

Costs of Consumer Balance Sheet Stress

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Abstract: This paper investigates the impact of consumer-debt distress on the U.S. economy. Preliminary results find that changes in household balance sheet can explain approximately 45% of the total decline in consumption during the recent recession.

Introduction: Household consumption expenditure is approximately 70% of the U.S. economy. Recent research has shown that consumption decline during the Great Recession was in part due to household debt burden, which is also partially the reason for the slow recovery. Our preliminary results suggest that household debt burden can explain 45% of the decline in consumption from crest to trough during the Great Recession. The reduction in consumption was disproportionately borne by households with weaker balance sheets in terms of net wealth, income and leverage to begin with. For example, households with wealth in the lowest decile saw their consumption decline two times more than households with highest wealth.

Our preliminary results show that one standard deviation increase in household balance sheet has the same impact as 4% increase in unemployment in terms of reduction of consumer demand. Such comparisons can help understand the tradeoff between consumer debt and inflation in terms of monetary policy, in addition to the traditionally accepted tradeoff between unemployment and inflation.

Background: Recent theoretical works have hypothesized that accumulation of large amounts of debt by consumers can be an important driver of recessions.¹ Mian, Rao, and Sufi (2013) use a new data set to observe changes in household consumption and wealth at the county and zip code levels. They estimate a large elasticity of consumption with respect to housing net worth. They also point out that heterogeneity among households is an important determinant of consumption patterns.

Research Description: Our paper has two goals: (i) We seek to study the impact of heterogeneity of individual households on consumption pattern. (ii) More importantly, by using individual households consumption patterns, we seek to measure the aggregate impact of overextended household balance sheets on consumption during the recent recession.

¹See Eggertsson and Krugman (2012), Guerrieri and Lorenzoni (2011), Hall (2011), Philippon and Midrigan (2011). Mian and Sufi (2011) use zip code level data on auto purchases and exploit within-county variation to show that the consumption response to declining house prices was stronger in areas with more reliance on housing as a source of wealth.

We utilize Panel Study of Income Dynamics (PSID) data to estimate the consumption response of households to their balance sheet shocks and aggregate shocks. We then employ a structural model to disentangle the various household characteristics (income, wealth, leverage) at play that affect household consumption. The model can distinguish between two main channels through which household balance sheet affects household consumption: (i) the collateral channel and (ii) the “wealth effect”. In addition to PSID, in the structural model calibration, we employ Survey of Consumer Finances data to obtain more detailed balance sheet data on U.S. consumers over time.² To the best of our knowledge, this is the first paper to measure the impact of consumer balance sheet on consumption at an aggregate level allowing for heterogenous response of consumers.

The model features a continuum of infinitely lived consumers who maximize their utility. Wages are persistent and depend on aggregate and individual specific shocks. If wage offer is below reservation wage, consumers choose to not work and receive reservation wage. Each consumer has two accounts - cash/savings and investment/housing account, with fixed and variable returns respectively. Adding capital to the housing/investment account is costly, as observed in real estate transactions. The wage process is able to generate substantial heterogeneity in terms of wealth, income and household debt. These moments generated from the model are matched with data providing us confidence regarding model fit. *The model generated panel data of consumers with all relevant information and code for analyzing it will be available to all.*

Preliminary Results: As a counterfactual analysis, we compare the consumption reduction of each household from their peak in December 2007 to trough in June 2009 (NBER defined recession), to the case where the housing prices remained flat starting December 2007. Aggregating over the distribution of all individual households, we find that optimal consumption falls by 1.25% due to the household decline. Given that the total consumption fell by 2.78%, household balance sheet channel can explain 45% of the decline in consumption during the recent financial crisis.

Regarding cross-sectional variation, preliminary results show that households that were most levered before the crisis faced approximately three times larger decline in consumption compared to households with no leverage. The decile of consumers with the lowest income faced 50% larger decline in consumption compared to the highest income group.

We hope that our results help policy makers to shorten periods of economic downturn and slow growth further.

²We employ Case-Shiller House Price Index for housing prices, along with additional macroeconomic data from the Bureau of Economic Analysis.

