with the expectations data for the same household, the goal was to identify, as closely as possible, the expectations held by the individual household at the time it made its spending decisions. To this end, the authors matched the nondurable spending data with the expectations data such that a household’s nondurable

Relative Price Changes for Specific Consumer Goods Categories



Source: Values are based on authors' calculations using CPI inflation data from Haver.

Note: A given plot represents the difference between the year-over-year percent change in the CPI-U for the specific goods category and the year-over-year percent change in the CPI-U All Items Index.

spending would have taken place during the same calendar month in which its economic expectations were reported. In the case of quarterly spending on durable goods, they identified the calendar quarter in which the spending took place, and then matched that quarter's spending data with the earliest-dated expectations data available for that household within that quarter. Because it is not possible to identify the specific month within a given quarter in which spending on durable goods occurred, the matching between quarterly spending measures and expectations is less precise than the matching between the monthly spending measures and expectations.

The estimation strategy calls for a measure of the household's expected, one-year-ahead real wage growth, a measure intended to isolate the predicted effects of higher expected inflation on consumption. This measure is calculated as the difference between the expected nominal wage growth reported by the household for the relevant time period and the same household's inflation expectation for the same period. The authors were not able to observe a household's real net worth.

As is typical of spending data, the dependent variables are highly right-skewed. In the case of nondurable spending, the data also include a significant number of zeroes, consistent with the infrequent nature of durable goods purchases at the individual household level. After comparing several candidate models, the authors determined that a generalized version of a Poisson model represents the most suitable choice in terms of goodness-of-fit and predictive power, for models of both nondurable and durable goods spending. The Poisson model is similar to the more-familiar log-linear model, with the advantage of being able to accommodate multiple zeroes and avoiding biases associated with the standard log-linear approach. For each Poisson model, versions were estimated with and without controls for unobserved heterogeneity at the individual household level in order to show the extent to which such heterogeneity drives the relationships between the variables. In all cases of model estimation, standard errors

were clustered at the level of the individual household. The authors controlled for common unobserved macroeconomic factors using time dummies—months or quarters, as necessary. Observations from individual households were used only if that same household was observed at least four times, whether in each of four months in the case of spending on nondurables, or in each of four quarters in the case of durable goods spending.

KEY FINDINGS

- In some models, spending on nondurable goods increased with short-run expected inflation, but the estimated average treatment effects were small and not highly robust. In the Poisson model with fixed effects, a 1 percentage point increase in expected one-year-ahead inflation raised current-month spending on nondurable goods, including clothing, food, health care, utilities, and a number of other goods and services, by 1.1 percent, or \$21.46 at the sample-average monthly spending level.
- The likelihood that individuals will purchase a car increases by 17 percent (over a baseline car purchase chance) when their short-run inflation expectations rise by 1 percentage point.
- Spending on big-ticket durable goods such as large home appliances and electronics does not increase with expected inflation, and may even decline. In most models the estimated effects were small, negative, and statistically insignificant. This result is surprising because theory predicts that spending on large durable goods should be more sensitive to real interest rates than spending on nondurable goods. A fact that might help to explain this counterintuitive result is that during a large portion of the sample period, prices for major appliances were falling, either in absolute terms or in relation to the overall consumer price index.

.....
The likelihood that individuals will purchase a car increases by 17 percent when their short-run inflation expectations rise by 1 percentage point.
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IMPLICATIONS

Overall, these findings offer only very limited support for the hypothesis that higher inflation expectations would boost current consumer spending. The evidence that inflation expectations may be less economically significant and less robust than theory, and some recent policy discussion, might suggest could be explained by income expectations, a prime culprit not much discussed in the existing literature. Consumers in the sample, on average, anticipated negative real wage growth, an expectation that was consistent with the fact that the U.S. median real wage exhibited declines between mid-2008 and late 2012. In this context, any incentives generated by higher inflation expectations to increase present consumption may have been blunted by concomitant expectations of falling real wages.

In terms of a bottom line policy implication, the findings suggest that raising inflation expectations may be insufficient for boosting present consumption, and in some cases higher inflation expectations may actually discourage consumer spending. This means that the broader economic context within which an increase in expected inflation occurs will likely be critical for determining how monetary policy that seeks to lower real interest rates by raising inflation expectations ultimately affects consumer spending. It is important to gain a better understanding of the relationship between inflation expectations and wage expectations as these evolve under various economic conditions.

About the Authors

Mary A. Burke and Ali K. Ozdagli are senior economists in the research department at the Federal Reserve Bank of Boston.

The Role of Economic, Fiscal, and Financial Shocks in the Evolution of Public Sector Pension Funding

by Robert K. Triest and Bo Zhao

abstract and complete text: <http://www.bostonfed.org/economic/wp/wp2013/wp1326.htm>
 e-mail: robert.triest@bos.frb.org, bo.zhao@bos.frb.org

MOTIVATION FOR THE RESEARCH

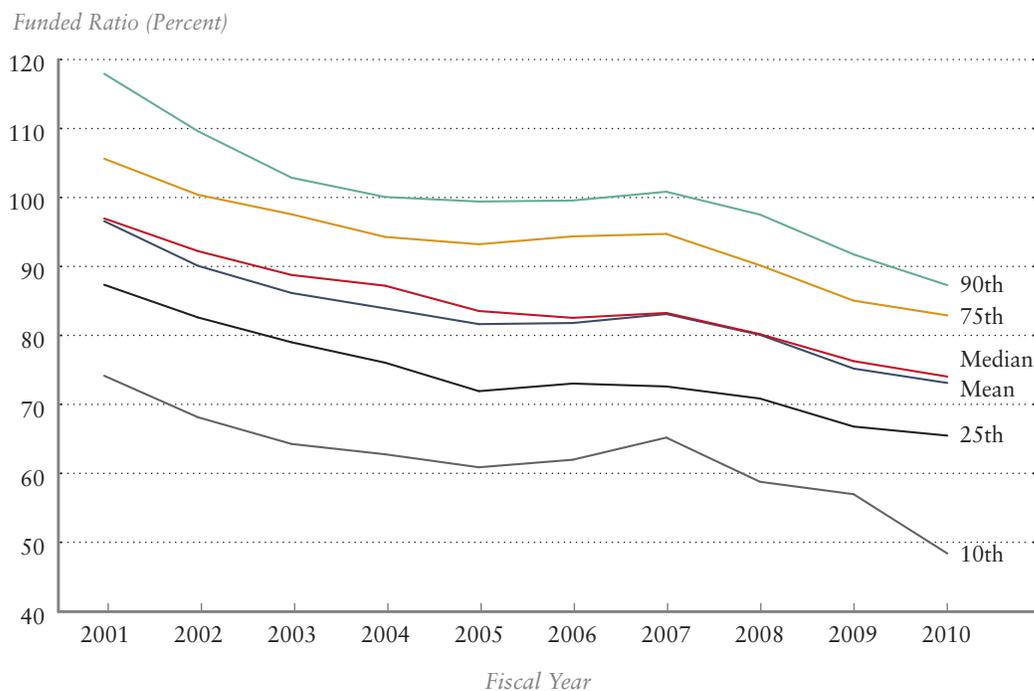
There has been growing concern that U.S. state and local governments have underfunded their pension plans, a situation that could cause widespread fiscal stress in the future when these plans need to pay retiree benefits. State and local government pensions are still predominantly defined-benefit plans that base retiree payments on final average salary and years of creditable service, as opposed to the defined-contribution plans that now characterize most private pension plans in the United States. In 2001 the median state-administered public pension plan was close to fully funded—meaning that the ratio of the value of a plan’s assets to the present value of its future benefit payments (liabilities) is about 100 percent. Over the course of the last decade, funding ratios have decreased across nearly the entire distribution of plans, with the least well-funded plans deteriorating more than those at other points of the distribution. By 2010, the average funded ratio in the three lowest quartiles of public plans was below 80 percent, a figure which many pension experts consider to be a lower bound for a relatively healthy pension system. By the decade’s end, even in the top quartiles the average funded ratio was less than 100 percent. The emergence of a growing volume of state and local pension debt suggests the possibility that state and local governments may have strategically underfunded the pension plans they sponsor in order to circumvent restrictions on the issuance of explicit government debt to finance operating deficits.

This paper uses regression analysis to determine whether the decrease in the funded ratios of public sector pension plans resulted from government sponsors’ deliberately choosing to decrease their required contributions in response to adverse economic or fiscal shocks.

RESEARCH APPROACH

After giving a brief overview of the institutional features of state and local pension plans that are pertinent to the empirical analysis, the authors estimate regressions relating the contributions made by plan sponsors to changes in economic, financial, and fiscal conditions by using panel data on state-administered public sector pension plans. The primary data source is the Public Plans Database (PPD) produced by the Center for Retirement Research at Boston College. The main regression analysis uses 85 plans that are broadly representative of state-administered pension plans; this set includes more than 70 percent of all state government pension plans and members and includes states that comprised 93 percent of the U.S. population as of 2010. The authors use as a proxy for economic shocks the individual state’s unemployment rate, a rate that changes substantially over the business cycle. Following Poterba (1994), they measure unexpected fiscal shocks using data from the National Association of State Budget Officers. The sample period extends from 2001 through 2010, an era that included two recessions, a major financial crisis, and the associated periods of state fiscal stress.

Percentile and Mean Values of Funded Ratios, 2001–2010



Source: Authors' calculations based on the Public Plans Database produced by the Center for Retirement Studies at Boston College.

Notes: Sample includes 85 state-administered plans. Figure displays the percentile and mean values of funded ratio from 2001 to 2010.

KEY FINDINGS

- The regression results are qualitatively robust across five different specifications, and strongly refute the hypothesis that plan sponsors reduce their contributions as a percentage of payroll in response to adverse fiscal or economic shocks. Rather, plan sponsors respond to increases in unfunded liabilities by increasing contributions relative to payroll.
- While over the last decade public pension plan sponsors increased their contributions in response to the increase in unfunded liabilities, these increases were not large enough to fully counteract the effect of subpar portfolio returns. This finding holds across the spectrum of plans ranked in terms of 2010 funding status.
- During the 2000s, the underfunding of public pension plans was largely a result of portfolio investment returns being hit by financial shocks and thus falling short of expectations. Since public pension plan portfolios have a relatively high share of equities and other risky assets, these plans are particularly vulnerable to asset price fluctuations.
- The reason the less-well-funded plans experienced lower investment returns is not because these plans invested larger shares of their portfolios in risky assets and therefore suffered greater losses from financial shocks. In fact, the authors find that portfolio composition is fairly similar across the spectrum of pension plans. Some evidence suggests that the less-well-funded plans had lower portfolio returns most likely because they suffered from lower-quality investment management and smaller economies of scale than better-funded plans.

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IMPLICATIONS

A better understanding of the optimal degree of risk in public pension portfolios, and the optimal response to a series of subnormal investment returns, is needed to devise improved mechanisms for plan governance, management, and risk-taking in order to prevent future funding crises.

About the Authors

Robert K. Triest is a vice president in the research department at the Federal Reserve Bank of Boston. Bo Zhao is a senior economist in the New England Public Policy Center, housed in the research department at the Federal Reserve Bank of Boston.

PUBLIC POLICY BRIEFS

b-13-2

Cyclical versus Secular: Decomposing the Recent Decline in U.S. Labor Force Participation

by Michelle L. Barnes, Fabià Gumbau-Brisa, and Giovanni P. Olivei

abstract and complete text: <http://www.bostonfed.org/economic/ppb/2013/ppb132.htm>
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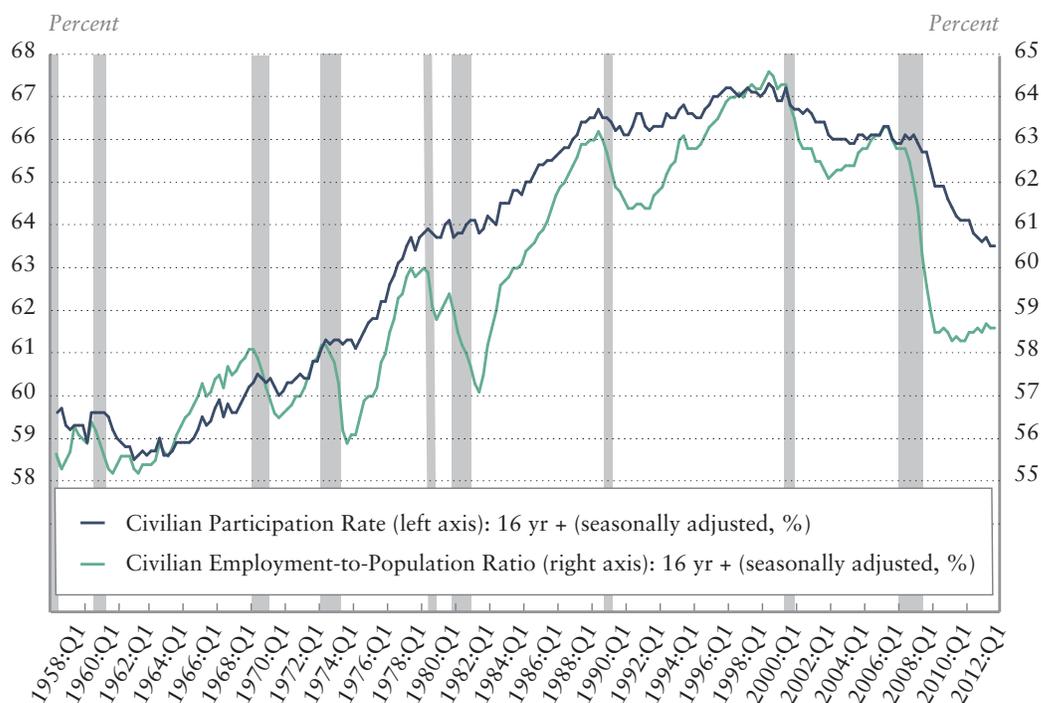
MOTIVATION FOR THE RESEARCH

Since the onset of the Great Recession, one of the most striking developments in the U.S. labor market has been the pronounced decline in the labor force participation rate. When interpreting this decline, the crucial issue is how much of the drop in the labor force participation rate reflects cyclical factors, namely the Great Recession and the slow ensuing recovery, and how much reflects more persistent developments such as the demographic effects of an aging population.

Different studies have reached different conclusions on how to apportion the decline in the labor force participation rate between cyclical and long-term (trend) factors. For example, the U.S. Bureau of Labor Statistics (BLS) now interprets most of the decline in the labor force participation rate as reflecting long-term demographic and behavioral changes rather than cyclical developments. Other studies, however, have reached the opposite conclusion: that most of the post-2007 decline in the rate of labor force participation is a result of cyclical factors. According to this view, the depressed labor market conditions generated by Great Recession and the disappointing recovery that followed have led workers to temporarily leave the labor force. In this view, as the pace of economic activity improves, most of the workers who left the labor force are expected to return, and thus exert upward pressure on the unemployment rate.

Which view is correct has important implications for the conduct of monetary policy. If most of the decline in the rate of labor force participation reflects cyclical factors, then focusing on the unemployment rate as the relevant measure of labor market slack could lead to suboptimal monetary policy. This point is conveyed by Erceg and Levin (2013), who argue that the impact of a recession on the rate of labor force participation is nonlinear in the magnitude of the recession, with large recessions producing a decline in the rate of labor force participation

Civilian Labor Force and Employment



Source: Bureau of Labor Statistics.
 Note: Shaded areas indicate recession.

that is larger in relation to the activity gap than is the case for small recessions. As a result, monetary policy rules devised for small recessions may not work well for large recessions. Rather, during large recessions a reliance on broader measures of slack that take into account the low rate of labor force participation could lead to better macroeconomic outcomes than a reliance on the unemployment rate for policy guidance. Specifically, focusing on the unemployment rate as the measure of labor market slack in a large recession could lead to a monetary policy response that is insufficiently accommodative, thus engendering too slow a recovery with only small improvements in the unemployment rate as many workers re-enter the labor market. Conversely, if large recessions do not generate an outsize decline in labor force participation relative to small recessions, then even when the degree of resource underutilization is significant the unemployment rate may prove an accurate summary of labor market conditions for the conduct of policy.

In this brief, the authors examine the relative contributions of the cyclical and trend components to movements in the labor force participation rate observed since the onset of the Great Recession, based on an initial assumption that the labor force participation rate shares a common trend with the employment-to-population ratio.

RESEARCH APPROACH

The authors obtain estimates of the trend components for the labor force participation rate and the employment-to-population ratio via a Beveridge and Nelson (1981) trend-cycle decomposition in a multivariate setting. The Beveridge-Nelson trend for a variable is defined as the value to which the variable is expected to converge once transitory movements die out. The Beveridge-Nelson decomposition partitions the variable in question as the sum of a non-stationary component, identified as trend, and a stationary component, identified as cycle.

This approach to identifying trend and cycle extends to a multivariate setting. In the authors' setup, the vector of variables is given by the log of the labor force participation rate and the log of the employment-to-population ratio, for workers age 16 years and over.

Lower-frequency movements in the two series are similar. The null hypothesis of a unit root in the two series is not rejected at standard confidence levels. The authors therefore impose a cointegrating relationship between the log of the labor force participation rate and the log of the employment-to-population ratio.

To estimate the level relationship between the labor force participation rate and the employment-to-population ratio, the authors use Stock and Watson's (1993) dynamic least squares procedure. The vector autoregression is then augmented to include the estimated error-correction term. In the cointegrated vector autoregression, the log-difference of the labor force participation rate and the log difference of the employment-to-population ratio are each regressed on four lags of each of the two variables and on the error-correction term. The sample period for the regression is 1958:Q1 to 2007:Q4. The estimated vector autoregression is then used to compute in-sample and, for the most recent period, out-of-sample Beveridge-Nelson trends.

