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Article

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NBER Reporter Online

Provided in Cooperation with:
National Bureau of Economic Research (NBER), Cambridge, Mass.

Suggested Citation: Mian, Atif R.; Sufi, Amir (2011) : Finance and macroeconomics: The role of household leverage, NBER Reporter Online, National Bureau of Economic Research (NBER), Cambridge, MA, Iss. 3, pp. 11-13

This Version is available at:
https://hdl.handle.net/10419/61969

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Finance and Macroeconomics: The Role of Household Leverage

Atif R. Mian and Amir Sufi*

The increase in household leverage prior to the most recent recession was stunning by any historical comparison. From 2001 to 2007, household debt doubled, from $7 trillion to $14 trillion. The household debt-to-income ratio increased by more during these six years than it had in the prior 45 years. In fact, the household debt-to-income ratio in 2007 was higher than at any point since 1929. Our research agenda explores the causes and consequences of this tremendous rise in household debt. Why did U.S. households borrow so much and in such a short span of time? What factors triggered the slowdown and collapse of the real economy? Did household leverage amplify macroeconomic shocks and make a quick recovery less likely? How do politics constrain policy responses to an economic crisis?

While the focus of our research is on the recent U.S. economic downturn, we believe the implications of our work are wider. For example, both the Great Depression and Japan's Great Recession were preceded by sharp increases in leverage.[1] We believe that understanding the impact of household debt on the economy is crucial to developing a better understanding of the linkages between finance and macroeconomics.

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The Rise in Household Debt

Our explanation for the increase in household debt begins with the dramatic expansion in mortgage originations to low credit-quality households from 2002 to 2007.[2] Mortgage-related debt is a natural starting point, given that it makes up 70 to 75 percent of household debt and was primarily responsible for the overall increase in household debt. Further, the expansion of new mortgage originations was much larger in zip codes with a large fraction of low credit-quality households.

We argue that the primary explanation behind the dramatic increase in mortgage debt was a securitization-driven shift in the supply of mortgage credit. The fraction of home purchase mortgages that were securitized by non-GSE (government sponsored enterprise) institutions rose from 3 percent to almost 20 percent from 2002 to 2005, before collapsing completely by 2008. We show that non-GSE securitization primarily targeted zip codes that had a large share of subprime borrowers. In these zip codes, mortgage denial rates dropped dramatically and debt-to-income ratios skyrocketed. Our evidence contradicts the hypothesis that the expansion in mortgage credit reflected productivity or permanent income improvements for marginal borrowers. For example, mortgage credit growth and income growth become negatively correlated at the zip code level from 2002 to 2005, despite being positively correlated in every other time period back to 1990.

Part of our research explores the relationship between house prices and mortgage credit growth, which is difficult to disentangle because mortgage credit is likely to both respond to and to drive house price growth. We address this issue by focusing on areas of the country with extremely elastic housing supply, where both expected and realized house price growth is very low. The logic of this test is straightforward: house price expectations cannot drive credit supply decisions in cities where house price growth expectations must be constrained to be close to the rate of inflation. Even in cities with very elastic housing supply which did not experience house-price growth, there was a sharp increase in mortgage originations in low credit-quality zip codes corresponding to falling incomes and a sharp rise in securitization. However, these effects are larger in cities with an inelastic housing supply. Therefore we conclude that the expansion in mortgage credit was more likely to be a driver of house price growth than a response to it. In cities with inelastic housing supply, though, the initial increase in house price growth likely had important feedback effects on mortgage credit during the housing boom.

We focus on the feedback effect from house prices to household borrowing by analyzing individual-level borrowing data on U.S. households that already owned their homes in 1997, before mortgage credit expanded.[3] Using an instrumental variables approach and isolating the direct impact of house price increase on home equity-based borrowing, we find that existing homeowners borrowed 25 to 30 cents against the rising value of their home equity from 2002 to 2006. Further, this effect is concentrated among borrowers with a weak credit history.