Itemized Budget

1. Research Assistantship: We plan to hire a research assistant who can independently check our code and data analysis. We also hope to ask him/her to help us clean additional data that we obtain. 40 weeks at 20 hours a week, \$10 per hour: \$8,000.
2. Travel Support: We would like to obtain partial support for at least two conferences where one of the authors can go to present this paper. \$400 airline tickets, and three nights stay per conference at \$200 per day cost: \$2,000 in total for two conferences.
3. Total Grant Requested: \$10,000

Public Availability of Our Data: Our fitted model produces simulated data on consumers. We plan to make this model generated panel data of consumers with all relevant information and code available to everyone. Hopefully, this data will help several researchers interested in understanding household behavior based on various household characteristics (such as income, wealth, leverage).

References

- Eggertsson, Gauti B., and Paul Krugman, 2012, Debt, Deleveraging, and the Liquidity Trap: A Fisher-Minsky-Koo Approach, *The Quarterly Journal of Economics* 127, 1469–1513.
- Guerrieri, Veronica, and Guido Lorenzoni, 2011, Credit Crises, Precautionary Savings, and the Liquidity Trap, NBER Working Papers 17583 National Bureau of Economic Research, Inc.
- Hall, Robert E., 2011, The Long Slump, *American Economic Review* 101, 431–69.
- Mian, Atif, Kamalesh Rao, and Amir Sufi, 2013, Household Balance Sheets, Consumption, and the Economic Slump, *The Quarterly Journal of Economics* 128, 1687–1726.
- Mian, Atif, and Amir Sufi, 2011, House Prices, Home Equity-Based Borrowing, and the US Household Leverage Crisis, *American Economic Review* 101, 2132–56.
- Philippon, Thomas, and Virgiliu Midrigan, 2011, Household Leverage and the Recession, NBER Working Papers 16965 National Bureau of Economic Research, Inc.

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Academic Position

Edwin L. Cox School of Business, Southern Methodist University, Dallas, TX
Assistant Professor of Finance
Finance Instructor

August 2011–Present
August 2010 – July 2011

Research Interests

Corporate Finance. Financial Intermediation. Household Finance. Entrepreneurship.

Education

Ph.D. in Finance, The Wharton School, University of Pennsylvania, 2005 - Dec 2010. (Committee: Franklin Allen (Co-Chair), João Gomes, Craig MacKinlay, David Musto (Chair) and David Scharfstein.)
M.S. in Electrical Engg. and Comp. Sc., MIT, 2001-2003. (Passed Ph.D. Technical Qualifier Exam)
B.Tech. in Comp. Sc. and Engg., IIT Guwahati, 1997-2001. (President of India Gold Medalist)

Publication

1. [Does Shareholder Coordination Matter? Evidence from Private Placements](#) (with Nikolay Gantchev) *Journal of Financial Economics*, 108(1), 213-230, April 2013.

Working Papers

2. [Marriage Stability, Taxation and Aggregate Labor Supply in the U.S. vs. Europe](#) (with Hans Holter and Serhiy Stepanchuk) Revision resubmitted to *Journal of Monetary Economics*
2012: European Economic Association, Federal Reserve Bank of Philadelphia*, Goethe University*, New Economic School*, Royal Economic Society Annual Conference.
2011: French Macro Workshop, Nordic Summer Symposium on Macroeconomics, Uppsala Univ.*.
Media Coverage: [VOX](#), [WSJ Real Time Economics](#), [Business Insider](#), [Huffington Post](#) among others.
3. [Does Source of Capital Affect Investment and Firm Value?](#)
Revision requested by *Journal of Financial and Quantitative Analysis*
Awards: Shmuel Kandel Award (Outstanding Ph.D. Student in Financial Economics), Utah Winter Finance 2010, Morgan Stanley Research Award, Rodney L. White Center for Financial Research 2009.
2010: American Finance Association Annual Meetings, Federal Reserve Bank of San Francisco, University of Virginia, University of North Carolina Chapel Hill, Pennsylvania State University, Southern Methodist University, Emory University, Federal Reserve Bank of New York.
2009: Financial Management Association Annual Meetings, Lehigh University.
4. [Do Asset Price Bubbles have Negative Real Effects?](#) (with Itay Goldstein and Andrew MacKinlay)
Award: Marshall Blume Award in Financial Research 2013.
2013: NBER Summer Institute - Corporate Finance and Risks of Financial Institutions, Rothschild Caesarea Center IDC 10th Annual Conference, SFS Finance Cavalcade, WFA, University of Miami, European Finance Association, FDIC Bank Research Conference, Louisiana State.
Media Coverage: [The Economist](#), [CFA Institute](#), [Chicago Tribune](#) among others.