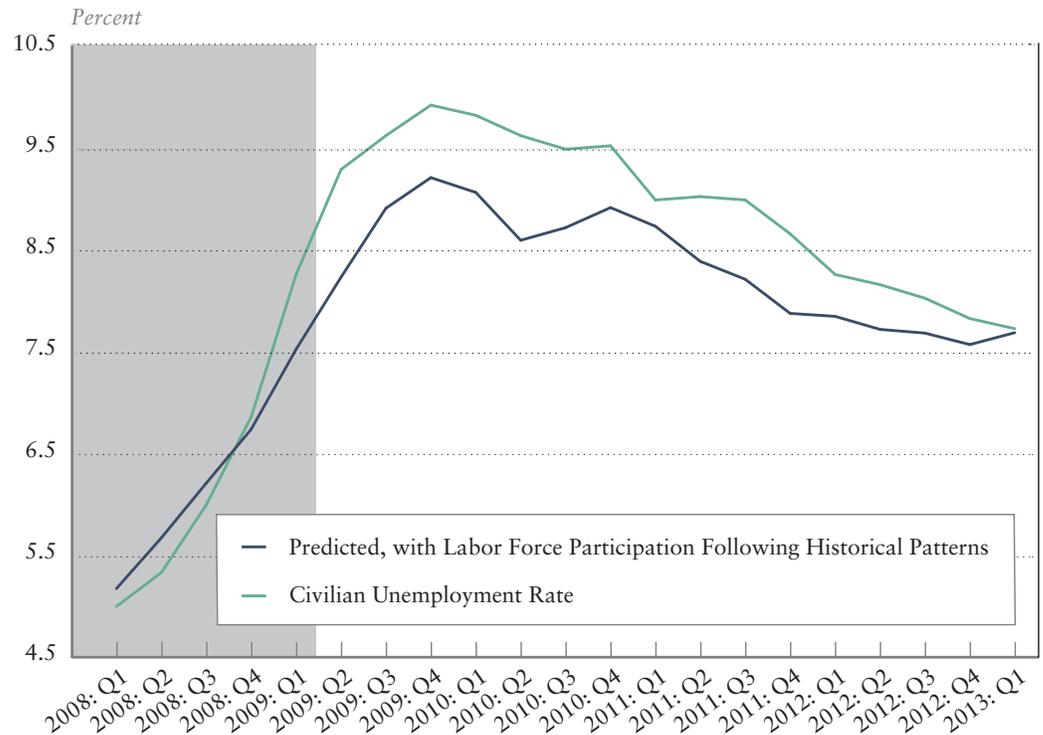
KEY FINDINGS

- Since 2008:Q1, trend movements have accounted for a significant portion of the decline in labor force participation. The estimated trend for the out-of-sample period is negative, with the trend decline accounting for about 70 percent of the decline in labor force participation over the period 2007:Q4 to 2013:Q1. For the most recent quarter of available data the actual level of labor force participation is estimated to be about 75 basis points below trend. The trend decline in the rate of labor force participation is mirrored by a decline in the trend component of the employment-to-population ratio.
- The employment-to-population ratio features more amplified cyclical fluctuations around trend than the labor force participation rate does. Consequently, for the most recent quarter of available data the employment-to-population ratio is estimated to be roughly 175 basis points below trend. While this variable has shown little improvement in absolute terms since 2010, the estimated trend decline implies that in the ongoing recovery the gap in the employment-to-population ratio relative to trend has been narrowing.
- The cyclical component of the labor force participation rate and the employment-to-population ratio exhibit a relatively high degree of correlation. A regression of the estimated cyclical component of the labor force participation rate on the estimated cyclical component of the employment-to-population ratio over the period 1958:Q1 to 2007:Q4 shows that a 1 percentage point cyclical increase (decline) in the employment-to-population ratio generates a cyclical increase (decline) in the labor force participation rate of approximately four-tenths of one percent.
- Over the period 2009–2011, the labor force participation rate was 50 basis points higher on average than what would have been predicted by the behavior of the cyclical component of the employment-to-population ratio. If the cyclical behavior of the labor force participation rate had followed historical norms, the unemployment rate over the period 2009–2011 would have been lower on average by roughly three-quarters of one percentage point.

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Trend movements have accounted for a significant portion of the decline in labor force participation since 2008:Q1.
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- It is only recently that the rate of labor force participation has returned to display a cyclical response more in line with historical norms. Indeed, some of the more recent declines in the labor force participation rate can be interpreted as the participation rate adjusting to display a cyclical response that is more typical from a historical standpoint.

U.S. Unemployment Rate



Source: Bureau of Labor Statistics and authors' calculations.
 Note: Shaded area indicates the Great Recession.

IMPLICATIONS

The authors' analysis in this brief does not support the view that because the cyclical decline in labor force participation rates in the post-2007 period has been abnormally large, monetary policy should respond differently under current circumstances than in the past to labor market conditions. If anything, the analysis shows that the opposite has been true.

While the authors' analysis is reduced form and is too aggregated to address the possible reasons for the behavior of the labor force participation rate in the recent recession and early stages of the recovery, their empirical exercise suggests that at present the labor force participation rate is, relative to trend, close to its predicted value. Importantly, such a statement is conditional on having an adequate estimate of the cyclical component of the employment-to-population ratio. If this is indeed the case and the future behavior of labor force participation evolves roughly in accordance with the cyclical norm captured by the estimated relationship, then future declines in the unemployment rate will have to rely on an improvement in the cyclical component of the employment-to-population ratio.

Another implication of this exercise is that while over the period 2011:Q4 to 2013:Q1 the unemployment rate declined by 1 percentage point, the improvement would have been much smaller had the labor force participation rate followed the historical pattern predicted by

the evolution of the employment-to-population ratio. With the cyclical behavior of the labor force participation rate at historical norms, the improvement in the unemployment rate over this period would have been less than one-quarter of 1 percentage point. In other words, recent progress in the labor market as measured by the unemployment rate can be interpreted as having been driven mainly by the labor force participation rate reverting to a level that is more in line with the typical relationship between the labor force participation rate and the employment-to-population ratio at this stage of the business cycle.

The conclusions drawn from this analysis need to be tempered by the fact that the analysis represents just one possible approach to estimating trend and cycle for the labor force participation rate. In addition, the empirical exercise in this brief is reduced-form and statistical in nature and therefore lacks the structure to frame the economic decision of whether (or not) to participate in the labor force. If anything, the analysis, by reaching different conclusions than those reached by other studies, illustrates that there is a considerable degree of uncertainty when interpreting what portion of the decline in the rate of labor force participation is due to trend and what portion is due to cycle.

About the Authors

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b-13-3

The Impact of Policy Uncertainty on U.S. Employment: Industry Evidence

by J. Christina Wang

abstract and complete text: <http://www.bostonfed.org/economic/ppb/2013/ppb133.htm>
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MOTIVATION FOR THE RESEARCH

The anemic pace of the U.S. economy's recovery from the Great Recession has frequently been blamed on heightened uncertainty, much of which concerns the nation's fiscal policy. Following an exceptionally deep recession, the weakness of this recovery has surprised many, and the elevated perception of uncertainty has become a popular scapegoat explanation for the slow pace of growth. In particular, much of the uncertainty seems to be concentrated at the federal level and related to the inability of the legislative and the executive branches of the U.S. government to agree on a policy to achieve long-term fiscal sustainability. Intuition suggests that increased policy uncertainty likely has different impacts on different industries, to the extent that industries differ in their exposure to government policies. This study uses industry data to explore whether policy uncertainty indeed affects the dynamics of employment, and particularly the differential impact on employment dynamics in various industries during this recovery. The analysis focuses on heterogeneity across industries in terms of the fraction of their product demand that can ultimately be attributed to federal government expenditures.

RESEARCH APPROACH

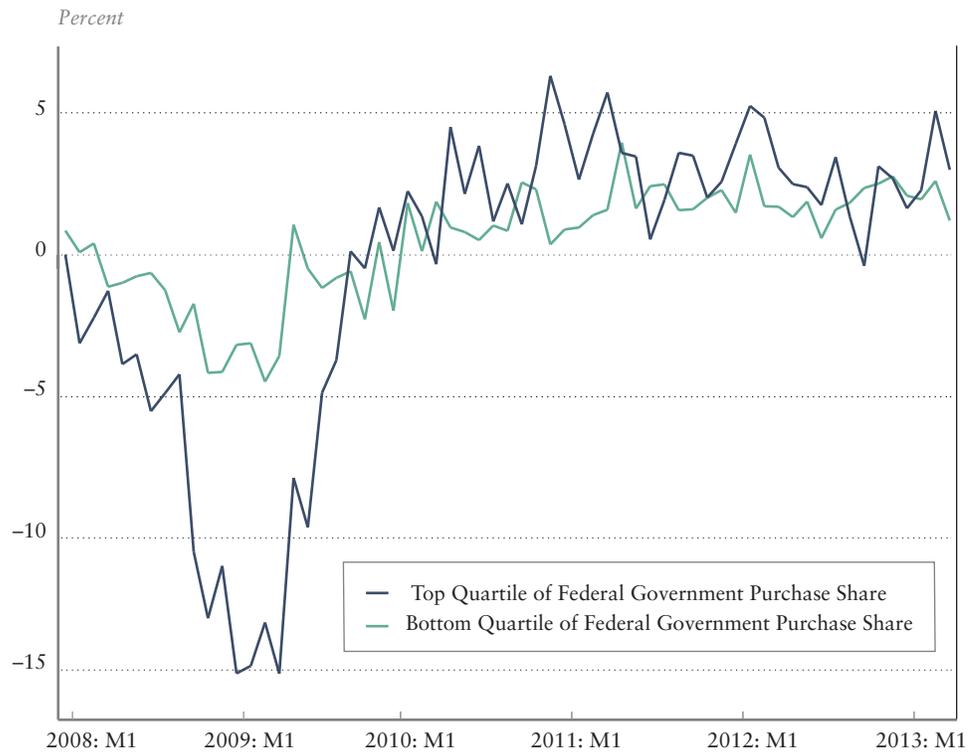
Many existing studies of the effect of uncertainty on economic activity, especially those that rely on a structural approach, such as the use of dynamic stochastic general equilibrium (DSGE) models, naturally focus on the impact of uncertainty on the aggregate economy. The merit of the structural approach notwithstanding, one of its potential drawbacks is that any inferences can be sensitive to model assumptions. While it is clear that the federal government will either have to cut spending, or raise taxes, or both, in order to achieve long-run sustainability, it is far from clear whether the structural component of the federal deficit would be reduced more through spending cuts, tax increases, or a more even blend of the two. This uncertainty clearly affects both sides of the ledger.

To complement the existing structural studies, this policy brief uses cross-sectional variation to help identify the impact of uncertainty without imposing structural restrictions. It relies on the simple premise that cross-sectional heterogeneity in economic units' sensitivity to uncertainty likely leads to disparate effects of uncertainty across households or firms. Possible differential responses to uncertainty shocks in the cross section can stem from either different exposure to the source of the uncertainty, or from different adjustment technologies. In this study, the author's main interest is in the uncertainty concerning fiscal policy. Therefore, the focus is on the dimension of heterogeneity that is due to differences in the exposure to the source of policy uncertainty.

More specifically, the author uses industry data and focuses on how the fraction of industry output eventually purchased by the government sector, particularly the federal government, varies across industries. It seems natural to focus on the federal government, which has been the primary source of recent policy uncertainty. The federal budget deficit and debt have ballooned since the Great Recession, because the federal government needed to provide fiscal stimulus not only to soften the fall in private-sector spending but also to partly offset the steep cuts in state and local government spending. More worrisome than this cyclical swing in the federal deficit and debt is the projected structural shortfall that will only worsen over the next decade or so if existing policies continue, as more and more baby boomers retire. Since the cross-industry disparity in the importance of government is more clearly defined in terms of product demand, for which there is also better and more readily available data, the author focuses on the uncertainty concerning government spending, as opposed to taxes. The basic logic of the identification strategy used in this brief is that if some firms or industries rely more on government purchases, then, all else being equal, the heightened uncertainty concerning fiscal policy should cause those firms or industries to be more cautious than others about adjusting their factor inputs that are subject to adjustment costs. According to Bloom's (2009) structural study, the impact of uncertainty shocks is fairly short-lived, so the analysis requires relatively high-frequency data on factor inputs. At the industry level, this points to employment data, since these are available monthly and in a timely manner. In contrast, industry-level data on investment are available only at an annual frequency and with a relatively long delay.

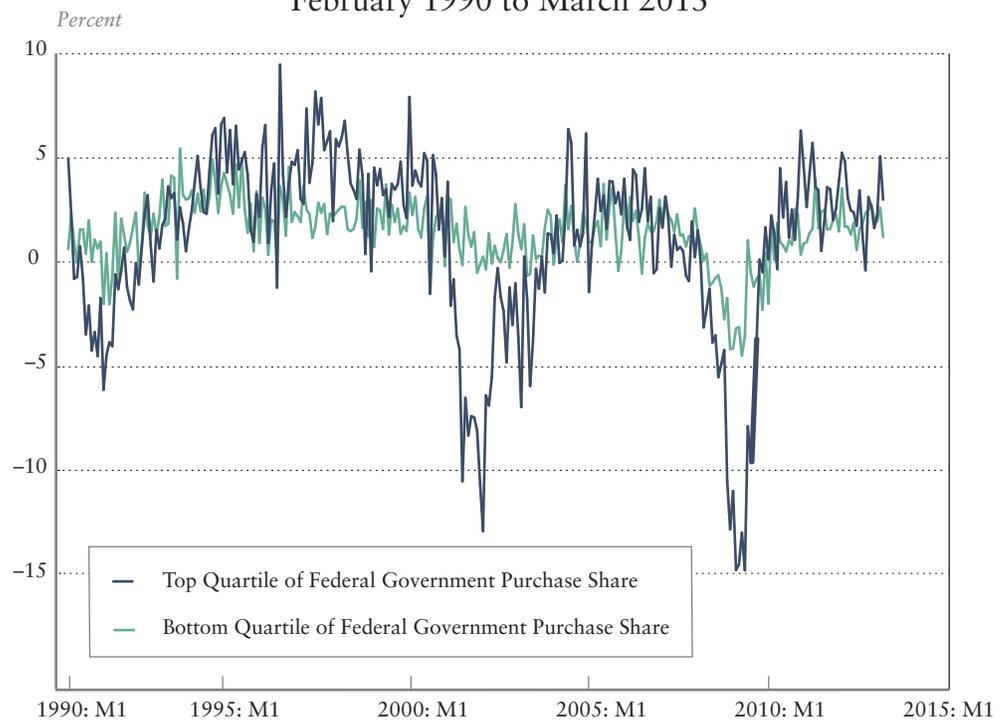
Specifically, this brief examines whether, during episodes of heightened fiscal policy uncertainty since the beginning of the Great Recession, employment growth was lower in industries that rely more on government demand than in other industries. It should be noted that the change in employment is a net flow, reflecting the change in hiring net of total separations (due to layoffs, quits, and other reasons). It is likely that the rates of both hiring and separations slow following an uncertainty shock, in the latter case because workers also become more cautious and therefore less likely to quit their jobs.

Industry Employment Growth Rate (Annualized) January 2008 to March 2013



Source: Author's calculations.

Industry Employment Growth Rate (Annualized) February 1990 to March 2013



Source: Author's calculations.

Note: These two charts compare the monthly employment growth between the top and the bottom quartiles of industries using 2002–2007 average shares of direct and indirect sales to the federal government.

KEY FINDING

- The estimation results indicate that policy uncertainty indeed retards employment growth more in industries that rely more heavily on federal government demand: the growth rate of employment in these industries appears to have been 0.4 percentage point lower during the quarters in recent years when policy uncertainty spiked. More specifically, industries selling a relatively high fraction of their output directly and indirectly to the federal government tend to slow their payrolls more than other industries when policy uncertainty is elevated, even after accounting for industry demand conditions. Moreover, this effect is nontrivial economically, although it is insufficient to fully account for the unusually slow employment growth during the Great Recession and the subsequent recovery. There is also some indication, albeit not particularly robust, that policy uncertainty exerts a negative across-the-board influence on growth.

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Industries selling a relatively high fraction of their output directly and indirectly to the federal government tend to slow their payrolls more than other industries when policy uncertainty is elevated
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IMPLICATIONS

The detrimental effect of greater policy uncertainty on the aggregate economy may well exceed the magnitude estimated in this study. This is because employment is a net outcome between the gross flows of hiring and separation. To the extent that workers also become more cautious, and thus less likely to look for new jobs and then quit when policy uncertainty is perceived to be high, the lower rate of separation at least partially offsets the lower rate of hiring due to caution on the part of employers. This then results in a smaller change in the net flow—employment. In contrast, investment is a gross flow, and so the impact of policy uncertainty on business investment is likely to be more pronounced.

There are certainly other ways in which individual firms' exposures to fiscal policy uncertainty differ. For example, firms in industries that receive more government subsidies are likely to become more cautious when the policy outlook is more uncertain. Also, taxes on capital affect the cost of capital, and these taxes likely matter more for firms in industries that are more capital intensive. These issues are worth exploring in future analysis.

About the Author

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b-13-4

Asymmetric Responses to Tax-Induced Changes in Personal Income: The 2013 Payroll Tax Hike versus Anticipated 2012 Tax Refunds

by Anat Bracha and Daniel Cooper

abstract and complete text: <http://www.bostonfed.org/economic/ppb/2013/ppb134.htm>
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MOTIVATION FOR THE RESEARCH

The permanent income hypothesis (PIH) states that households consume the annuity value of their expected lifetime wealth and implies that in a frictionless world, consumption should only respond to permanent and unexpected changes in household income. Economists have long sought to test the implications of the PIH by investigating how household consumption responds to anticipated and unanticipated income shocks. Since 2001 a number of legislated

federal tax changes in the United States have induced a series of household income shocks, a situation that has provided researchers with the ability to test these implications. In 2011 and 2012, U.S. payroll taxes were cut, such that workers' incomes were taxed at a 4.2 percent rate for Social Security and Medicare benefits rather than at the usual 6.2 percent rate. As part of the fiscal cliff resolution, on January 1, 2013 payroll taxes reverted to the previous level. This change gave researchers the opportunity to test whether individuals respond differently to income losses stemming from tax increases than to income gains due to tax cuts or rebates.

Although recent studies, such as Graziani, Van der Klaauw, and Zafar (2013) do examine the effect of tax-induced income changes on consumer behavior, they do so using a 94-percent white sample population with a mean annual income that is well above the U.S. median household income. It is therefore unclear how low-to-moderate-income individuals might respond to income fluctuations, an important consideration since the marginal propensity to save (MPS) and to consume (MPC) differ across the income distribution. This study adds to the literature and to our understanding of the effect of tax-induced income fluctuations by investigating the response of low-to-moderate-income individuals to income fluctuations resulting from the 2012 tax return and tax changes.