Our findings are in line with models that propose a "feedback" or "accelerator" effect of asset prices on the real economy through collateral constraints. For example, we find that the home equity-based borrowing chan-

nel is largest for low credit-quality and high credit-card-utilization individuals. Moreover, the borrowings were not used to purchase new properties or to pay down expensive credit card balances, implying that they were likely used for real outlays, such as home improvement and consumption. Overall, we estimate that the home-equity based borrowing channel can explain 50 percent of the overall increase in debt among homeowners from 2002 to 2006.

Household Debt, the Recession, and the Weak Recovery

An expansion in the supply of credit, coupled with the feedback effect of borrowing against rising house values by existing homeowners, led to an unprecedented growth in U.S. household leverage between 2002 and 2006. One strand of our research has shown that during the Recession of 2007–9 and beyond, the cross-sectional variation in leverage growth across U.S. counties as of 2006 is an early and powerful predictor of the severity of the recession.[4] The predictive effect of household leverage on macroeconomic outcomes is large enough to explain the entire rise in mortgage defaults, the fall in house prices, and the fall in durable consumption measured by auto sales.

We use county-level information on auto sales and building permits to show that durable consumption declined earlier and more sharply in counties that experienced a large increase in household leverage before the recession. In the most highly levered counties, auto sales and new residential building began declining as early as 2006, a full year before the beginning of the recession. In fact, counties with low household leverage completely escaped the drop in durable consumption until the fourth quarter of 2008.

The most recent data show that while low leverage households have brought their consumption back to the levels from before 2008, high leverage households continue to experience very low consumption.[5] Auto sales and residential investment in high leverage counties continue to remain 30 to 50 percent below their 2005 levels according to most recent data.

We also find much sharper drops in employment, both during and after the recession, in counties with high household leverage. The theoretical links between leverage and employment do not yield an obvious prediction. First, we would expect over-levered households to supply more labor in order to pay off their debts. Second, employment in a given county is not directly linked to consumption in that county, given that the factors of production are often outside of the area. Despite these issues, we find that employment in high household leverage counties dropped by 8 percent from 2008 to 2009 and remained depressed through the end of 2010.

The continued weakness in aggregate demand and labor markets in areas with high leverage highlights the main source of economic weakness in the current environment. This analysis also hints at why some of the traditional policy tools, such as monetary easing, are not having much of an impact on real activity. We suspect that the problems with the household balance sheet will be difficult to resolve without a credible mechanism for writing down bad debt by highly indebted households.

The Role of Foreclosures

One of the mechanisms through which high leverage can adversely affect real outcomes in a downturn is the negative feedback effect of leverage-induced forced sales on asset prices. The negative impact on prices in turn can lead to lower consumption and investment through a reduction in collateral value, balance sheet weakness, or negative wealth effects.

With Francesco Trebbi, we examine this idea in the context of foreclosures.[6] The recent financial crisis has led to almost 3 million U.S. households going into foreclosure, and the number is expected to increase. Does the forced sale of houses reduce house prices further and, more importantly, lead to declines in real economic activity? We use legal differences across states in the requirement that foreclosures go through a judicial process to construct an instrument for foreclosures. We then estimate the effect of foreclosures on house prices, new automobile purchases, and residential investment.

By comparing states with different legal requirements on foreclosures, we find that state laws have a large impact on the incidence of foreclosures. We find that foreclosures have large price and real effects. From 2007 to 2009, foreclosures were responsible for 20 to 30 percent of the decline in house prices, 15 to 25 percent of the decline in residential investment, and 20 to 35 percent of the decline in auto sales.

The Political Economy of Policy Intervention

Financial crises lead to urgent calls for governments to intervene. Optimal policy prescriptions vary depending on one's view of the world. However, actual policy decisions are equally likely to be made based on the constituent and special interest pressures that members of Congress face.

In another study with Francesco Trebbi,[7] we show that special interest pressure via campaign contributions from the financial industry influenced voting behavior on the financial rescue legislation that was designed to provide support to the banking sector in 2008. Similarly, constituent pressure from delinquent and under-water homeowners significantly influenced legislators to vote in favor of legislation that promoted mortgage modifications.