* seminar presentation by co-author.

5. [A Theory of Reverse Asset Substitution](#) (with Franklin Allen)

2013: Mid-Atlantic Research Conference.

6. [Does Security Choice Matter in Venture Capital? The Case of Venture Debt](#) (with Michael Ewens)

2012: Babson College Entrepreneurship Research Conference, Mid-Atlantic Research Conference, Darden Entrepreneurship and Innovation Research Conference and AOM Exemplars Conference, Financial Intermediation Research Society, Kauffman Entrepreneurial Finance and Innovation Conference, Southern Methodist University, Texas A&M.

2011: Arizona State University, Carnegie Mellon University*, Harvard Business School*.

Works in Progress

7. Moral Hazard in Bank Loans (with Sudheer Chava and Ji Zhou)

2013: Indian School of Business*, Indian Institute of Management Bangalore*.

8. Agency Costs of Equity, Firm Value, and the Level of Investment (with Robert Parrino)

2013: University of Texas at Austin*.

9. How does Volatility affect Capital Structure? (with Hans Holter, William Maxwell and Serhiy Stepanchuk)

Patents

Inventor of US Patent [US6807159](#), European Patent EP1202495, Japanese Patent JP3721115, German Patent DE60110184, Chinese patent CN1319298 and Austrian Patent AT293859 all assigned to International Business Machines (IBM) Corporation, Armonk, NY. Patents on methodology for managing power consumption in a master driven time division duplex wireless network.

Awards

Marshall Blume Award in Financial Research 2013.

Shmuel Kandel Award (Outstanding Ph.D. Student in Financial Economics), Utah Winter Finance 2010.

President of India Gold Medal (for the highest GPA among all graduating students) at IIT Guwahati 2001.

3rd Place at MIT IDEAS Competition, 2001.

Computer Science Journal Publications

[Clock Synchronization for Wireless Networks](#) (with Rui Fan and Nancy Lynch, MIT) - *Principles of Distributed Systems* Lecture Notes in Computer Science, Volume 3544/2005, 900, 2005.

[Rolling Element Bearing Design through Genetic Algorithms](#) (with Vinay Kumar, Shivashankar Nair and Rajiv Tiwari, IIT Guwahati) - *Engineering Optimization*, 35(6), 649-659, 2003.

Grants and Scholarships

The National Bureau of Economic Research (NBER) Household Finance Group Travel Grant 2010 from the Sloan Foundation, and NBER Entrepreneurship Group Travel Grant 2010; Kauffman Foundation sponsored seat on University of Chicago NORC Data Enclave 2009-2010; Morgan Stanley Research Award by Rodney L. White Center for Financial Research 2009; Rodney L. White Center for Financial Research Grant 2007-2008; Weiss Center for International Financial Research Grant 2007-2008, 2008-2009, 2010-11; Univ. of Penn. Dean's Fellowship for Distinguished Merit, 2005-2010; EECS Dept. General Research Assistantship at Massachusetts Institute of Technology, 2001-2002; IIT Merit Scholarship, 1998-2001; Top 0.1% in National Physics Olympiad, India, 1996; National Talent Scholar (500 students selected nationwide), India, 1995.

Teaching

SMU Cox School - Investments (MBA/MS): Fall 2013 Mod A.

U.Miami - Corporate Theory (PhD): Fall 2013.

SMU Cox School - Financial Management (UG): Fall 2010, 2011. Spring 2013.

Wharton (TA) - Corporate Finance (MBA/UG): Spring 2007, Summer 2007, Fall 2007, Fall 2008.

Wharton (TA) - Financial Derivatives (MBA/UG): Spring 2006, 2008, 2009.