RESEARCH APPROACH

The authors use data obtained from three surveys administered by the Federal Reserve Bank of Boston between late January and mid-April 2013 as part of a free tax preparation service offered by the Boston Earned Income Tax Credit (EITC) Coalition. This survey information was augmented with information from a separate survey given by the Boston EITC Coalition to all the individuals who use its free tax preparation service and with demographic information and filing status data taken from the actual tax returns of these individuals. Taken together, the data include information about the participants' financial standing, behavioral traits, reaction to the 2013 payroll tax hike, and, if applicable, their plans for allocating their newly calculated refund for the 2012 tax year. All the 879 people included in the resulting sample are low-to-moderate-income individuals with a mean annual income of \$18,810, well below the annual median income of the U.S. population. In the sample, 83 percent of the respondents (729 persons) received a tax refund, averaging \$2,063. The vast majority of the sample individuals were minorities; 32 percent reported working full-time in 2012, while 54 percent worked at least part-time during that year.

The analysis focused on the responses to two main questions in the survey: what individuals were planning to do with their 2012 tax refund (if any), and how they planned to respond to the 2013 payroll tax hike.

The authors used various proxies to examine whether a tax refund was expected and thus factored into an individual's decision about how much of current income to spend on current consumption. The first proxy indicates whether an individual's calculated refund amount for the 2012 tax year is similar to any actual refund received in 2011. Another proxy indicates whether an individual's income fluctuated from paycheck to paycheck. A third proxy, called the MPS shift, captures whether an individual allocated tax refund dollars similarly across years—basically, this examines whether an individual's MPS was similar for the 2011 and 2012 refunds. A person's MPC can be impacted if he or she is financially constrained, so the sample is split based on whether a respondent reported having per capita monthly income above the sample average of \$1,291 or income that is at or below the sample average. FICO

(credit) scores were also checked for being above or below average, since a greater ability to borrow helps to smooth consumption over time. A regression analysis was conducted to isolate the conditional factors that drive the asymmetric response of the two MPCs stemming from the payroll tax hike and the tax refund.

KEY FINDINGS

- The results show a 30 percentage point difference in individuals' MPC from the two tax-induced income fluctuations. Taxpayers are much more likely to reduce spending in response to the payroll tax hike than they are to increase spending based on an anticipated tax refund. For every dollar of income lost as a result of the 2013 payroll tax increase, consumption declined by 90 cents, while consumption increased by 60 cents for each additional dollar of income gained from the tax refund.
- The average MPC and the MPC gaps are similar across the subgroups, and it appears that financial constraints do not matter for an individual's response to tax-induced income changes. There are no systemic differences in the MPC between those individuals who had or did not have a similar actual refund amount in 2011 and 2012, or between those who reported having a fixed monthly income and those whose monthly income fluctuated. This suggests that the asymmetric responses to the tax-induced income gain and loss are not due to the tax refund being treated as spendable income.
- The MPC from the tax refund, and hence the MPC gap, varies based on an individual's saving behavior. The MPC gap is much larger for those individuals with variable saving behavior, while those who never save have essentially no MPC gap.
- The regression analysis reinforces the results by showing that the gap between the MPC from a tax refund and the consumption response to the 2013 payroll tax hike is not explained by behavioral, demographic, or financial distinctions within the sample. Only gender and the interaction of gender with present bias—meaning the extent to which someone is willing to substitute current consumption for future consumption—and at times age, are significant in explaining the observed MPC as measured in response to the payroll tax hike. The MPS shift is the only significant factor that explains the MPC from the tax refund. Only age and the shift in the MPS are significant in explaining the MPC gap.

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These financially constrained taxpayers were much more likely to cut spending in response to a payroll tax hike than to increase spending in anticipation of a tax refund.
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IMPLICATIONS

Using a sample comprising a low-income and sometimes financially constrained segment of the U.S. population, this study found a 30 percentage point difference in the MPC between the two tax-induced income fluctuations. It is possible that the lack of observable explanations for individuals' asymmetric behavior in this study results from differences in the timing and method of delivery of the tax changes. It is also possible that the individuals in this sample focused more on income losses than on income gains and had more flexibility in responding to income gains, given their financial situation.

The observed gap does not appear to be affected by financial constraints or to vary based on whether someone anticipated the amount of his/her tax refund.

About the Authors

Anat Bracha and Daniel Cooper are both senior economists in the research department at the Federal Reserve Bank of Boston.

Do Foreclosures Affect Boston Public School Student Academic Performance?

by Katharine Bradbury, Mary A. Burke, and Robert K. Triest

abstract and complete text: <http://www.bostonfed.org/economic/ppb/2013/ppb135.htm>

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MOTIVATION FOR THE RESEARCH

The wave of foreclosures that followed the recent housing bust and subsequent Great Recession is one of the defining characteristics of the economic crisis. Foreclosures have well-documented adverse consequences for families living in or owning properties undergoing foreclosure and on surrounding neighborhoods, but they may also have other costs. This brief investigates one important aspect of behavior that may be affected by foreclosure: the academic performance of children whose families experience a foreclosure, whether as homeowners or as tenants in foreclosed properties. This brief summarizes the same research as working paper 13-12 and then discusses the implications more extensively.

RESEARCH APPROACH

The authors' statistical analysis uses data provided by the Boston Public Schools (BPS) relating to both individual students and schools for the school years 2003/2004 through 2009/2010, matched by students' home addresses to property information from the City of Boston Assessor and the Warren Group. The data do not include direct indicators of family finances aside from a student's eligibility for free or reduced-price school lunches. However, the filing date of a foreclosure petition—the earliest indicator of foreclosure activity available to the authors—represents a reasonable first signal of financial distress in some families.

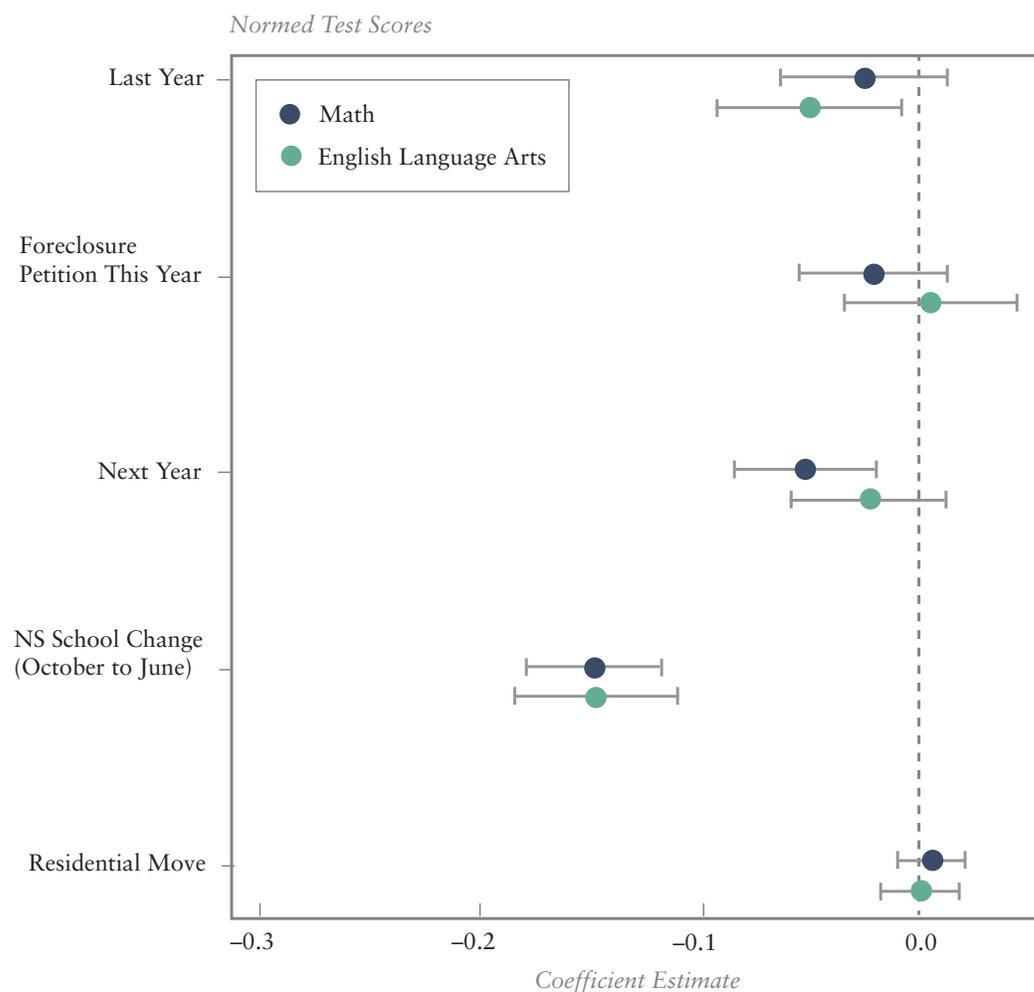
The authors use three measures of academic performance: standardized (expressed in standard deviations of the state-wide distribution) MCAS test scores for individual students in math and English language arts (ELA) and a variable measuring the percentage of school days when a student was present. In order to isolate the effect of foreclosures from the factors that are associated with the increased likelihood of both foreclosure and poor academic performance, the authors regress the academic performance variables on an extensive group of covariates, plus a lag of the dependent variable; in addition, they include indicators of a residential move during the year, school changes that occurred over the summer, and school changes that occurred during the school year.

The authors also include a variable indicating whether a foreclosure petition was filed in the previous year (the lag of the foreclosure variable) and a variable indicating whether a foreclosure petition was filed in the subsequent year (the lead of the foreclosure variable). The purpose of including the lead and lag variables is to explore whether there is a causal relationship between foreclosures and academic performance or whether the relationship is instead driven by factors, such as family financial stress, that underlie both foreclosures and poor academic performance.

KEY FINDINGS

- Although foreclosure activity increased greatly during the Great Recession, even in the peak year only about 3 percent of students resided in a property served with a foreclosure petition and the percentage of students residing in a property that proceeded to a foreclosure auction was less than half of that amount.

LDV Specification Test Score Coefficients and 95-Percent Confidence Intervals



Source: Authors' calculations based on data from Boston Public Schools, the City of Boston Assessing Department, the Warren Group (foreclosure petitions), and Lauren and Timothy Lambie-Hanson (foreclosure auctions).

Note: LDV stands for "limited dependent variable".

- About 12 percent of the BPS students in the dataset changed residence in a typical school year. The city of Boston is divided into the three broad zones (West, East, and North) for purposes of assigning students in kindergarten through eighth grade to specific schools. BPS assigns students via a computer algorithm based on parental preferences, sibling and walk-radius priority, and available space. The 35 BPS high schools serve students citywide, rather than being zone-specific, meaning that residential location does not restrict the high schools a student may attend. Overall, because of Boston's fairly loose link between residential location and school assignment, only 23 percent of students whose families moved changed schools between October and June of the same school year, or 34 percent if school changes during the school year following the residential move are also included.
- Simple bivariate regressions indicate that students who lived at an address where a foreclosure petition had been filed in the current year exhibited significantly worse academic performance than students who were not affected by a foreclosure petition. The coefficients on the lag and lead of the foreclosure indicator are statistically significant and of

similar magnitude to the contemporaneous coefficient. One interpretation of this coefficient pattern is that a foreclosure petition is a symptom or result of factors that also contribute to poor academic performance. Although the significant negative coefficient on the lead of the foreclosure indicator is consistent with the economic stress explanation, it is inconsistent with foreclosures having a direct causal effect on academic performance.

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Students whose families experience a foreclosure event tend to have worse academic performance than those whose families do not.
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- When academic performance variables are regressed on an extensive group of covariates, as well as on a lag of the dependent variable and on various indicators of a residential move and change of school, the foreclosure indicator coefficients are very small and mostly statistically insignificant. This is strong evidence that foreclosures have, at best, only a small direct negative causal effect on students' academic performance.
- The residential move variable coefficients are small and statistically insignificant in the test score regressions, suggesting that, all else being equal, residential moves are not associated with lower MCAS test scores. Residential moves are associated with a relatively small but statistically significant reduction in attendance.
- The coefficients on school changes between October and June are negative and statistically significant in all three of the academic performance regressions. These coefficients are considerably larger than the estimated coefficients on any of the foreclosure variables, indicating that changing schools during the school year is associated with a math or ELA test score lower by about one-fifth of a statewide standard deviation than the score of a student who does not change schools.

.....
The factors that make families vulnerable to mortgage default and foreclosure also place students at high risk of not doing well in school.
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IMPLICATIONS

Although the authors do not observe a substantive, direct, causal link from foreclosures to decreased academic performance, foreclosures may indirectly reduce academic performance by causing a student to change schools. The main path by which a foreclosure would result in changing schools during the academic year is via a residential move associated with the foreclosure. Both persistently low income and shocks to family finances are likely candidates to be the factors that jointly cause foreclosures and poor academic performance.

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The task of addressing acute economic shocks and chronically low income goes well beyond the purview of the public school system.
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In attempting to ameliorate the below-average school performance observed for foreclosure-affected children, policymakers should seek to mitigate the underlying stressors contributing to foreclosure rather than focusing on legal interventions in the foreclosure process itself. It seems useful to think about school assignment procedures and other school policies that affect the prevalence of mid-year school changes. As noted earlier, Boston's existing school assignment policy increases the likelihood that a student who changes residence will be able to avoid having to change schools.

However, Boston recently adopted a new set of procedures for school assignment, scheduled to take effect in the 2014–2015 school year, that are not based on geographically fixed zones but instead provide a customized choice of schools designed around a student's home address. The home-centered design of the policy, which is expected to reduce the average distance travelled to school by 40 percent compared with current conditions, suggests that residential moves will be more likely to necessitate school changes than is the case under the current policy. The school change could be deferred until the summer while the student finishes out the current year at the current school, with transportation assistance from BPS if necessary. Policymakers would need to evaluate this potential tradeoff of transportation costs against students' educational disruption costs.

Other policies that attempt to keep people in their homes when financial stresses occur could reduce the incidence of disruptive school changes. At the very least, families and service providers should be made aware of the potential costs to children—in terms of weaker school performance—of residential moves that involve changing schools during the academic year, so that they could weigh such costs against the housing cost savings of residential moves across school assignment zones.

About the Authors

Katharine Bradbury is a senior economist and policy advisor, Mary A. Burke is a senior economist, and Robert K. Triest is a vice president and economist, all in the research department of the Federal Reserve Bank of Boston.

b-13-6

Structural Unemployment

by Peter Diamond

abstract and complete text: <http://www.bostonfed.org/economic/ppb/2013/ppb136.htm>
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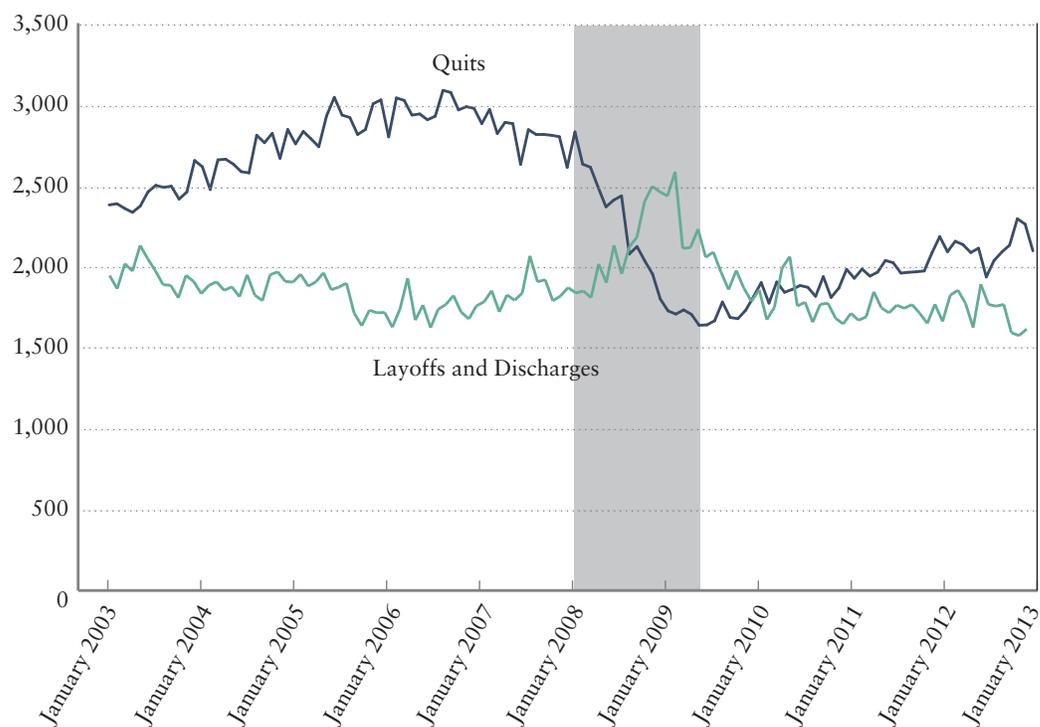
MOTIVATION FOR THE RESEARCH

Whenever there is an extended period of high unemployment, as has been the case in the United States since the advent of the Great Recession and continuing in its aftermath, debate centers on the extent to which this elevated unemployment is due to structural or cyclical factors. Much analysis focuses on the Beveridge curve, which reports the ratio of job vacancies (openings) to the unemployment rate. Movements along the Beveridge curve are typically assumed to reflect shorter-term cyclical effects, while shifts in the curve are thought to reflect structural changes in the labor market that may be longer lasting. Search-theory-based analyses of the Beveridge curve typically relate the levels of unemployment and vacancies to the separation rate from employment and a matching function relating the level of hires to the stocks of unemployed workers and job vacancies. The matching function is treated as a given function but with a multiplicative efficiency parameter that can reflect a change in matching efficiency between an earlier Beveridge curve and a later one. While the separation rate is usually treated as a constant, in reality the separation rate varies over the business cycle, separations vary both in the division between quits (voluntary) and layoffs (involuntary) and in the extent to which departing workers move directly to other jobs, to unemployment, or to nonparticipation. The pattern of hiring from these three categories of labor market status also varies over the business cycle, as does the rate of filling vacancies across industries and different-sized firms.