The Bigger Picture: Linking Finance and Macroeconomics

In the aftermath of the Great Recession, a broad consensus has developed that both finance and macroeconomics need to incorporate more of the other discipline in their conceptual frameworks. Our work is motivated by a desire to advance the conversation between financial and macro econo-

mists through a better empirical understanding of the evolving relationship between financial markets and the real economy.

A number of serious econometric questions — from identifying causality and structural parameters of interest to quantifying economic magnitudes — arise as one embarks upon the journey to link finance with macroeconomics. However, advancements in information technology, econometrics, and micro-founded theoretical models together put us in a much better position than our predecessors to overcome these obstacles.

Our own work highlights the availability of large datasets that enable researchers to break down macroeconomic aggregates to the level of actual decision making. For example, we can track individual-level borrowing decisions. We can quantify house prices and consumer spending at a much more granular level than ever before. We can observe job creation and destruction at the establishment level and follow household mobility across space and time. We have data that track borrower-lender relationships in the banking sector.

At the same time, the theoretical literature increasingly has developed more "bottom-up" macroeconomic models in which agents explicitly maximize objective functions and frictions between agents are carefully modeled. These models provide a richer set of predictions which can now be tested with increased rigor given the availability of large-scale microeconomic data. Moreover, the development of new empirical techniques in applied microeconomic fields offers tools that can more effectively tease our causal relations in the macroeconomy.

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[1] *B.J. Eichengreen and K. Mitchener, "The Great Depression as a Credit Boom Gone Wrong", Bank of International Settlements Working Paper 137, September 2003; and R. Koo,* The Holy Grail of Macroeconomics: Lessons from Japan's Great Recession, *John Wiley & Sons, Singapore, 2009. The Great Depression, like the current economic downturn, was preceded by a sharp increase in household leverage. Japan's Great Recession was preceded by a sharp increase in non-financial corporate leverage.*

[2] *A.R. and A. Sufi, "The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis," NBER Working Paper No.13936, April 2008, and* Quarterly Journal of Economics *124: pp.1449–96.*

[3] *A.R. Mian and A. Sufi, "House Prices, Home Equity-Based Borrowing, and the U.S. Household Leverage Crisis", NBER Working Paper No.15283, August 2009, forthcoming in* American Economic Review.

[4] *A.R. Mian and A. Sufi, "Household Leverage and the Recession of 2007 to 2009", NBER Working Paper No.15896, April 2010, and* IMF Economic Review, *58: pp. 74–117.*

[5] *A.R.Mian and A.Sufi, "Consumers and the Economy, Part II: Household Debt and the Weak U.S. Recovery", FRBSF Economic Letter, January 18, 2011.*

[6] *A.R. Mian, A. Sufi, and F. Trebbi, "Foreclosures, House Prices and the Real Economy", NBER Working Paper No. 16685, January 2011.*

[7] *A.R. Mian A. Sufi, and F. Trebbi, "The Political Economy of the U.S. Mortgage Default Crisis", NBER Working Paper No.16107, June 2010, and* American Economic Review, *100: pp.1967–98.*

The Labor Market Effects of Immigrants

Giovanni Peri*

Introduction

International migration is firmly restricted by national policies and national laws. While capital, technology, and goods move globally with few restrictions, governments heavily regulate the movement of labor, restricting the number of foreign nationals who reside and work in their countries. In spite of this, immigration into the rich countries of Europe, North America, and Oceania increased dramatically during the last decade. As of 2009, around 10 percent of the working age population in the OECD countries and about 14 percent of that population in the United States was born abroad. That was up from around 6 percent in the OECD and 11 percent in the United States, in 2000.

From a world perspective, international migration is a formidable way to increase individual productivity: immigrants moving from poor to rich countries nearly quintuple their income (on average) after the move.[1] Therefore, less restrictive immigration policies could

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