Debt and the Great Recession

Atif Mian
Princeton University

May 2, 2019
The credit-driven household demand channel 

$\uparrow$ credit supply $\Rightarrow \uparrow$ household aggregate demand $\Rightarrow \downarrow$ future GDP growth.

Source: Mian and Sufi (IMF, 2010).
The credit-driven household demand channel

$\uparrow$ credit supply $\Rightarrow \uparrow$ household aggregate demand $\Rightarrow \downarrow$ future GDP growth.

**United States**

Source: Mian and Sufi (IMF, 2010).

**World**

Source: Mian, Sufi, and Verner (QJE, 2017).
The credit-driven household demand channel

Source: Mian and Sufi (IMF, 2010).

Source: Mian, Sufi, and Verner (QJE, 2017).
The credit-driven household demand channel

\[ \uparrow \text{credit supply} \Rightarrow \uparrow \text{household aggregate demand} \Rightarrow \downarrow \text{future GDP growth.} \]
Outline

• Evidence from business cycles internationally, as well as regional business cycles within the U.S., over the last half-century
  • International evidence - including a new out of sample test of previous findings
  • A natural experiment using the U.S. banking deregulation wave from the 1980s
  • U.S. regional evidence from the Great Recession

• Implications of the credit-driven household demand channel for
  • Macroeconomic theory and long run fundamentals
  • Public policy (monetary policy, macro-prudential policy, and crisis response)
Empirical Challenges

• How to isolate credit supply expansion?
  • ↑ in quantity and ↓ in spreads, deregulation/policy experiments, differential pass-through of global shocks (e.g. oil, securitization, savings glut)

• How to identify change in household aggregate demand?
  • Focus on nontradable/tradable sectors, relative size and prices
  • Asymmetry between household and non-financial firm credit

• Use of micro data and regional variation
International Evidence

GDP Response to HH Debt Shock

GDP Response to NF Debt Shock

Source: Mian, Sufi, and Verner (QJE, 2017)
## International Evidence

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta_3 d_{it}^{HH}$</td>
<td>0.058* (0.024)</td>
<td>-0.15** (0.051)</td>
<td>0.055* (0.025)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta_3 d_{it}^{F}$</td>
<td>0.038** (0.012)</td>
<td>-0.00036 (0.031)</td>
<td>-0.012 (0.021)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country fixed effects</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
<td>✓ ✓ ✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.087</td>
<td>0.062</td>
<td>0.012</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>816</td>
<td>832</td>
<td>858</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Standard errors in parentheses


$^+ p < 0.1, ^* p < 0.05, ^{**} p < 0.01$
International Evidence

<table>
<thead>
<tr>
<th>MSV2017 30 Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\Delta_3 \frac{C_{it}}{Y_{it}}</td>
<td>\Delta_3 \frac{N_{X_{it}}}{Y_{it}}</td>
<td>\Delta_3 s_{it}^{MC}</td>
<td>\Delta_3 \ln \left( \frac{L_{it}}{L_{tt}} \right)</td>
<td>\Delta_3 \ln \left( \frac{P_{N_{it}}}{P_{it}} \right)</td>
<td>\Delta_3 \gamma_{i,t+4}</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>0.058* (0.024)</td>
<td>-0.15** (0.051)</td>
<td>0.055* (0.025)</td>
<td>0.36** (0.056)</td>
<td>0.38** (0.097)</td>
<td></td>
</tr>
<tr>
<td>0.038** (0.012)</td>
<td>-0.00036 (0.031)</td>
<td>-0.012 (0.021)</td>
<td>0.0085 (0.064)</td>
<td>-0.065 (0.059)</td>
<td></td>
</tr>
</tbody>
</table>

Country fixed effects ✓ ✓ ✓ ✓ ✓ ✓

\( \Delta_3 d_{it}^{HH} \)

\( \Delta_3 d_{it}^{F} \)

\( R^2 \) 0.087 0.062 0.012 0.17 0.067

Observations 816 832 858 639 670

Standard errors in parentheses


\( \dagger p < 0.1, \ast p < 0.05, \ast\ast p < 0.01 \)
## International Evidence

<table>
<thead>
<tr>
<th></th>
<th>MSV2017 30 Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) $\Delta_3 Y_{it}$</td>
</tr>
<tr>
<td>$\Delta_3 d_{it}^{HH}$</td>
<td>0.058* (0.024)</td>
</tr>
<tr>
<td>$\Delta_3 d_{it}^{F}$</td>
<td>0.038** (0.012)</td>
</tr>
<tr>
<td>Country fixed effects</td>
<td>✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.087 0.062 0.012 0.17 0.067 0.11</td>
</tr>
<tr>
<td>Observations</td>
<td>816 832 858 639 670 840</td>
</tr>
</tbody>
</table>

Standard errors in parentheses


$\dagger$ $p < 0.1$, $^*$ $p < 0.05$, $^{**}$ $p < 0.01$
### International Evidence