Since the flow patterns differ between recession and recovery and across different business cycles, the apparent structural shifts of the Beveridge curve will be affected. It is important for macroeconomic policymaking to determine the reasons behind the shifts and to understand whether the cause might endure long enough to affect the labor market as the economy approaches a full-employment point. This brief reviews some of the elements that affect the labor market's matching function and the Beveridge curve, relationships regarded as proxies for the functioning of the labor market, in order to help identify issues concerning the possible duration of effects that move the curve at a given point in time.

Quits, Layoffs, and Discharges

(seasonally adjusted, in thousands)



Source: Bureau of Labor Statistics, Current Population Survey, and Job Openings and Labor Turnover Survey, May 7, 2013.

Note: The shaded area represents the Great Recession.

RESEARCH APPROACH

The author surveys the existing literature’s methodology for interpreting why shifts in the Beveridge curve and the matching function may or may not be temporary. The focus is on the impacts that come from variables that change significantly over the business cycle, as opposed to the trend effects that also shift the curve. A key question for interpreting the current circumstances is the extent to which different outcomes can be expected given differences among recessions in terms of severity, length, the state of the housing market, the state of financial firms, and the financial positions of state and local governments. The depth and length of the Great Recession contributed to a very large increase in the pool of long-term unemployed and has likely affected the makeup of the pool of job losers. This increase in the stock of the unemployed would contribute to a shift in the Beveridge curve, so a key consideration is whether the flow into long-term unemployment will return to a more typical pattern as the economy recovers. Another main consideration is the extent to which a measured drop in the efficiency parameter of the matching function during a recession is likely to be long-lasting, and so affect the full-employment point. If a decline in the matching function is part of the normal Beveridge curve pattern in a recession, or at least during the Great Recession, what additional factors influence the relationship between the Beveridge curve and the matching function? Disaggregated data on the filling of vacancies across firms and industries suggest that changes in the pattern of vacancies over the business cycle can affect the measurement of the matching function.

KEY FINDINGS

- Citing the finding in Kudlyak and Schwartzmann (2012) that the 2007–2009 recession was distinguished by a particularly large increase in the unemployment rate and a slow decline in the peak unemployment rate, the author says that several factors likely combined to generate these patterns. The lengthy extension of unemployment benefits likely increased the number of individuals remaining in measured unemployment rather than moving to nonparticipation. If the stock of unemployed workers increases, this pattern would contribute to the appearance of a shift in the Beveridge curve, but part of the effect should go away when extended benefits end and as the economy recovers.
- Hyatt and McEntarfer (2012) show that the flow from job to job without an intervening spell of nonemployment fell sharply during the Great Recession. The author argues that this decline in quits and employment-to-employment flows is consistent with a drop in the measured efficiency parameter of the standard matching function during the recent recession, and a continued low level of the efficiency parameter during the recovery. However, there is no apparent reason to think that this pattern would be long-lasting once the economy recovers.
- The continuing drop in quits during the Great Recession is plausibly linked to a relative drop in vacancies at higher-turnover firms, and so constitutes a further source of decline in the aggregate matching function. The slow recovery of quits would limit the rise of the measured efficiency parameter of the matching function during the current recovery.
- In order to obtain a measure of effective vacancies Davis, Faberman, and Haltiwanger (2012b) construct a measure to gauge recruiting intensity, and find it yields a better fit than the standard matching function. Their results indicate that recruiting intensity started declining before the onset of the Great Recession. The author argues that this drop in recruiting intensity reduced the measured efficiency parameter of the standard matching function, and that recognizing the drop in recruiting intensity offsets part of the decline in the matching function. He argues that recruiting intensity should recover as the economy improves.

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The Beveridge curve offers important information on the state of the labor market but should not be viewed as a tight technical relationship.
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IMPLICATIONS

This brief finds multiple reasons why the measured efficiency parameter of the matching function can vary over the business cycle, and reasons for this variation to be different from how it behaved during earlier recessions and recoveries given the nature of the Great Recession. Since measuring structural change in the Beveridge curve is not simple or easy, merely noting a shift in the Beveridge curve does not offer sufficient basis for concluding that further stimulus designed to lower the unemployment rate is inappropriate.

The author suggests that developing a labor market analysis that distinguishes between trend and business cycle issues would be beneficial, as the efficiency parameter of the standard matching function should vary over the course of the business cycle. The bottom line is that the Beveridge curve offers important information on the state of the labor market, but it should not be viewed as a tight technical relationship and inferences should be based on the underlying factors behind the unemployment and vacancy observations.

About the Author

Peter Diamond wrote this brief while he was a visiting scholar in the research department at the Federal Reserve Bank of Boston. He is an Institute Professor and an emeritus professor of economics at the Massachusetts Institute of Technology and was a co-recipient of the 2010 Nobel Memorial Prize in Economic Sciences.

b-13-7

Domestic and Foreign Announcements on Unconventional Monetary Policy and Exchange Rates

by Federico J. Díez and Ignacio Presno

abstract and complete text: <http://www.bostonfed.org/economic/ppb/2013/ppb137.htm>
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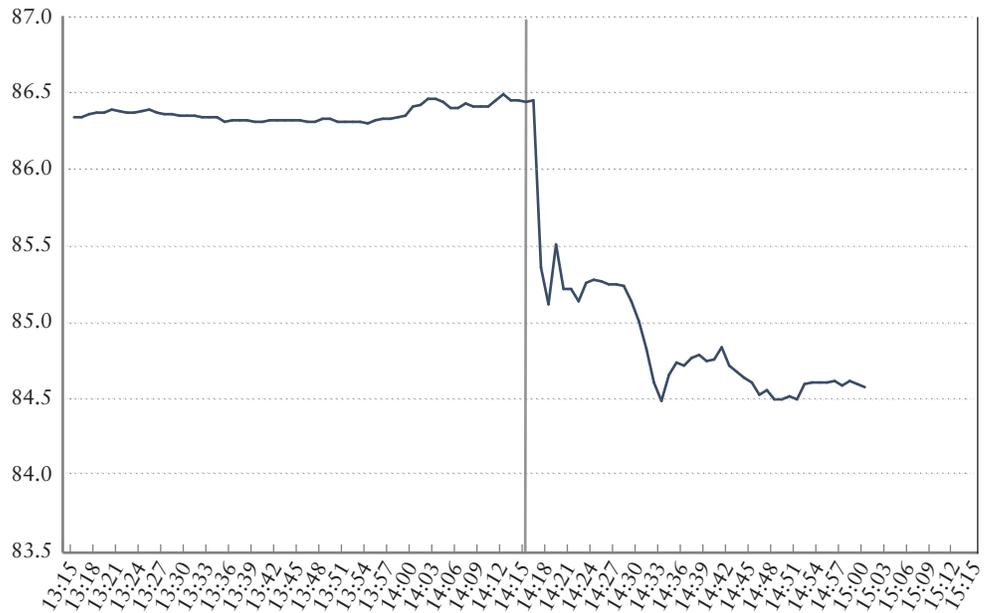
MOTIVATION FOR THE RESEARCH

While central banks usually employ short-term nominal interest rates to conduct monetary policy, these rates reached the zero lower bound as a result of the 2008–2009 financial crisis and thus have been rendered ineffective for monetary policy transmission. Consequently, most central banks have adopted unconventional monetary policy tools for stimulating economic growth. These more novel policy tools include large-scale asset purchases (LSAPs), refinancing operations, and forward guidance about the future path of monetary policy. This brief examines the effects that monetary policy announcements have on nominal exchange rates in a period characterized by unconventional monetary policies.

RESEARCH APPROACH

The authors use high-frequency intra-daily data to study the asset-price variations occurring around a tight window before and after the exact time these policy announcements are made. This event-study approach observes the price of government bond futures for every minute of each event date. Besides studying the movements prompted by announcements made by the U.S. Federal Reserve, this paper adds to the literature by also examining the effects of policy announcements made by foreign central banks. Specifically, the authors consider announcements made by the European Central Bank (ECB), the Bank of England, the Bank of Japan, and the Bank of Canada. In the case of Federal Reserve and ECB announcements, the bond futures considered include the 2-, 5-, 10-, and 30-year U.S. Treasuries and the 2-, 5-, 10-, and 30-year euro bond futures. The Bank of England announcements track the long gilt future, the Bank of Canada announcements use the 10-year bond future, and the Bank of Japan announcements use the 10-year bond TSE future. Tickdata is the source for the bond data used. High-frequency data are also used for the exchange rates, as each event date observes the intra-daily U.S. dollar bilateral exchange rates and the U.S. dollar index. All these data come from Pi Trading. These detailed data show the exchange rate behavior at the exact moment an announcement occurs. The surprise shocks are obtained as the first principal component of yield changes occurring in the 10 minutes immediately before an announcement and in the 20 minutes following an announcement. The shocks are rescaled to have a standard deviation of one and signed in such a way that a positive shock implies a fall in yields. These shocks are used to estimate the effect of the monetary policy announcements on different nominal exchange and interest rates.

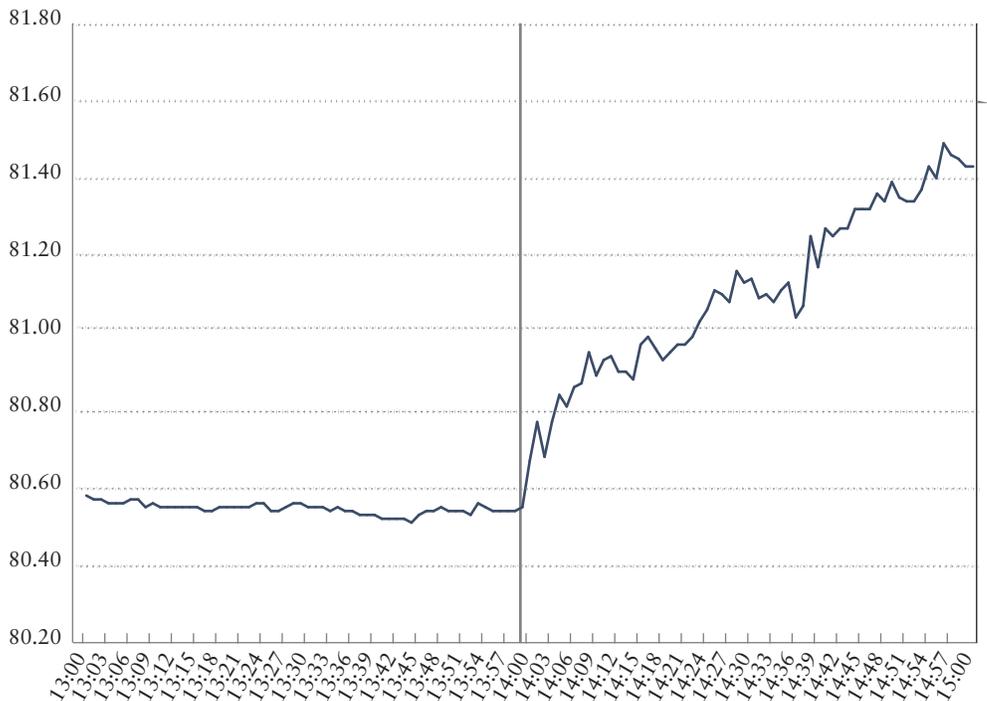
U.S. Dollar Index Spot Values Around the Fed's Announcement on March 18, 2009 (Depreciation)



Source: Pi Trading.

Note: The gray line signals the exact moment of the announcement.

U.S. Dollar Index Spot Values Around the Fed's Announcement on June 19, 2013 (Appreciation)



Source: Pi Trading.

Note: U.S. Dollar Index (DXY) spot values around the time of the FOMC announcement on June 19, 2013. The gray line signals the exact moment of the announcement.

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An expansionary surprise following a Federal Reserve announcement is associated with a decrease in both domestic and foreign interest rates, thus stimulating demand both at home and abroad.
.....

KEY FINDINGS

- A one standard deviation expansionary surprise following a Federal Reserve announcement yields an average depreciation of the U.S. dollar by about 0.4 percent. This same shock is associated with a decrease in interest rates both in the United States and abroad, thus stimulating both domestic and foreign aggregate demand.
- Foreign central bank announcements about unconventional monetary policies are associated with an appreciation of the U.S. dollar. A one standard deviation expansionary monetary policy surprise causes the U.S. dollar to appreciate against the major foreign currencies. This appreciation ranges from 0.09 percent to 0.3 percent.

IMPLICATIONS

This brief shows how unconventional monetary policy translates to exchange rate movements. The research could be expanded to study how the announcement surprise-exchange rate affects net exports and how other economic announcements affect nominal exchange rates.

About the Authors

Federico J. Díez is an economist in the research department at the Federal Reserve Bank of Boston. Ignacio Presno is an assistant professor at the University of Montevideo. When this paper was written, he was an economist in the research department at the Federal Reserve Bank of Boston.

b-13-8

The Michigan Surveys of Consumers and Consumer Spending

by Michelle L. Barnes and Giovanni P. Olivei

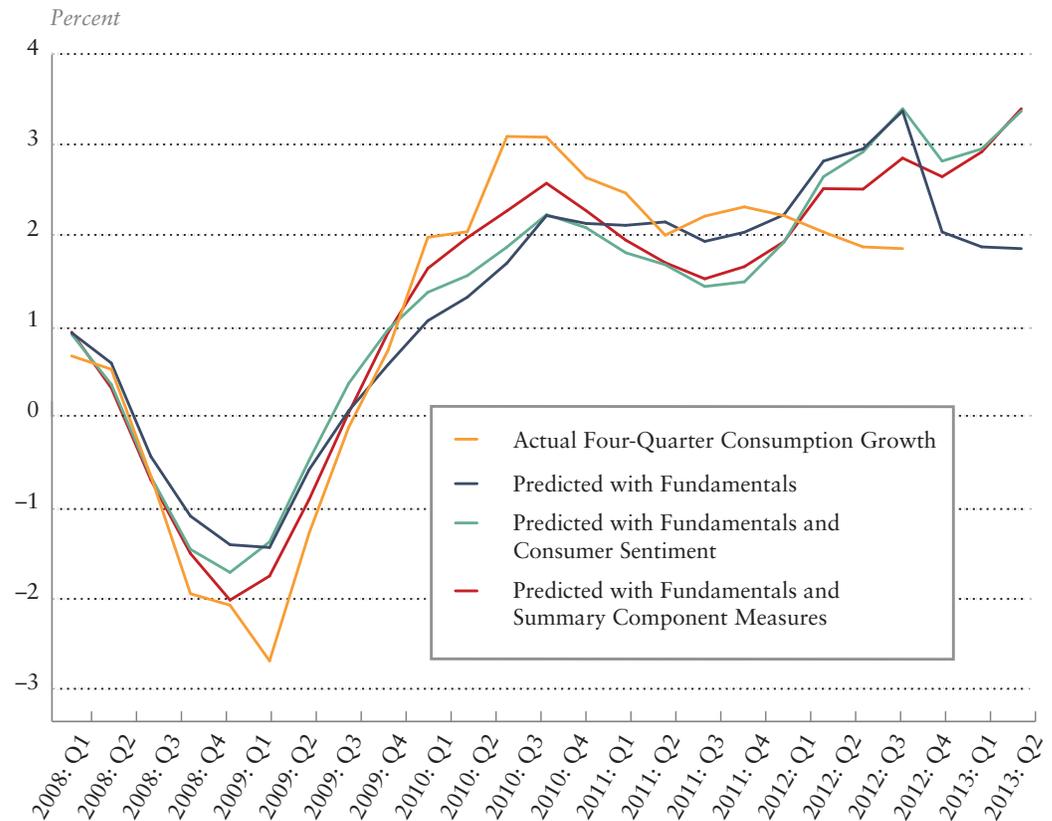
abstract and complete text: <http://www.bostonfed.org/economic/ppb/2013/ppb138.htm>
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MOTIVATION FOR THE RESEARCH

Surveys of consumer sentiment receive widespread attention, and their role in consumer spending has been the subject of numerous studies. Consumer sentiment is typically measured by survey questions to households about current and expected economic conditions, both household-specific and economy-wide. The Michigan Index of Consumer Sentiment, a representative measure of survey-based assessments of sentiment, is constructed from answers to five survey questions. These questions are part of a much broader survey of consumers' attitudes and expectations, the Michigan Surveys of Consumers. There is a widespread consensus in the literature that the role of consumer sentiment in explaining consumption is typically small from an economic standpoint, even if often statistically significant. This is especially true when controlling for economic fundamentals. In this case, the independent information derived from consumer sentiment is limited and arises (at least in part) from sentiment's ability to forecast subsequent developments in income and, more generally, in aggregate demand.

While consumer sentiment has been widely analyzed in the literature, much less attention has been devoted to assessing the role in consumption behavior of consumer attitudes and expectations from the broader Michigan Surveys of Consumers. One challenge in doing so is

Actual and Predicted Consumption Growth 2008:Q2 to 2013:Q2



Source: Bureau of Economic Analysis, Thompson Reuters/University of Michigan Surveys of Consumers, and author's calculations.

devising a way to summarize the information contained in the survey in a manner that is economically meaningful. In this brief the authors propose a limited set of summary measures of various aspects of the economic environment covered by these broader surveys. These measures are constructed from subsets of the survey questions, with each subset corresponding to a broad economic determinant of consumption—income, wealth, prices, and interest rates. With these summary measures, one can assess the explanatory power for consumption behavior in light of consumers' understanding of the economic fundamentals to which the survey broadly refers.

RESEARCH APPROACH

The authors consider a broad range of questions from the Michigan Surveys of Consumers. The surveys are based on a representative sample of households in the contiguous United States. The questions range from a household's own current and expected financial situation to this household's assessment of the broader economic environment—in terms of unemployment, inflation, buying conditions for a variety of products, and other topics. For their analysis the authors select 42 questions from the survey that pertain to income, wealth, prices, and interest rates. The questions pertaining to these variables may refer to current or expected developments and to developments that are household-specific or economy-wide.

The Michigan Index of Consumer Sentiment is constructed from five questions in the broader

set of questions contained in the Surveys of Consumers. In order to understand the extent to which the Index of Consumer Sentiment is related to the broader set of questions in the survey, the authors summarize the information in the 42 questions taken from the broader survey using a principal components approach. From the original variables, this method generates a new set of variables—called principal components—in which each principal component is a linear combination of the original variables.