Presentations and Discussions

2014: University of Melbourne, Adam Smith Corporate Finance Conference, European Central Bank Conference on The Optimal Size of the Financial Sector (Invited Presentation as top contribution on the theme of contribution to the real economy), Financial Intermediation Research Society.

2013: American Economic Association, Mid-Atlantic Research Conference, Rothschild Caesarea Center 10th Annual Conference at the Arison School of Business, IDC, SFS Finance Cavalcade, Western Finance Association Conference, University of Miami, NBER Summer Institute - Corporate Finance and Risks of Financial Institutions, European Finance Association, University of Texas at Austin*, Indian School of Business*, Indian Inst. of Management Bangalore*, Louisiana State University, FDIC Bank Research Conference.

2012: AREUEA Mid-Year Conference, Babson College Entrepreneurship Research Conference, Mid-Atlantic Research Conference, Darden Entrepreneurship and Innovation Research Conference and AOM Exemplars Conference, European Economic Association, Federal Reserve Bank of Philadelphia*, Financial Intermediation Research Society (+ Discussant), Goethe University*, Kauffman Entrepreneurial Finance and Innovation Conference, New Economic School*, Royal Economic Society Annual Conference, Southern Methodist University, Texas A&M.

2011: Arizona State University, Carnegie Mellon University*, Harvard Business School*, Joint French Macro Workshop, Lone Star Conference, Nordic Summer Symposium on Macroeconomics, University of North Carolina Chapel Hill*, Uppsala University*.

2010: American Finance Association Annual Meetings, Federal Reserve Bank of San Francisco, University of Virginia, University of North Carolina Chapel Hill, Pennsylvania State University, Southern Methodist University, Emory University, Federal Reserve Bank of New York, Student Utah Winter Finance Conference, Lone Star Conference (Discussant).

2009: Financial Management Association Annual Meetings, Lehigh University, Mid-Atlantic Research Conference (Discussant), Wharton.

Professional Activities

Invited Attendee: National Bureau of Economic Research (NBER) Corporate Finance and Financial Intermediation Summer Inst. 2013; NBER Household Finance Working Group 2010-Present; NBER Entrepreneurship Working Group 2010-.

University Service: Wharton Ph.D. Seminar 2009-10; SMU Seminar Series 2011-12; SMU Faculty Recruitment Committee 2011-Present; SMU High Performance Computing Committee Member 2012-Present.

Affiliations: American Finance Association, American Economic Association, Western Finance Association, Econometric Society.

Ad-hoc Referee: Journal of Financial Services Research, Financial Management, Midwestern Finance Association.

Certification: Passed CFA Level II.

Media Mentions: On work hours in the US and Europe, May 2012: [VOX](#), [WSJ Real Time Economics](#), [Business Insider](#), [Huffington Post](#), [The Economist](#), among others.

Computer Science Conference Proceedings

1. Dynamic Self-Configuration of Collocated Wireless Networks, *ACM SIGCOMM 2003*, Germany. (with S. Bauer and J. Wroclawski.)
2. The Personal Router, *ACM SIGMOBILE Mobile Computing and Communications Review*, Volume 7, Issue 1, January 2003. (with Advance Network Architecture Group)
3. [“Adaptive Routing for Ad hoc Wireless Networks Providing QoS Guarantees”](#), in *Proc. IEEE Intl. Conf. on Personal Wireless Comm.*, 2002, India. (with G. Barua)
4. [“Methodology for Optimizing Power Consumption and End to End Packet Delay over the Bluetooth Ad-hoc Network”](#) in *Proc. IEEE International Conf. On Communications*, 2001, Finland. (with A. Kashyap, A. Kumar, A. Rastogi, H. Saran and R. Shorey)
5. [“A Scheduling Scheme to Increase Throughput in Indoor Pico-Cellular Wireless System”](#), in *Proc. IEEE Intl. Conf. on Personal Wireless Comm.*, 2000, India. (with A. Kashyap, A. Kumar, A. Rastogi, H. Saran and R. Shorey)
6. “An Authenticated Key Exchange Scheme”, in McGraw Hill *Proc. Intl. Conf. on IT*, 2000, India. (with S. Nandi)