<table>
<thead>
<tr>
<th></th>
<th>MSV2017 30 Countries</th>
<th>IMF2018 Additional 105 Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>$\Delta_3 d_{it}^{HH}$</td>
<td>$\Delta_3 Y_{it}$</td>
<td>$\Delta_3 N_{it} X_{it}$</td>
</tr>
<tr>
<td>$\Delta_3 d_{it}^{F}$</td>
<td>0.058*</td>
<td>-0.15**</td>
</tr>
<tr>
<td></td>
<td>(0.024)</td>
<td>(0.051)</td>
</tr>
<tr>
<td>$\Delta_3 d_{it}^{F}$</td>
<td>0.038**</td>
<td>-0.00036</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.031)</td>
</tr>
</tbody>
</table>

Country fixed effects | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

$R^2$ | 0.087 | 0.062 | 0.012 | 0.17 | 0.067 | 0.11 | 0.056 |

Observations | 816 | 832 | 858 | 639 | 670 | 840 | 964 |

Standard errors in parentheses


$\dagger$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$
Rise in household leverage predicts GDP slowdown

Source: Mian, Sufi, and Verner (QJE, 2017).
Deregulation experiment in the 1980s in U.S.

Source: Mian, Sufi, and Verner (WP, 2018).

Total Bank Credit

Unemployment Rate

Source: Mian, Sufi, and Verner (WP, 2018).
Deregulation experiment in the 1980s in U.S.

**Total Bank Credit**

- **Early Deregulation**
- **Late Deregulation**

**Unemployment Rate**

Source: Mian, Sufi, and Verner (WP, 2018).
Local demand and NT / T sector expands

![Graph showing Non-Tradable Employment Growth, 82–89 vs. Deregulation exposure.](image)

Source: Mian, Sufi, and Verner (WP, 2018).
Local demand and NT / T sector expands

**Non-Tradable Employment Growth, 82–89**

Source: Mian, Sufi, and Verner (WP, 2018).

** Tradable Employment Growth, 82–89**

Source: Mian, Sufi, and Verner (WP, 2018).
Local demand and NT / T price rises

Non-tradable CPI Inflation, 84–89

Deregulation exposure
(Alaska excluded)

Source: Mian, Sufi, and Verner (WP, 2018).

Tradable CPI Inflation, 84–89
Local demand and NT / T price rises

Source: Mian, Sufi, and Verner (WP, 2018).

**Non-tradable CPI Inflation, 84–89**

Source: Mian, Sufi, and Verner (WP, 2018).

**Tradable CPI Inflation, 84–89**

Source: Mian, Sufi, and Verner (WP, 2018).
Rise in household leverage predicts depth of 1990/91 recession

Source: Mian, Sufi, and Verner (WP, 2018).
U.S. experience during the 2000’s

• A large expansion in credit supply, Mian and Sufi (2009), (also see [1])

• Credit expansion led to an increase in local demand and the non-tradable sector expanded, Di Maggio and Kermani (2017)

• When the music stops, Fisher’s “debt deflation” dynamics take hold (see [2])
  • large fall in demand, Mian et al. (2013)
  • fall in employment due to demand shortage, Mian and Sufi (2014)
  • foreclosure fire-sale externalities amplify the negative cycle, Mian et al. (2015)
The fall in demand

Fall in employment in response to demand

\[ \Delta \text{ Tradable Employment, 07−09} \]

\[ \Delta \text{ Non-Tradable Employment, 07−09} \]

\[ \Delta \text{ HH net worth, 06−09} \]

Source: Mian and Sufi (ECMA, 2014).
Fall in employment in response to demand

Source: Mian and Sufi (ECMA, 2014).
Theoretical implications of credit-driven household demand channel
• Heterogeneity across borrowers and creditors matters as it interacts with frictions like ZLB & wage rigidity. e.g. Eggertsson and Krugman (2012), Farhi and Werning (2015), Guerrieri and Lorenzoni (2017), Schmitt-Grohé and Uribe (2016) ([3])
• Ex-ante “over-borrowing” due to AD and pecuniary externalities (see [4])
• Systematic forecasting errors suggests departure from rational expectations with common beliefs (See [5])
• Important to model heterogeneous beliefs and behavioral biases, e.g. Geanakoplos (2010), Gennaioli et al. (2012), López-Salido et al. (2017) ([6])
Public policy implications of credit-driven household demand channel

- Post-2007 policy should have focused on reducing household debt service payments and preventing foreclosures (see [8]).

- Mortgage design matters, more equity-like contracts that promote risk-sharing have benefits at the macro level

- Monetary policy pass-through depends on the credit-driven household demand channel, e.g. Di Maggio et al. (2017)

- UK and many other countries have since adopted macro-prudential regulations that impose constraints based on loan to value or debt service to income
Thinking long-run now

Total credit to GDP

Credit to GDP by type

- household plus government
- non-financial firm
• Is there a link between secular rise in household credit, Jordà et al. (2016), falling interest rate and rising inequality and savings glut? (see [7])

Source: Mian and Sufi (WP, 2018).
Business dynamism
Leader-follower productivity gap
Aggregate investment and productivity growth
Relative market value
Relative P/E ratio
Interest rate
growth rate
Exogenous growth
High
Low
Our model
Standard endogenous growth models
Euler equation
Market Competition Effect Dominates

Euler equation

Our model
Notes


Notes


5. Mian et al. (2017b), Baron and Xiong (2016)


References III


References V


and, *House of debt: How they (and you) caused the Great Recession, and how we can prevent it from happening again*, University of Chicago Press, 2015.


and, “Inequality, Surplus Savings and Credit Creation,” 2018.