The main feature of the principal components is that they are orthogonal to one another, meaning that there is no systematic relationship among the components, so that each principal component contains no redundant information and measures a different driving force in the original data. There are as many principal components as original variables, and each successive component summarizes a decreasing portion of the total variance of the original data. This method usefully summarizes the information contained in the original variables whenever a large fraction of the original variables' total variance is captured by the first few principal components.

The authors plot the standardized measure of the Michigan Index of Consumer Sentiment against the first principal component, over the period 1987:Q1 to 2013:Q2. After determining that sentiment fails to capture all of the information collected in the survey, the authors compute principal components for various subsets of the survey questions partitioned according to the economic dimension—income, wealth, prices, interest rates—that the survey questions address. To preserve degrees of freedom, the authors consider jointly the survey questions referring to income and those referring to wealth.

Next, the authors examine the explanatory power of their three summary components for consumption growth, both in isolation and compared with the performance of consumer sentiment. They consider both the period from 1987:Q4 to 2013:Q2 and the subsample that ends in 2007:Q4, then assess how much of the predictive content is preserved when controlling for standard consumption fundamentals.

Finally, the authors investigate the role of the survey measures in consumer spending, using a reduced-form framework for consumption, and interpret some of the findings in light of current developments in consumer spending.

KEY FINDING

- Survey questions pertaining to income and wealth are highly correlated with the index of consumer sentiment and—similar to previous findings reported in the literature—survey responses to questions about income and wealth have a role to play in explaining consumption behavior. Moreover, the summary components from the survey questions concerning prices and interest rates provide additional explanatory power. In particular, the informational content of responses concerning the interest rate appears to be robust across various specifications and sample periods. Thus, even when controlling for actual economic fundamentals, the survey measures provide modest additional information beyond that contributed by the consumer sentiment information and can be useful for understanding consumption behavior that occurred from 1987 to the present.

IMPLICATIONS

While the information from the survey as summarized by the authors' principal components analysis is generally significant from a statistical standpoint, its economic relevance is modest. Even

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The Michigan Survey of Consumers contains information about aggregate consumption behavior that goes beyond the information from the survey captured by the consumer sentiment index.
.....

with the inclusion of these summary measures, a sizable portion of the variation in consumption growth remains unexplained. Still, consideration of some of these measures is interesting. The survey measures are explicitly constructed with reference to the fundamental determinants of consumption. As a result, their persistent significance in explaining consumption behavior after the fundamentals are controlled for is somewhat surprising. However, the economic determinants that the authors consider are often only proxies of the true underlying fundamentals, and may not adequately capture expectations and uncertainty about the economic environment. These dimensions could find their way into how consumers answer the survey questions. Future work should therefore consider the robustness of these findings to a broader conditioning set of economic determinants than the limited set explored here.

About the Authors

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b-13-9

Cliff Notes: The Effects of the 2013 Debt-Ceiling Crisis

by Ali K. Ozdagli and Joe Peek

abstract and complete text: <http://www.bostonfed.org/economic/ppb/2013/ppb139.htm>
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MOTIVATION FOR THE RESEARCH

As a result of the continuing debate about the debt ceiling, the U.S. Treasury estimated that in the absence of an agreement, the borrowing authority of the United States would be exhausted on October 17, 2013, potentially forcing the U.S. government into a technical default. The stakes were high, given the roles played in financial markets by U.S. Treasury securities as the “safe” asset that serves as a benchmark for pricing many other securities and as collateral for other financial assets such as repurchase agreements. A default would have not only damaged the credibility of Treasury securities as a safe, stable investment vehicle, but also been extremely disruptive to financial markets, with the potential to cause a financial crisis that would spread far beyond our borders.

Although the United States did stop short of going over the fiscal cliff, at least for the moment, financial markets were not unscathed. In the lead-up to the deadline for resolving the debt-ceiling crisis, short-term Treasury bill rates rose sharply. However, because the issue was not whether investors would be paid in full, but when they would be paid, the spike in rates centered on instruments that were scheduled to mature during the window when the Treasury might be up against the debt ceiling and thus would face a potential problem making timely payments of principal and interest on its obligations. This crisis window would span the period from October 17, 2013 until the debt-ceiling crisis was resolved through an act of Congress signed by the President. Prior to resolution of the crisis, the endpoint of the period during which the Treasury bill market would have been disrupted would not have been known. Consequently, the length of time during which financial market yields would have been affected would have been based on the expectations of market participants.

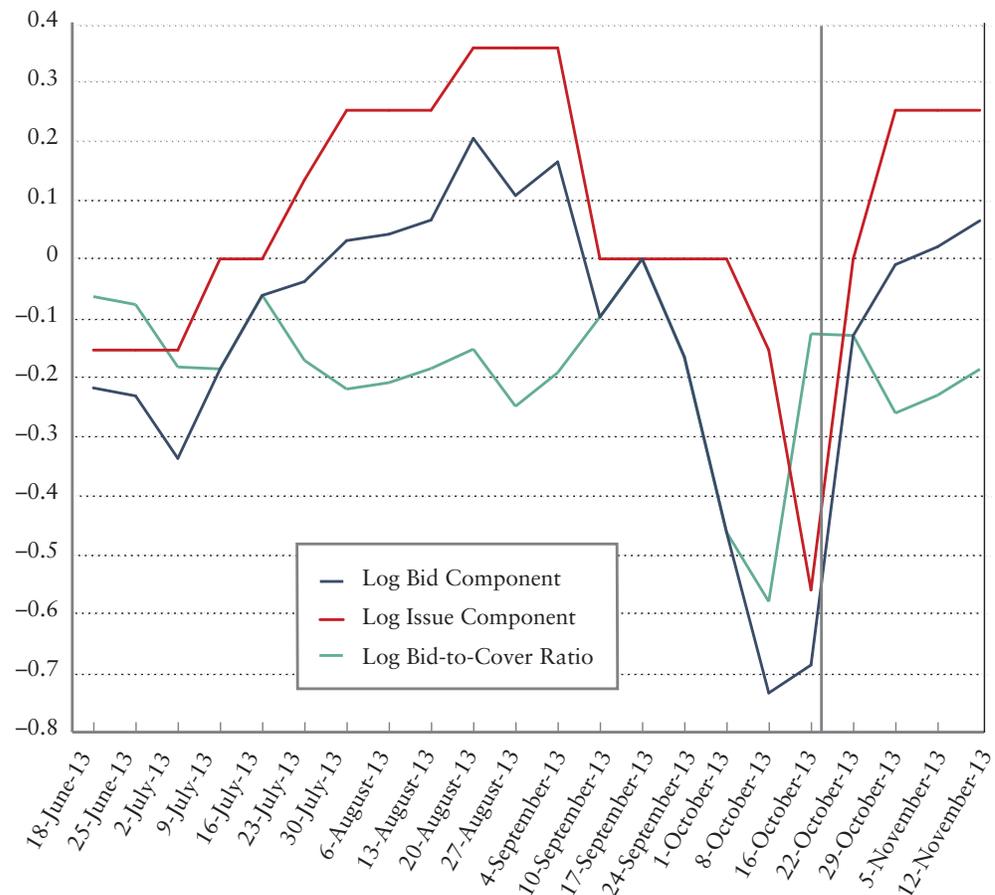
This policy brief investigates the nature of the disruption to the Treasury bill market in terms of its timing and magnitude and explores whether the disruption was entirely transitory or had effects that were likely to persist. In addition, the authors looked for indications of a reaction appearing in Treasury bill rates near the next debt-ceiling deadline in early 2014. They then considered

the extent to which the disruption was transmitted to other financial instruments and markets, specifically commercial paper and money market funds.

RESEARCH APPROACH

A standard indicator of demand in Treasury bill auctions is the bid-to-cover ratio, which is the ratio of the dollar volume of bids on an issue to the dollar volume of the issue. To assess whether the evidence indicates a decline in demand for Treasury bills around the time of the debt crisis, the authors examined the bid-to-cover ratio and transformed its two components to highlight the relative contributions of the bid volume and the issue volume for the weekly one-month (four-week) Treasury bill auctions for the four months preceding the debt-crisis resolution deadline, as well as a few subsequent auctions. The one-month Treasury bill was chosen because its maturity is sufficiently short that securities issued just prior to the debt-ceiling deadline would likely mature during the crisis window. They considered the bid component, the issue component, and the bid-to-cover ratio as normalized log values, using as the benchmark the date when the bid-to-cover ratio was at its local maximum value, just prior to the resolution deadline. The authors divided each series by its value on that date, giving it a normalized value of one, and then took the logarithm of each series. Each series has a zero value on the benchmark date. Therefore, the subsequent movements in the normalized bid volumes and normalized

One-Month T-Bill Normalized Log Bid-to-Cover Ratio and Components During the Period Around the 2013 Debt-Ceiling Crisis



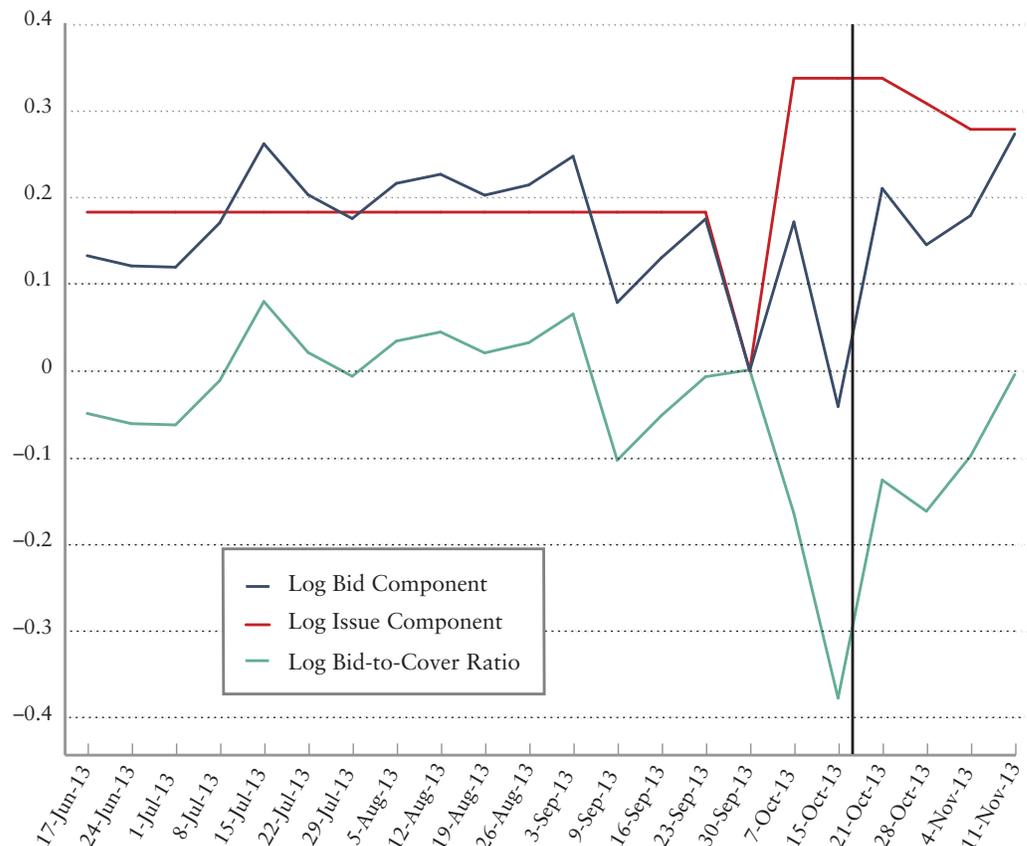
Source: U.S. Treasury.

Note: The benchmark date on which the bid-to-cover ratio reached its local maximum was September 17, 2013. The vertical gray line indicates the crisis resolution deadline of October 17, 2013.

issue volumes indicate their individual contributions to the decline in the bid-to-cover ratio. The authors examined similar evidence for auctions of the three-month (13-week) Treasury bill, and, for purposes of comparison, also examined corresponding information of the one-month and three-month Treasury bill auctions for the prior debt-ceiling crisis, focusing on August 2, 2011, the date when the Treasury had estimated that the borrowing authority of the United States would be exhausted. The authors then looked at the term structure of short-term Treasury yields for both the 2013 crisis and, to determine whether the effects were distinctive in this episode, for the 2011 debt-ceiling crisis.

The authors examined how the debt crisis affected the commercial paper (CP) market by analyzing how the weekly average commercial paper issue volumes across different maturities changed. This was measured relative to the benchmark week ending September 20, 2013, around and soon after the resolution deadline. According to the maturity substitution channel, during the period just before the resolution deadline private companies may reduce their shortest-term borrowing and replace these issues with longer-term borrowing in order to limit the effect of uncertainty about fiscal policy and potential rollover risk. The supply of commercial paper at the longer end of CP maturities should increase, resulting in a steepening of the term structure of commercial paper yields. A second channel in the CP market, the asset substitution channel, suggests that since CP is a reasonably good alternative to Treasury bills, investors might increase their demand for the shortest-term CP just before the

Three-Month T-Bill Normalized Log Bid-to-Cover Ratio and Components During the Period Around the 2013 Debt-Ceiling Crisis



Source: U.S. Treasury.

Note: The benchmark date on which the bid-to-cover ratio reached its local maximum was September 30, 2013. The vertical black line indicates the crisis resolution deadline of October 17, 2013.

resolution deadline, increasing the volume of shortest-term CP issuance and steepening the CP term structure.

In analyzing the spillover effects from the debt-ceiling crisis to money market funds (MMFs), the authors considered changes in total assets at Treasury MMFs and prime MMFs, out of an awareness that the MMFs are potentially subject to runs. They expected outflows to be more severe at MMFs that had more exposure to short-term Treasury bills, such as Treasury MMFs, than at prime MMFs. In addition, in order to identify maturity distribution shifts, they looked at the patterns of two maturity measures reported by MMFs: the weighted maturity of the portfolio and the share of the portfolio maturing within seven days. Maturity shifting would appear as an increase in the seven-day maturity measure during the period immediately prior to October 17 (to the extent that MMFs shifted to shorter maturities) and as an increase in the weighted-average maturity of their portfolios—to the extent that MMFs shifted to longer maturities without offsetting the lengthening of the weighted average maturities with other maturity composition adjustments.

KEY FINDINGS

- The debt-ceiling crisis caused the demand for Treasury bills maturing during the crisis window to decline notably, and then to return to its typical range immediately upon the (temporary) resolution of the crisis. Moreover, there was no evidence of a notable decline

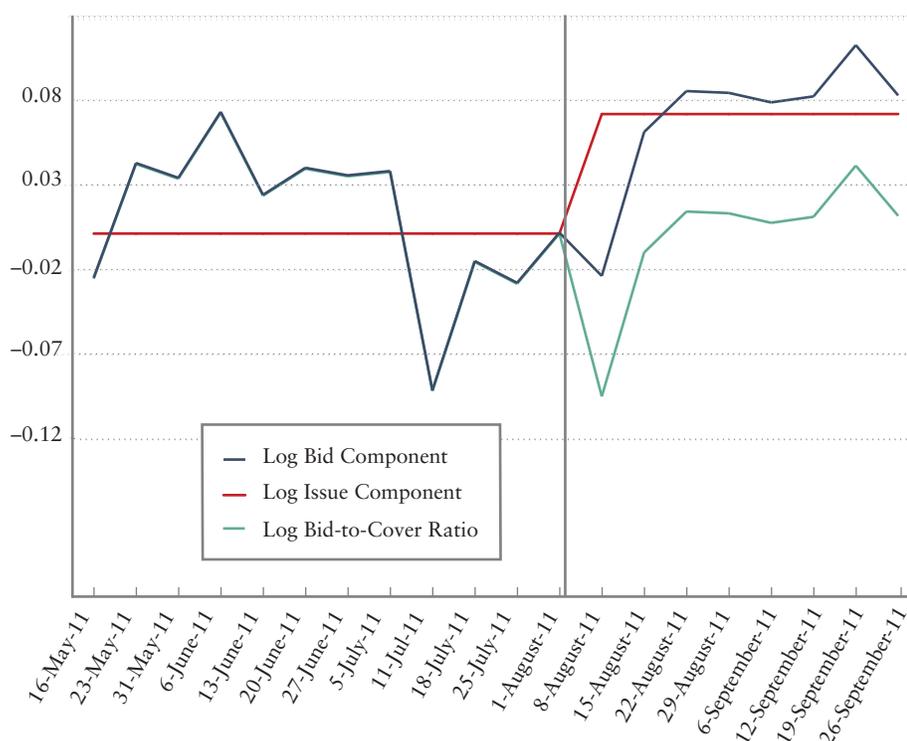
One-Month T-Bill Normalized Log Bid-to-Cover Ratio and Components During the Period Around the 2011 Debt-Ceiling Crisis



Source: U.S. Treasury.

Note: The benchmark date on which the bid-to-cover ratio reached its local maximum was July 26, 2011. The vertical black line indicates the crisis resolution deadline of August 2, 2011.

Three-Month T-Bill Normalized Log Bid-to-Cover Ratio and Components During the Period Around the 2011 Debt-Ceiling Crisis



Source: U.S. Treasury.

Note: The benchmark date on which the bid-to-cover ratio reached its local maximum was August 1, 2011. The vertical gray line indicates the crisis resolution deadline of August 2, 2011.

in bid volume for auctions of three-month Treasury bills, meaning that the sharp decline in Treasury bill demand appears only for the one-month securities that might have matured during the crisis window. The behavior of the one-month and three-month Treasury bill auctions for the prior debt-ceiling crisis, focusing on August 2, 2011, was consistent with the behavior around the 2013 crisis. This result suggests that the debt-ceiling crisis effects on Treasury bill demand appear to have been limited to the one-month maturity bills that were likely to mature during the crisis window.

- As the crisis deadline approached, the Treasury bill term structure began to exhibit a hump tied to the expected crisis window. By October 9, a week before the October 17 resolution deadline, the yields on Treasury bills maturing on October 24 had spiked. As of October 9 the immediate concerns about the debt ceiling seem to have been limited to approximately a one-month horizon because the term structure flattened for maturities after November 21. Once the crisis was resolved, the hump in the term structure of short-term Treasury bill rates immediately dissipated.
- Another hump formed around the Treasury bills maturing in late January through early February 2014, suggesting that the market had priced in the possibility of another debt ceiling stand-off. In the aftermath of the Continuing Appropriations Act (CAA) on October 17, the longer-term yields (three to six months) remained at elevated levels, and the small February yield hump persisted. The yield hump began with issues maturing in mid-January and early February, with the yield differential compared to the baseline reverting

back to zero for Treasury bills maturing on March 13, 2014.