Non-Academic Experience

Cornerstone Research, New York, NY Securities Group.	June 08–Aug 08
Citigroup Global Markets Inc., New York, NY Treasury and Relative Value Groups.	Feb 05–July 05
Citadel Investment Group, Chicago, IL Financial Instruments and Credit Groups.	June 03–Feb 05
MIT Sloan School of Management Business analysis of Automatic Check Processing in US, Switzerland, Brazil and India.	Sep 01–May 03
IBM India Research Lab., New Delhi, India Networking Research Group.	Summer 2000

Rong Hai

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Education

Ph.D. Economics, University of Pennsylvania, 2013
M.A. Economics, China Center for Economic Research, Peking University, China, 2007
B.A. Economics, Fudan University, China, 2004

Current Position

Postdoctoral Scholar, 05/2013-Present
Becker Friedman Institute for Research in Economics, University of Chicago, Chicago

Past Positions

Summer Research Fellow, 06/2012-08/2012
Federal Reserve Bank of Chicago, Chicago
Short Term Consultant, Winter 2008
Office of Chief Economist & Senior Vice President, World Bank, Washington D.C.

Working Papers

1. [The Determinants of Rising Inequality in Health Insurance and Wages](#). Latest Version: May 2014.
2. [On the Welfare Cost of Consumption Fluctuations in the Presence of Memorable Goods](#) (with Dirk Krueger and Andrew Postlewaite). Latest Version: April 2014.
3. A Dynamic Model of Health, Education and Wealth with Credit Constraints and Rational Addiction (with James J. Heckman). Preliminary draft available upon request.

Presentations

2014: (includes scheduled) Federal Reserve Bank of Chicago Conference on the Affordable Care Act and the Labor Market; Biennial Meeting of the American Society of Health Economists (USC); Cowles Summer Conference: Structural Microeconomics (Yale)

2013: Ohio State University; Syracuse University; University of Chicago; University of South Florida; North American Summer Meetings of the Econometric Society; Southern Economic Association Annual Meeting

2012: Federal Reserve Bank of Chicago; University of Pennsylvania

2010: University of Pennsylvania

Honors and Awards

CSWEP Dissertation Fellowship, 2012
International Economic Review Fellowship, University of Pennsylvania, 2007-2012
Xinmei Zhang Fellow, University of Pennsylvania, 2011-2012
Judith Rodin Fellow, University of Pennsylvania, 2009-2010
Scholarship for University of Chicago Price Theory Summer Camp, 2010
PEW Presidential Prize Fellowship, University of Pennsylvania, 2008
Freshman Scholarship (for Excellent Performance in China's National Higher Education Entrance Examination), Fudan University, 2000

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Teaching Experience

Econometrics (Undergraduate), Instructor, Summer 2010
Public Finance, Teaching Assistant for Dr. Francesca Acacia, Spring 2012
Introductory Economics for Business Students, Recitation Instructor for Dr. Uriel Spiegel, Fall 2011
International Finance, Teaching Assistant for Prof. Wilfred Ethier, Spring 2011
Labor Economics (Undergraduate), Teaching Assistant for Prof. Kenneth Burdett, Fall 2010
Advanced Microeconometrics (Undergraduate), Teaching Assistant for Prof. Petra Todd, Fall 2009 and 2010
Time Series Analysis (Ph.D), Recitation Instructor for Prof. Francis Diebold, Spring 2009 and 2010
Statistics for Economists (Undergraduate), Review Session Instructor for Prof. Aureo de Paula, and Dr. Suleyman Ozmucur, Fall 2008
China Economy (Undergraduate/Graduate), Teaching Assistant for Prof. Justin Yifu Lin, Spring and Summer 2005

Referee

International Economic Review; Journal of Political Economy ($\times 2$); LABOUR: Review of Labour Economics and Industrial Relations

Professional Activities

2014: NBER Summer Institute Macro Public Finance
2010: Price Theory Summer Camp, University of Chicago
2010: NBER Summer Institute

Service

Co-organizer of Econometrics Lunch, University of Pennsylvania, 2009-2010
Coordinator at Graduate Student Housing Community Services, University of Pennsylvania, 2009-2012

Computer Skills

C++ (including MPI & OpenMP), Fortran, Matlab, SAS, Stata, R, Eview, L^AT_EX