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The debt-ceiling crisis caused temporary disruptions to the Treasury bill markets, with spill-over effects in the markets for commercial paper and money market funds.
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- Consistent with the maturity substitution channel, the CP issue volume decreased for the shorter maturities (5–9 and 10–20 days) that were close to the resolution deadline of October 17 and the first potentially missed Treasury bill principal and interest payment on October 24. Through the week ending October 18, the issue volume increased for medium-long maturities (41–80 days), but not as much for the longest CP maturities (greater than 80 days). Consistent with the asset substitution channel, the issue volumes increased for CP maturing in less than a week, doubling for the week ending on October 11, while the 41–80 day maturities increased six-fold. Moreover, the data for the week ending on October 25 reveal that this pattern disappeared immediately after the government reached an agreement, and persisted through the end of November.
- There is an upward shift of the commercial paper yield curve for the days just prior to the resolution deadline. Additionally, the term structure of commercial paper yields steepened in these two weeks, consistent with both the maturity substitution and the asset substitution channels. The data show a yield hump for the two-month maturity date for the week ending October 11, consistent with the authors' argument for the maturity substitution channel that the spike in the 41–80 day issues was caused by the commercial paper supply side, driving prices down and yields up. The CP term structure shifted downward during the first full week following the debt-ceiling crisis resolution, the week ending October 25, and remained at these lower levels through the end of November.
- The data also show a pattern of more severe outflows at MMFs that were more exposed to short-term Treasury bills, such as Treasury MMFs, than at prime MMFs. There is a sharp decline in total assets under management at Treasury MMFs and prime MMFs beginning about a month before the resolution deadline, falling about 7 percent and 2 percent, respectively, from September 25 to October 16. However, the outflows were reversed immediately after the debt-ceiling crisis resolution, quickly climbing back to values in the range experienced in August, making it clear that the observed pattern was tied to the debt-ceiling crisis. The same pattern is observed during the 2011 debt-ceiling crisis, which strongly suggests a temporary disruption in the pattern of outflows associated with the debt-ceiling crisis.
- The evidence indicates a clear reduction in the weighted-average maturities of Treasury MMFs leading up to the crisis resolution, followed by a sharp rebound immediately after the crisis resolution. The seven-day maturity measure of Treasury MMFs declined until just before the crisis resolution date, at which time it spiked upward, although the changes are only in basis points. The seven-day maturity measure reversed immediately upon resolution of the crisis. While the behavior of these measures was tied to the debt-ceiling crisis, it is difficult, based on this limited information, to understand exactly how these MMFs were adjusting their portfolios prior to the deadline.
- Prime MMFs shifted out of Treasury securities as the resolution deadline approached and at the same time increased the volume of repurchase agreements. There is also a sharp decline in prime MMFs' holdings of commercial paper, a decline that was immediately reversed upon the resolution of the crisis. Given the timing of these adjustments, it is easy

to conclude that these were related to the debt-ceiling crisis.

IMPLICATIONS

The debt-ceiling crisis and its resolution caused temporary disruptions to the Treasury bill markets and had spillover effects in the commercial paper market that altered yields and issuance patterns. Spillover effects were also evident in money market funds, as these funds experienced large temporary withdrawals by investors and, perhaps in anticipation of such outflows, altered their portfolio holdings.

About the Authors

Ali K. Ozdagli is a senior economist and Joe Peek is a vice president and economist and head of the finance group, both in the research department of the Federal Reserve Bank of Boston.

RESEARCH DATA REPORTS

d-13-2

The 2010 Survey of Consumer Payment Choice

by Kevin Foster, Scott Schuh, and Hanbing Zhang

abstract and complete text: <http://www.bostonfed.org/economic/rdr/2013/rdr1302.htm>
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MOTIVATION FOR THE RESEARCH

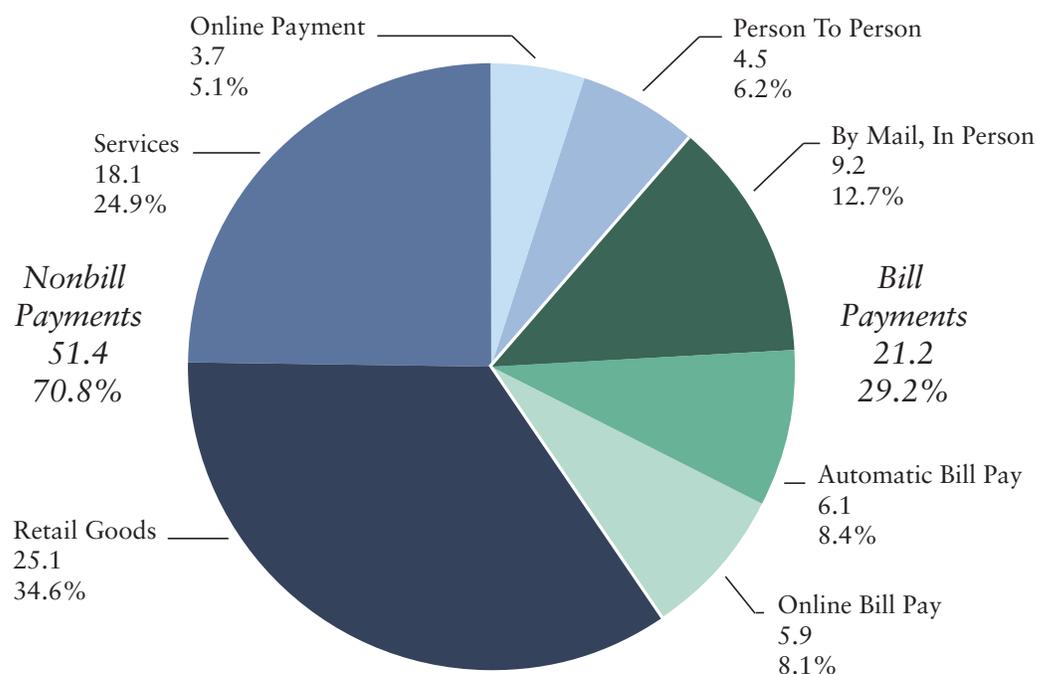
The 2010 Survey of Consumer Payment Choice (SCPC) is the third in a series of annual studies (2008–2010) conducted by the Federal Reserve Bank of Boston to gain a comprehensive understanding of the cash and noncash payment behavior of U.S. consumers. This report contains 43 tables with detailed estimates of the rates of adoption, the shares of consumers using, and the number of payments made by consumers for nine common payment instruments—cash, checks, money orders, traveler’s checks, debit cards, credit cards, prepaid cards, online banking bill payments (OBBP), and bank account number payments (BANP)—plus payments made directly from consumers’ income source. The report also contains estimates of consumer activity related to banking, cash management, and other payment practices; consumer assessments of payment characteristics; and a rich set of consumer and household demographic characteristics.

RESEARCH APPROACH

As in prior years, the 2010 SCPC was developed by the Consumer Payments Research Center (CPRC) of the Boston Fed and implemented by the RAND Corporation as an online survey, using RAND’s American Life Panel. The 2010 SCPC had 2,102 respondents whose responses were weighted to represent all U.S. consumers age 18 years and older. Of these respondents, 1,913 of them (91 percent) also responded to the 2009 SCPC, and 788 of the 2010 respondents completed all three surveys since 2008. Both groups form valuable longitudinal panels for research on consumer payment choice. The survey was implemented in the fall of 2010, primarily in October.

In the 2010 SCPC, in order to improve the overall quality and measurement of consumer payment choices, the following modifications were introduced in the questionnaire and other aspects of the survey methodology:

Number of Consumer Payments per Month by Transaction



Source: 2010 Survey of Consumer Payment Choice.

- Questions were modified and added to improve measurement of mobile banking and mobile payments;
- New questions were added about the security and initiation of debit card payments;
- Two questions about consumer assessments of characteristics of payments that had been dropped in 2009 (record keeping and setup cost) were restored;
- An improved methodology was introduced for detecting and reducing online reporting errors.

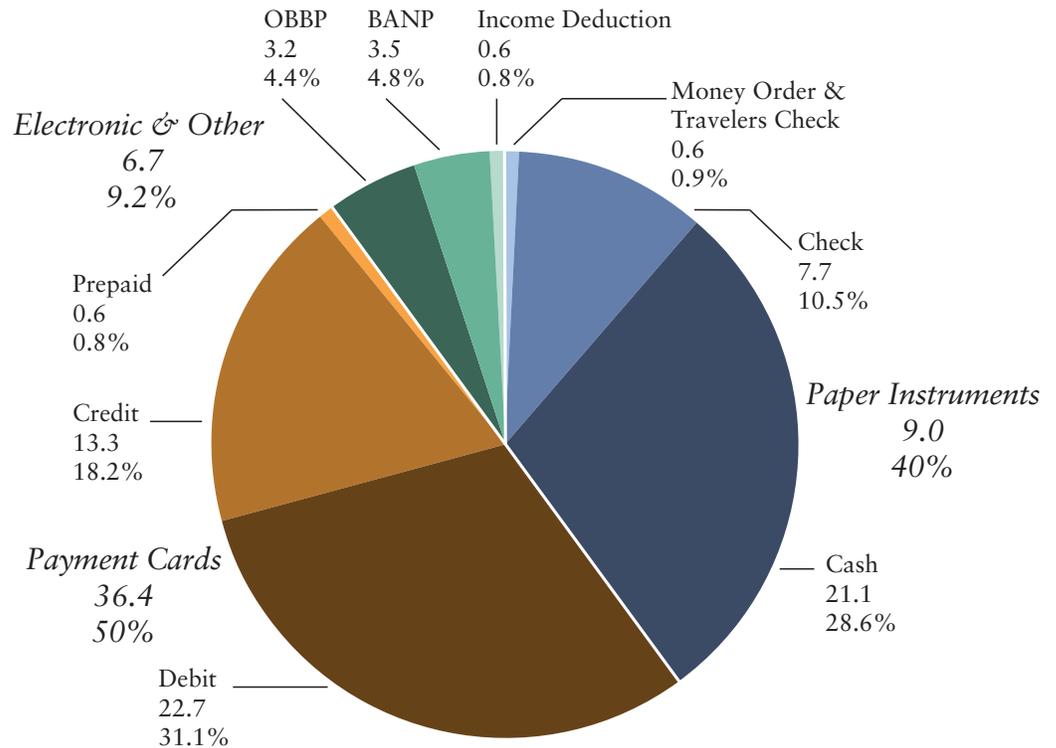
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Debit cards and cash continued to account for the two largest shares of consumer payments.

With the addition of a third year of data in 2010, it became possible to enhance the analysis to include the time-series properties of the responses and develop more consistent and objective rule-based, multi-year procedures for evaluating and cleaning the survey-response data. Although these changes are valuable improvements to the measurement of consumer payment activity, the difficulties inherent in separating the effects of changes in the survey from the effects of changes in economic behavior make it more challenging to draw cross-year comparisons.

KEY FINDINGS

- In 2010, the volume of consumer payments increased nearly 9 percent from 2009 as economic activity began to rebound from the financial crisis and recession. Cash payments by consumers, which had increased sharply in 2009, did not fall back but rather grew by another 3 percent in 2010. However, the share of cash payments, the dollar amount of cash withdrawals, and cash holdings by consumers decreased moderately in 2010. Consumer credit card payments increased 15 percent, reversing more than half the 2009

Number of Consumer Payments in a Typical Month, by Payment Instrument

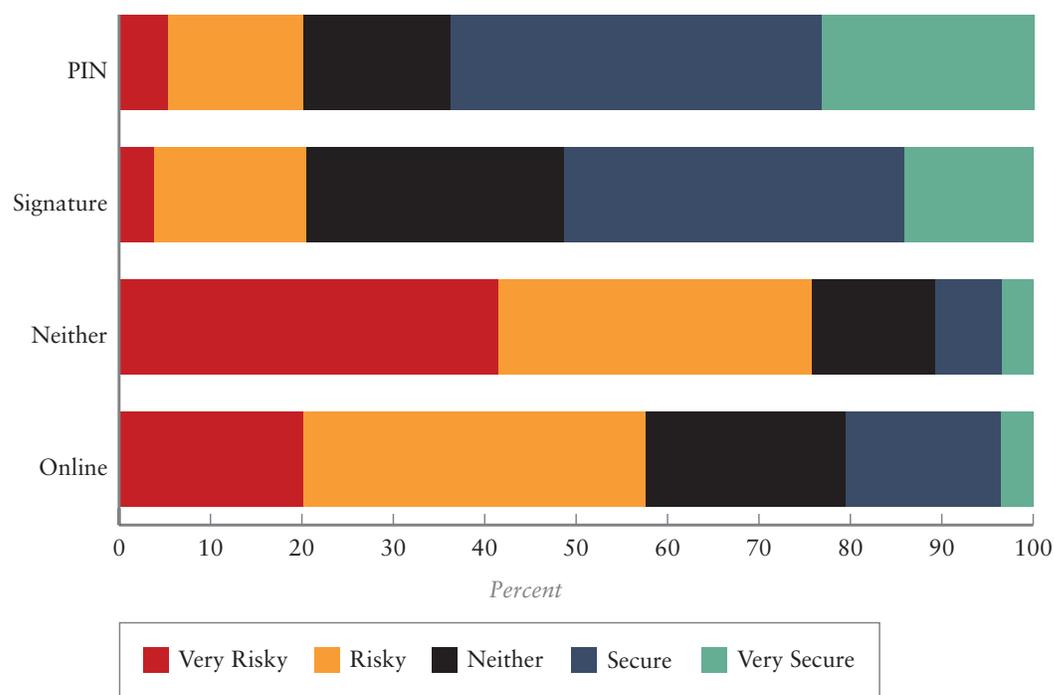


Source: 2010 Survey of Consumer Payment Choice
Note: Percentages do not sum to 100 due to rounding.

decline, and the steady trend decline in consumer paper check payments continued. Debit cards and cash continued to account for the two largest shares of consumer payments (31.1 and 28.6 percent, respectively), and the adoption of all types of prepaid cards (38.2 percent) increased notably in 2010. Mobile banking and mobile payments by consumers continued to show moderate increases through the end of 2010, consistent with the early stages of technology adoption.

- As of 2010, about two-thirds or more of U.S. consumers had adopted the five most popular payment instruments: cash (100 percent), blank checks (87.0 percent), debit cards (78.4 percent), credit cards (70.3 percent), and BANP (64.8 percent). Most adoption shares of consumer payments instruments generally appear to have been stabilizing during recent years. In contrast, consumer adoption of prepaid cards shows evidence of an increasing trend in recent years as the share of consumers holding prepaid cards more than doubled from 2008 to 2010.
- Of the average 73 payments in a typical month in 2010, consumers made an average of 21.2 bill payments (or 29.2 percent of total payments) and 51.4 nonbill payments (70.8 percent). Among consumers, the most common method of bill payment was by mail or in person (9.2 per month). Bill payments set up by consumers to be made automatically each month (6.1) and bill payments made online at the consumer's discretion throughout the month (5.9) numbered about the same. During a typical month, consumers made an average of 25.1 payments for retail goods and 18.1 payments for services while shopping offline, plus another 4.5 payments directly to another person (person-to-person, or P2P).

Consumer Assessments of Security of Debit Authorization Method

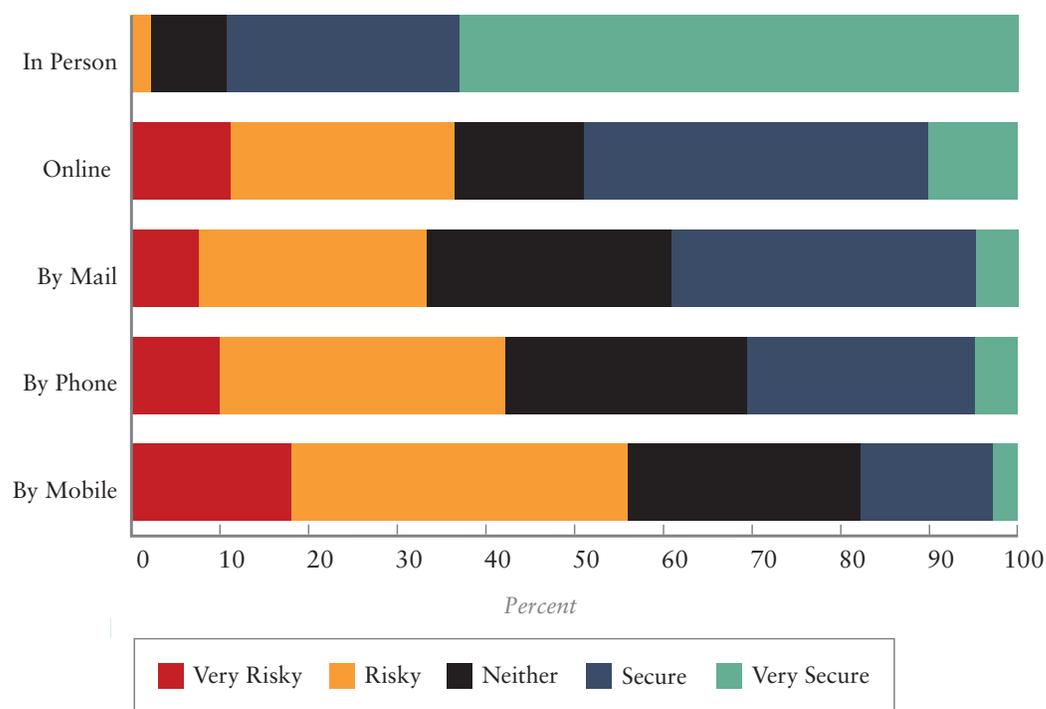


Source: 2010 Survey of Consumer Payment Choice

Consumers made an average of 3.7 nonbill online payments per month.

- On average, consumers held 5.2 instruments out of the nine common instruments tracked by the SCPC, up slightly from 2009 (5.0) but not much different from their holdings in 2008 (5.1). From a smaller group of four payment instruments, including only a subset of BANP (automatic ACH bill payments), consumers held 3.0 of them on average. This number is approximately twice as many as in 1989, reflecting a trend increase in consumer holdings of payment instruments. However, the average holdings in both the four-instrument set and the nine-instrument set appear to have been growing more slowly in recent years.
- As of 2010:Q4, mobile banking and mobile payments were still relatively uncommon among consumers. This low adoption rate is consistent with a new technology's early stages of diffusion, and both mobile banking and mobile payments increased substantially in subsequent years. In 2010, 92.2 percent of consumers had a mobile phone but only 11.5 percent of consumers had adopted mobile banking and 10.3 percent of consumers had used mobile banking in the previous 12 months. That is, about 90 percent (10.3 percent divided by 11.5 percent) of mobile banking adopters used the service. The percentage of consumers who made a text/SMS mobile payment was 3.1 percent in 2010, but the percentage of consumers who made a contactless mobile payment in 2010 was 1.0 percent. The small changes in both of these estimates from 2009 are not statistically significant.
- Consumers preferred PIN debit card payments among the four methods used to authorize debit card payments as of 2010:Q4: 1) entering a personal identification number (PIN); 2) signing the card holder's name (signature); 3) either PIN or signature indifference; and 4) neither entering a PIN nor signing. Almost half of consumers (46 percent) preferred PIN

Consumer Assessments of Security by Payment Location



Source: 2010 Survey of Consumer Payment Choice.

Note: “By phone” refers to payments made by conversation over a phone. “By mobile” refers to a payment made by using the online or text capabilities of a cell phone.

debit authorization and nearly one-third (30 percent) preferred signature debit authorization. One in five consumers (20 percent) was indifferent between entering a PIN and providing a signature. However, the choice of how to authorize debit card payments is not always left entirely to the discretion of consumers, because merchants make decisions that affect the choice, such as whether or not to provide PIN terminals at the point of sale. Furthermore, the Dodd-Frank Act and two subsequent legal settlements have made it possible for merchants to steer consumers toward low-cost payment methods using discounting and, for the moment, surcharging, although it does not appear that these practices have become widespread.

IMPLICATIONS

The 2010 SCPC contains new results that may help researchers and policymakers identify potential indirect effects of the 2010 Dodd-Frank Act (DFA), which included new legislation pertaining to debit card interchange fees and the routing of consumers’ card payments. The so-called Durbin Amendment to the DFA became Regulation II, which the Federal Reserve approved in July 2011 and implemented in October 2011. In response to this development, the CPRC added new questions to the 2010 SCPC about consumer attitudes toward debit card authorization methods and security to help gauge the potential policy impact on consumer behavior. Reg II primarily affected financial institutions, payment card networks, and merchants; most consumers likely were unaware of the changes. However, consumers’ debit card behavior may have been affected indirectly by Reg II because of differences in consumer attitudes toward authorization methods and security. If so, the new questions about these

issues in 2010 (and subsequent surveys) may help researchers to identify any indirect impact.

The SCPC of 2010 (and other survey years) may provide useful data for at least two other recently proposed policies. One is the Federal Reserve’s new strategic focus for financial services during the next decade, which was announced in October 2012 by the then-president of the Federal Reserve Bank of Cleveland (Pianalto 2012). An important element of the Fed’s plan is to begin taking into account the preferences of end users, such as consumers, when making decisions about the payment system. A second policy is the Advanced Notice of Proposed Rulemaking on prepaid cards issued by the Consumer Financial Protection Bureau (CFPB) in May 2012, which “seeks input on how to ensure that consumers’ funds on prepaid cards are safe and that card terms and fees are transparent.” To determine consumer preferences toward prepaid cards and other payment instruments, it is necessary to have data on actual consumer payment choices as well as their attitudes toward payment instruments and practices, which are included in the SCPC. A particular advantage of the SCPC data is the fact that it contains estimates for the same consumer over multiple years. This type of longitudinal panel of consumer data, which now extends to three years (2008–2010), offers unique information for researchers and policymakers.

About the Authors

Kevin Foster and Scott Schuh are members of the Consumer Payments Research Center in the research department of the Federal Reserve Bank of Boston. Kevin Foster is a survey methodologist. Scott Schuh is the director of the Center and a senior economist and policy advisor. Hanbing Zhang is a law student at Yale University and a former research associate with the Consumer Payments Research Center.

d-13-3

The 2010 Survey of Consumer Payment Choice: Technical Appendix

by Marco Angrisani, Kevin Foster, and Marcin Hitczenko

abstract and complete text: <http://www.bostonfed.org/economic/rdr/2013/rdr1303.htm>
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MOTIVATION FOR THE RESEARCH

This data report serves as the technical appendix to the 2010 Survey of Consumer Payment Choice (SCPC). The SCPC is an annual study designed primarily to study the evolving attitudes to and use of various payment instruments by U.S. consumers age 18 years and older. In this report, the authors detail the technical aspects of the survey design, implementation, and analysis.

The Survey of Consumer Payment Choice has been conducted since 2008 through a partnership between the Consumer Payment Research Center (CPRC) at the Federal Reserve Bank of Boston and the RAND Corporation. From 2013 the partnership includes the Dornisfe Center for Social and Economic Research at the University of Southern California. Written by the CPRC, the SCPC questionnaire is available for viewing at: <http://www.bostonfed.org/economic/cprc/SCPC>.

RESEARCH APPROACH

Conducting the SCPC involves carefully planning and executing a series of steps ranging

from gathering to analyzing the survey data. This process begins with designing a questionnaire, selecting the sample, and administering the questionnaire. Once the data have been collected, a coherent analytical methodology must be adopted. In the case of the SCPC, this involves calculating post-stratification weights, devising a strategy to clean the data, and developing a model that allows for population-based inference.

This data report describes and explains in detail the composition and methodology involved in planning and conducting the 2010 SCPC.

KEY POINTS

- The SCPC is administered via a computer-assisted web interview (CAWI). This mode of interview fits best with the sampling frame, which is the internet-based American Life Panel (ALP), jointly run by RAND and the Center for Social and Economic Research at USC. The CAWI mode is beneficial to the SCPC because of the length of the survey, the subjects' ability to log off and resume the survey later if interrupted, the lower cost relative to face-to-face or telephone interviews, and the greater willingness of respondents to answer some sensitive questions. All ALP members are given Internet access upon being recruited. The survey instrument is the MMIC survey system, developed by RAND.
- In contrast with the Survey of Consumer Finances and the Consumer Expenditure Survey, the SCPC, uses the individual consumer as both the sampling unit and the observation unit. The authors believe that the consumer surveyed will be able to report accurate accounts of his/her own payment behavior, but might not be able to accurately estimate the payment behavior of other household members.
- Once the survey instrument has been finalized, collecting the data involves two main steps: selecting the sample and administering the survey. Individuals are invited into the ALP via two recruiting strategies: the first involves gathering volunteers from other already-established panels; the second involves asking individuals already in the ALP to recommend acquaintances. ALP members remain in the panel, until they formally ask to be removed or stop participating in surveys over a prolonged period of time. One of the primary goals of SCPC sample selection in 2009 and 2010 has been to preserve the survey's longitudinal structure. In order to maximize the size of the longitudinal panel, in both 2009 and 2010, an invitation to participate in the SCPC was extended to everyone who had participated in the previous year.
- At the time of the 2010 SCPC sample selection (end of September 2010), there were 3,260 panelists. In 2010, all 2,104 individuals out of 2,173 who had participated in the 2009 SCPC and had not dropped out from the ALP were selected for the 2010 version. Around 91 percent of the individuals who participated in the previous year participate in the ensuing year. There are 788 individuals in the three-year panel from 2008 to 2010 and 1,125 in the two-year panel from 2009 to 2010 (but not in 2008). Roughly 37 percent of the 2010 sample consists of those who took the SCPC in both 2008 and 2009. Of the 1,010 SCPC respondents in 2008, 87 percent participated in the 2009 SPC and 80 percent participated in the 2010 SCPC. With an overall participation rate of 61 percent, the 2010 SCPC sample was finalized at 2,102 individuals.
- In 2010, over 50 percent of the respondents completed the survey within two days of its being made available, and 91 percent completed it within a month. This pattern is similar

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The overall goal is to improve the accuracy of estimates for various statistics relating to the population of U.S. consumers.
.....

for the 2008 survey. In 2009, while 90 percent of the respondents completed the survey after a month, only about 18 percent did so after a day.

- For all three years, 30 minutes was the median of the amount of time it took respondents to complete the survey. Of 100 questions that were asked of everyone, the median response rate for these items was slightly above 99 percent and the lowest response rate was about 95 percent.
- The SCPC is sent out early in the fall, with the goal of having most surveys completed in the month of October. The desire to standardize this response period is two-fold. First, from an analytical point of view, year-to-year trends are more easily identified if differences in behavior are not attributable to seasonal behavioral variation. Second, from an economic point of view, October was chosen as a reasonably representative month with respect to yearly payment behavior: there are no major holidays and it falls between summer vacation season and the winter holiday shopping season.
- To enable better inference of the entire population of U.S. consumers, SCPC respondents are assigned post-stratified survey weights designed to align as much as possible the composition of the SCPC sample with that of a reference population. The benchmark population distributions are derived from the Current Population Survey Annual Social and Economic Supplement, administered in March (CPS). Sampling weights are generated by RAND, using a raking algorithm (Deming and Stephan 1940; Gelman and Lu 2003). The weighting procedure consists of two main steps: first, demographic variables from the CPS are chosen and mapped onto those available in the SCPC; second, the raking algorithm is implemented and sample weights are generated by matching the proportions of predefined demographic groups in the SCPC to those in the CPS. The weighting algorithm is performed using 31 pairs of demographic variables.
- Prior to further statistical analysis, it is important to carefully examine the data and develop a consistent methodology for dealing with potentially invalid and influential data points. In preprocessing data, the authors distinguish between preprocessing categorical data and preprocessing quantitative data, as the issues and strategies differ substantially between the two.
- For categorical variables, the first line of data inspection consists of a basic range and consistency check for the demographic variables to ensure that reported values are logical and that they correspond to established categorical codes. Any response item that fails this check is considered to be missing data. For many demographic variables, missing information can be verified from the other surveys taken within the context of the ALP. For household income and household size, both attributes that could easily change within a year, values are imputed through logistic regression models for the purpose of creating post-stratification weights by RAND. On the other hand, nondemographic categorical variables are neither changed from their original values nor imputed if missing, as it is very difficult, without making strong assumptions, to identify irregular or erroneous data inputs.
- Quantitative variables, especially those that represent the number of monthly payments or dollar values, pose the greatest challenge in data preprocessing for the SCPC. To identify and edit invalid data entries based on economic principles, cleaning procedures are developed for two quantitative variables: the typical number of monthly payments and the dollar value of cash withdrawals.

- As previously mentioned, an important goal of the SCPC's data collection is to produce estimates of consumer payment behavior for the entire population of U.S. consumers, including changes from one year to the next. The authors accomplish this by developing a model that estimates the population means, which can correspond to a variety of underlying processes on the microeconomic scale. The procedure conceptually fits a regression model with weights designed to scale the sample data to generate estimates for a finite population. The analysis also gives the estimates' covariances. The standard errors give a sense of how variable the estimates are given the stratum weights, with large errors denoting more uncertainty in the true population values.
- The two functions of the population means that yield the most insight from an economic standpoint are the growth rates and the shares. The authors work with the macroeconomic definition of each function, meaning that they consider the growth rate and share of the averages. The estimates of the population mean from the SCPC are likely to be fairly variable due to the relatively small sample size. Thus, any difference between the population estimate and the mean is magnified when multiplied by the U.S. population, making the resulting estimate potentially a poor estimate of the population aggregate, which is why the authors recommend that such methodologies be used with caution.
- Knowing population estimates and their covariances also allows one to make inferences and test hypotheses about the U.S. population across the different years. The authors conduct a variety of hypothesis tests, including tests for means, growth rates, and shares, with the general goal of assessing changes from 2009 to 2010 in the payment behavior of consumers.

IMPLICATIONS

For the future, the overall goal for the methodology, administration, and analysis of the survey is to improve the accuracy of estimates for various statistics relating to the population of U.S. consumers. General areas of research and goals for future versions of the SCPC include editing the survey instrument to collect more reliable information, refining sample selection procedures, improving the post-stratification weights, developing multiple imputation procedures for missing values, and updating the data cleaning procedures.

About the Authors

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r-13-2

Assessing the Affordability of State Debt

by Jennifer Weiner

abstract and complete text: <http://www.bostonfed.org/economic/neppc/researchreports/2013/rr1302.htm>
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MOTIVATION FOR THE RESEARCH

States in New England and across the nation commonly issue debt in the form of bonds to finance the construction of roads, schools, and other capital investment projects. This financing method permits such projects to be built in a timely manner but also spreads the costs of

paying for these long-term assets to those who will benefit from these projects throughout their useful life. While borrowing plays an important role in state finance, uncontrolled debt levels can limit a state's ability to fulfill other priorities and obligations. Balancing a state's capital investment needs with debt service requirements is always a challenge, but this tension was magnified during the Great Recession and the associated state fiscal crisis. One argument held that states should take advantage of historically low interest rates to make long-term capital improvements and at the same time stimulate the economy. The American Recovery and Reinvestment Act of 2009 included additional federal subsidies for funding state and local capital investment. Yet a counterargument maintained that the Great Recession caused tax revenues to plummet and that amid these state budgetary shortfalls, taking on additional debt would be imprudent.

This report examines the crucial question of how states can gauge what constitutes an affordable level of debt and what issues must be considered when measuring debt levels.

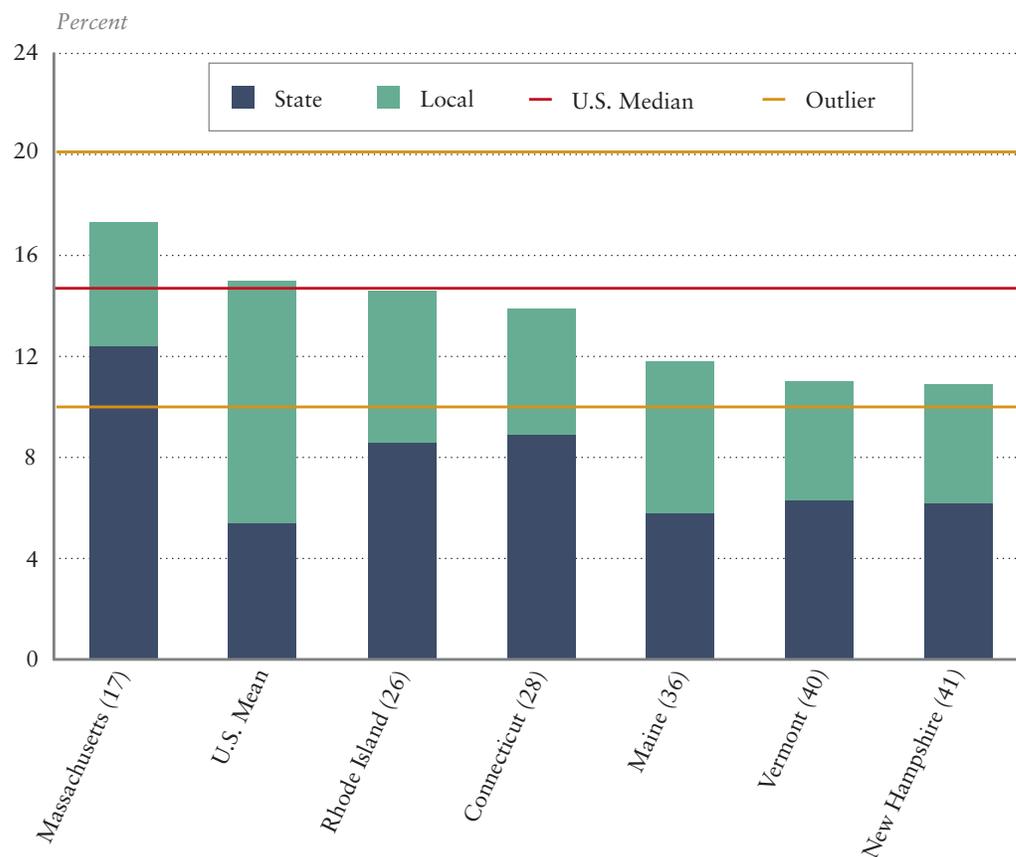
RESEARCH APPROACH

The report begins by discussing what debt affordability means and why it is important, then considers various issues pertaining to how state debt is measured. Illustrative data are provided for the New England states, including how their debt burdens compare with other U.S. states. The report concludes with some recommendations to policymakers to help guide future affordability assessments.

Debt affordability is a broad term that refers to a state's ability to repay all of its obligations without jeopardizing its ability to provide customary or desired public services at acceptable tax levels. For the purposes of this report, state debt obligations refer to bonded debt. While there are several commonly used definitions of bonded state debt, net tax-supported debt is most frequently used for debt burden calculations. Conceptually, this measure attempts to capture the obligations for which a state's general tax payers are most obligated. Debt service for this category of obligations is typically funded from a state's general operating budget, so this debt competes most directly with other public services for dollars. Broader characterizations of state debt, which may include bonds issued by public authorities that a state may not be legally obligated to repay, tend to be less relevant for budget discussions but may better capture the overall burden borne by residents and businesses. Forms of debt not supported by taxes draw on the same underlying pool of resources as tax-supported debt, and a default on such obligations could have a negative impact on a state's credit rating. Some analysts also include unfunded pension liabilities, which are long-term obligations of state governments, have strong legal protections, and are often included by rating agencies when assigning state credit ratings, since pensions place a competing claim on state resources.

The absolute level of a state's debt does not necessarily serve as a gauge of its affordability; that is better judged as a ratio of a state's debt obligations to the resources available for repayment. There are a variety of ways to measure debt affordability ratios. The metric most frequently used is debt service as a percentage of state revenues. Five of the six New England states use some version of this ratio, which compares the principal and interest costs associated with debt for a given period, usually a year, with available revenues over the same length of time. While this ratio is arguably the best indicator of the near-term affordability of state debt, the metric does not necessarily capture the long-term nature of most bonded debt commitments. Also, revenues may not be the best marker of a state's long-term ability to pay, as these receipts are highly dependent on current policy choices and also do not capture how much money a state holds in reserves. To avoid such complexities, some analysts compare

How State and Local Government Debt Burdens in New England Rank Nationally: Debt-to-Personal Income, 2011 Public-Purpose Debt



Source: U.S. Census Bureau and U.S. Bureau of Economic Analysis data, with calculations by author.
 Note: Ratios based on long-term public-purpose debt outstanding at end of the 2011 fiscal year. Outlier thresholds represent one standard deviation above the 50-state mean of the square roots of the ratios. The national ranking for combined state and local debt appears in parentheses after the state.

a state's outstanding debt with broader indicators of state resources, such as state personal income, state GDP, or the assessed (or market) value of taxable property.

For any given debt burden metric, there are two approaches for assessing affordability, the debt ceiling approach and the benchmarking approach. The debt ceiling approach compares a state's debt or burden to a specified threshold. A challenge with this approach is determining the "right" threshold: one that is too high may threaten a state's financial health, while one that is too low may cause a state to forgo worthwhile investments or use less-desirable funding sources. The benchmarking approach compares a state's debt burden to those of a selected peer group of states, and may provide a less arbitrary basis for gauging affordability. However, there may be inconsistencies across states in the definitions of state debt and resources, and states may differ in important ways that contribute to valid differences in debt burden metrics that complicate cross-state comparisons. For instance, county governments play a limited role in New England, and this approach shifts more responsibility to state government.

KEY FINDINGS

- Affordability assessments should use multiple definitions of state debt to better capture the

impact of debt on state budgets as well as the overall burden borne by a state's residents and businesses.

- Since no single metric captures all aspects of affordability, multiple debt burden ratios should be used. At a minimum, the concepts of debt service-to-revenues and debt-to-personal income serve as reasonable gauges of near-term and longer-term burdens.
- States should re-evaluate existing debt limits, as these may be too high or too low. Options such as a debt ceiling range or a target-and-cap can provide states with greater flexibility while still placing a constraint on overall debt levels.
- It is important to exercise care when benchmarking debt burdens against those of other states, as cross-state comparisons may omit consideration of a state's unique circumstances.
- Debt affordability assessments should be used in concert with capital planning to help states ensure that critical infrastructure needs are met while maintaining fiscal discipline.
- Formal debt affordability studies are currently conducted by 21 states, including Massachusetts, Rhode Island, and Vermont. In a complementary policy brief accompanying this research report, the author discusses the common elements and best practices employed in these formal debt affordability studies. See <http://www.bostonfed.org/economic/neppc/briefs/2013/briefs133.pdf>.

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Multiple debt burden ratios should be used in order to better gauge a state's ability to meet its obligations.
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IMPLICATIONS

The affordability of a state's debt can affect not only its fiscal sustainability but also its economic competitiveness, as states compete with each other to attract or retain residents and business investment based, in part, on the public services they offer and the taxes they levy. A heavy debt load that forces cutbacks in services or a rise in taxes can make it difficult to compete, while a low relative debt burden could signal underinvestment in services and infrastructure, offsetting other competitive advantages a state might have.

About the Author

Jennifer Weiner is a senior policy analyst for the New England Public Policy Center, housed in the research department at the Federal Reserve Bank of Boston.

r-13-3

Uncertain Futures? Youth Attachment to the Labor Market in the United States and New England

by Julia Dennett and Alicia Sasser Modestino

abstract and complete text: <http://www.bostonfed.org/economic/neppc/researchreports/2013/rr1303.htm>
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MOTIVATION FOR THE RESEARCH

In the aftermath of the Great Recession, high levels of unemployment and low labor force participation rates among youth between the ages of 16 and 24 years have raised considerable concern that this cohort's early experience will have some lasting effects. Historically, youth labor market attachment in the United States followed a cyclical pattern similar to that

of other workers. Since the early 1980s, the share of youth with jobs rose during expansions and fell during recessions, but otherwise remained essentially unchanged over time. This historic pattern shifted with the 2001 recession, when the youth employment-to-population ratio fell sharply but failed to rebound to its earlier peak, though the employment rates for most other age groups did recover to their pre-recession levels. During the Great Recession, the youth unemployment rate peaked at 19.6 percent, nearly double the rate for all U.S. workers. Five years later, youth joblessness remains elevated, and there has been a steep decline in youth labor force participation, with the share of youth working or looking for work falling to an all-time low of 54 percent in August 2012. The share of the youth population that is idle, or what is technically termed “not in employment, education, or training” (NEET) is particularly vulnerable to continued adverse labor market outcomes, and their prolonged detachment from the labor market may be costly. In addition to the social costs of unemployment, which include lost income, lower tax revenues, increased government payments, and lower economic output, NEETs also tend to have lower wages and lifetime earnings as well as more frequent unemployment spells.

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The overall goal is to improve the accuracy of estimates for various statistics relating to the population of U.S. consumers.
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Most of the existing research on youth labor market attachment to date has focused on either the long-term structural trends or the short-term cyclical impacts. Yet the sharp drop in youth employment during the Great Recession occurred amid a backdrop of declining youth labor market attachment even before this most recent downturn. Less emphasis has been placed on separating the structural trends observed for youth employment during the pre-recession period of 2000–2006 from the cyclical impacts of the Great Recession during 2008 through 2010. Few studies have attempted to put this most recent downturn into greater historical perspective by tracing youth labor force attachment over a longer time period. Even less attention has been devoted to examining the role that additional long-term factors may play in explaining the recent decline in youth labor force attachment, such as the growth in school enrollment, changes in the composition of the youth population over time, and structural and cyclical shifts across industrial sectors and within industries and occupations.

RESEARCH APPROACH

This report attempts to address these gaps in the current literature by using individual- and industry-level data from multiple sources to examine youth labor market attachment over the past several decades and quantify the forces driving the declines observed since 2000. The trends are examined for two groups, teens 16 to 19 years old and young adults 20 to 24 years old. Over the past several decades the composition of the youth population in the United States has shifted along a number of dimensions that reflect increasing shares of minority and immigrant populations in the United States as well as widening income inequality among families. Minority, immigrant, and low-income groups typically have lower levels of labor market attachment and school enrollment than middle-class whites born in the United States, and the recent changes may be driven by a higher share of the youth population being composed of demographic groups with traditionally lower levels of labor force attachment.

The analysis uses individual- and industry-level data from multiple sources to trace the experience of youth workers over the past decades to try to predict what the future might portend for them as they progress through their working lives. Earlier trends in youth employment by occupation and industry in the 2000–2006 period just prior to the Great Recession are analyzed separately from the cyclical impacts of the most recent downturn. These trends are also explored across gender, racial, and ethnic groups by focusing on the levels and changes

in labor market attachment over time, as measured at successive points in time in the cross-sectional data and over the work lives of successive cohorts of youth.

Previous research has found that labor demand has shifted away from routine work and towards jobs that require technical skills or post-secondary training. Shifts in employment across industries and occupations over the past several decades may have favored those that employ less youth labor. Alternatively, there may have been a shift away from employing youth within industries and occupations over time. The authors conduct a shift-share analysis to decompose the change in the overall youth employment share into two parts. The first part is the decrease that occurred due to shifts in the economy's industrial or occupational structure, holding constant the share of youth employed within each industry. The second part is the decrease that occurred due to the lower employment of youth workers within industries and occupations, holding constant the employment shares across industries.

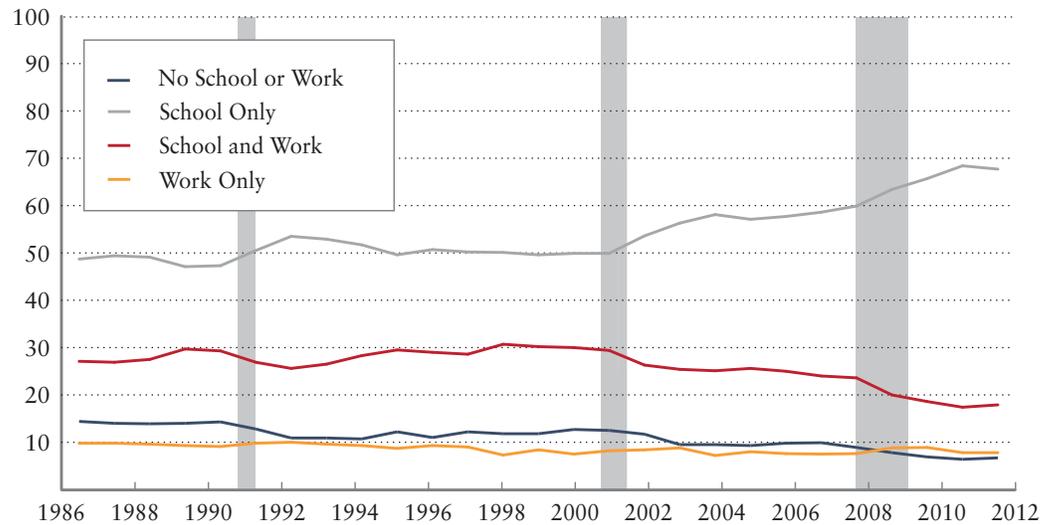
KEY FINDINGS

- While labor market attachment fell during the Great Recession for teens and young adults, only teens exhibited a decline in the prior period and seem to have experienced increasing difficulty in making the transition from school to work. Between 2000 and 2006 the share of teens reporting that they were unemployed due to “entering the labor force” jumped by 14.5 percentage points according to the Current Population Survey. In this period the teen unemployment-to-population ratio declined by 5.8 percentage points and the teen labor force participation rate dropped by 5.4 percentage points. These declines were similar in magnitude to those experienced by teens during the Great Recession.
- In contrast, between 2000 and 2006, young adults' employment-to-population ratio decreased by 0.5 percentage point, while their labor force participation increased slightly. Employment dipped only among young adult whites during this period.
- The shifting composition of the youth population in the United States towards greater shares of minority, immigrant, and low-income groups does not account for the observed decline in youth labor market attachment since 2000. For teens, virtually all of the decrease in the employment-to-population ratio stems from falling employment within each demographic group. While disadvantaged groups have lower levels of labor force attachment, employment and labor force participation has been declining among all teens regardless of race, ethnicity, or family income.
- These changes in youth labor market attachment occurred against a backdrop of continual increases in school enrollment since the mid-1980s. What has changed since 2000 is the degree to which youth combine school and work. The percentage of teens exclusively attending school has increased sharply, and the percentage combining school and work has decreased. Among young adults, the increase in the share exclusively attending school has meant fewer individuals are working exclusively, although the share combining school and work has held steady over this period.
- As a result of rising school enrollment, youth did not become increasingly idle prior to the Great Recession despite the sharp decrease in youth labor force attachment. While the share of youth that is NEET rises and falls with the business cycle, there is no evidence of a long-term upward trend that could suggest rising idleness among U.S.

Trends Among U.S. Youth Regarding Work, School Attendance, and Idleness, 1986–2012

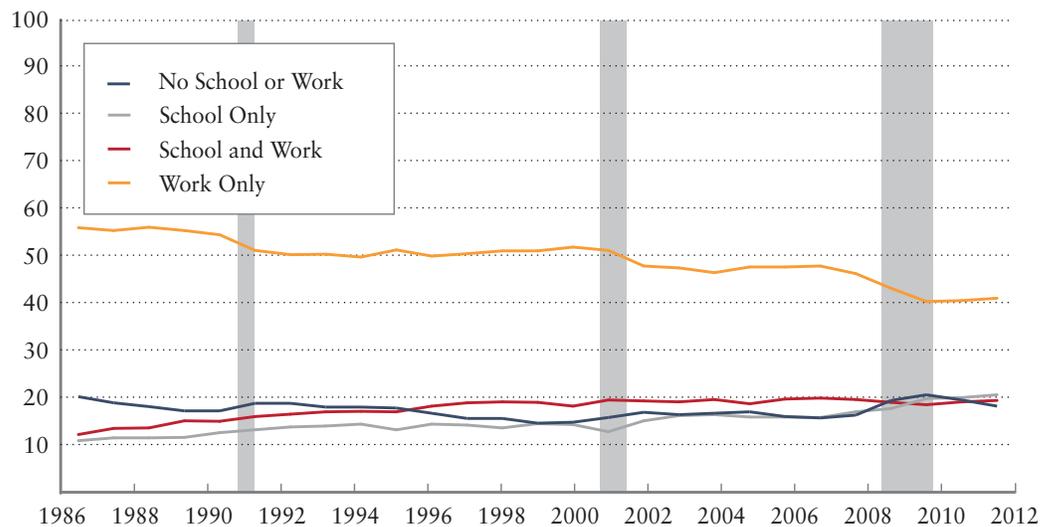
Teens 16 to 19 Years Old

Percent



Young Adults 20 to 24 Years Old

Percent



Source: Author's analysis of Current Population Survey data, March 1986 – 2012, IPUMS-CPS.
Notes: Civilian, noninstitutional population. Data prior to 1994 are not strictly comparable to those in later years due to survey redesign. CPS data on school enrollment not available prior to 1986. Shaded areas indicate recessions.

youth. Idleness among today's youth is no higher than it was two decades ago, just after the 1990–1991 recession.

- Breakdowns by family income quartile reveal that school enrollment increased more sharply among youth from low- and middle-income families. Among teens, employment rates were higher for those with family incomes above the median, yet all income groups experienced a similar decrease in employment between 2000 and 2006. College enrollment among teens was fairly steady across all income groups during this period. In contrast, college enrollment increased significantly for young adults from low- and middle-

income families, and particularly among those in upper middle-class households between the 50th and 75th percentile of family incomes. Yet changes in employment were similar among all income groups for the 20–24-year-old age group.

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Many young adults have found employment in the very same industries and occupations shedding teens, a trend evident before the Great Recession.
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- Some demographic groups exhibiting sharp increases in school enrollment appear to be delaying their labor market entry while investing in their education. White females born in the United States have experienced large increases in school enrollment over the past two decades, and recent cohorts have eventually followed similar trajectories to those of earlier cohorts despite lower initial levels of labor force attachment. Yet compared to earlier peers, recent cohorts of white males born in the United States have not caught up as they have moved through the lifecycle, a trend that began with the 1991 cohort.
- The overall decline in teen employment prior to the Great Recession does not simply reflect the decline of large industry or occupation groups, but rather indicates that the U.S. economy is employing fewer teens in almost all industries and occupations, regardless of whether the particular industry's employment share is growing or declining. Between 2000 and 2006, teen employment decreased by 7.6 percent for all industries combined, compared to an increase of 7.7 percent for all workers. Even among the top industries that employ teens, such as eating and drinking establishments, employment fell by 4.9 percent for all teens while growing 12.1 percent for all workers combined.

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The shift-share analysis reveals that the U.S. economy is employing fewer teens in almost all industries and occupations.
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- In contrast, no such pattern for young adults was found prior to the Great Recession, as between 2000 and 2006 their overall employment share was virtually unchanged and employment for this group grew slightly faster than the rate for all workers. This is for all industries combined as well as those that typically employ the majority of young adults. Many young adults have found employment in the very same industries and occupations that are shedding teens, a trend evident before the Great Recession.
- During the Great Recession, employment was negatively impacted for all youth, and the same pattern of within-industry and within-occupation shifts prevailed for both teens and young adults. All the variation between 2006 and 2010 is due to lower employment shares of youth within industries and occupations rather than shifts in employment between industries and occupations.
- More recent cohorts are entering the labor force with lower levels of labor market attachment than earlier cohorts, a trend that was evident before the Great Recession. For example, the 2001 teen cohort entered with slightly lower labor force participation than similarly aged cohorts in earlier generations, but failed to catch up to its predecessors even by the time the cohort reached the ages of 25 to 29 years. The 2006 cohort entered the labor market at the tail end of the previous cyclical peak, but at substantially lower labor force participation rates than the 2001 cohort. Finally, the most recent teen cohort entered the labor market in 2011 with extremely low levels of labor market attachment.
- The decline in labor force attachment among recent youth cohorts in New England began earlier in New England than in other parts of the United States. Teens and young adults experienced larger decreases in employment between 1990 and 2000 in the region than in the nation. These changes were driven entirely by decreasing employment of youth within industries and occupations rather than by shifts in demand across industries and occupations. Yet teens fared slightly better in New England during the Great Recession,

a trend reflected in both a lower unemployment rate and a slightly higher rate of labor force participation. Among the region's young adults, both employment and labor force participation decreased by 1.3 percentage points between 2000 and 2006—significantly different from what occurred across the nation and largely due to decreases within each demographic group. During the Great Recession, both employment and labor force participation fell for young adults in New England—largely due to similar decreases in all demographic groups.

IMPLICATIONS

It remains to be seen how the most recent 2011 youth cohorts entering the labor market will fare during their careers, as the full effects of the Great Recession have yet to play out. One striking pattern that has emerged from these findings is the different labor market experiences of young adults versus teens. Virtually all of the decrease in labor force participation among young adults occurred during the Great Recession, and the loss of early labor market experience potentially has long-run ramifications for both the individuals affected and society at large. Research identifying and evaluating programs and policies that are successful in helping young adults establish or regain their attachment to the labor market could help policymakers target funding towards those approaches that are deemed most effective and efficient. In the short run, while the labor market continues to strengthen, programs such as tax credits or subsidized jobs that allow employers to try out workers for eight weeks on a voluntary basis could help young adults obtain work experience during a critical early period in their careers.

However, the large and ongoing decline in teen labor force attachment may not reverse itself, as the Great Recession served only to intensify this downward trend that began much earlier. Although some demographic groups may simply be delaying labor market entry while pursuing education, the rising cost of college calls into question the value of time spent out of the labor market, particularly for those who do not complete their degrees. More work on the benefits of college coursework versus on-the-job training could help guide the decisionmaking of individuals and career counselors.

The greatest concern centers on the apparent difficulties that noncollege-bound youth have in transitioning to the labor force, a problem that existed prior to the Great Recession. A significant body of research suggests that long-term solutions are needed to prevent future youth cohorts from becoming detached from the labor force. Some solutions might involve expanding pathways to education and training through internships, apprenticeships, and career tech programs at the secondary level that are better aligned with labor market needs.

In sum, a variety of labor market challenges exist today for U.S. youth, and these issues cannot be addressed successfully by a single policy solution. Policymakers should seek evidence-based research that can help them better channel their limited resources towards those programs and approaches that promise the best results. Workforce development programs are typically more effective when applied to younger versus older workers, as youth are easier to train, more open to exploring new industries and occupations, and have a longer time horizon over which to reap the benefits of the investment. By working to ensure a pathway for all youth workers, policymakers will also help to ensure a path to greater economic growth in the future.

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