Nonbanks, Banks, and Monetary Policy: US Loan-Level Evidence Since the 1990s

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1The views expressed here are those of the author and do not necessarily reflect the views of the Bank of England, Board of Governors, Federal Reserve Bank of Chicago, or staff of the Federal Reserve System.
Motivation

- Credit markets have dramatically changed, with nonbank credit intermediaries now crucial.
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- We test the nonbank credit channel of monetary policy:
  1. MP “gets in all the cracks” as it directly acts on market rates and spreads that affect all institutions (Stein 2013).
  2. MP may affect funding of banks and nonbanks differently (Drechsler, Savov, Schnabl 2017; Xiao 2020).
  3. Banks are regulated, most nonbanks are not.
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Key empirical questions:
1. Do nonbanks attenuate or strengthen the credit channel?
2. How does monetary policy affect nonbank risk taking?
3. Does the nonbank credit channel affect real outcomes?
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Preview of Findings

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- In all markets, effects are larger for riskier borrowers.
Key Take-Away

The potency of monetary policy in lending markets depends on the respective size of the nonbank presence.
Corporate Loans
Syndicated Loan Market - Overview

- Syndicated loans are large corporate loans originated by a syndicate of lenders.

Originally banks dominated this market; nonbanks are now dominant in the secondary market for term loans (Irani, Iyer, Meisenzahl, Peydro, 2021).

Nonbank lenders in primary market:
- Investment Banks
- Broker-Dealers
- Finance Companies

Limit of nonbanks: no deposit base means nonbanks need to access short-term funding market in case borrowers draw on credit lines.
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Syndicated Loan Market - Identification

- Challenge: Monetary policy affects credit supply and credit demand.

\[
\log(\text{Quantity})_{b, l, t} = \alpha_{b, t} + \beta_1 (\text{Nonbank}_l \times \text{Monetary Policy}_t - 1) + \beta_2 (\text{Nonbank}_l \times \text{Macroeconomic Controls}_t - 1) + \delta_l + \epsilon_{b, l, t}
\]

Sample period: 1990Q1-2012Q3 (Gertler-Karadi series).
Syndicated Loan Market - Identification

- Challenge: Monetary policy affects credit supply and credit demand.

- Solution:
  1. Exploit composition of the syndicate and use within-syndicate variation (borrower-quarter fixed effects $\alpha_{b,t}$).

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## Impact of US monetary policy on US corporate lending

<table>
<thead>
<tr>
<th></th>
<th>All Loans (1)</th>
<th>Term Loans (2)</th>
<th>Revolvers (3)</th>
<th>All Loans (4)</th>
<th>Term Loans (5)</th>
<th>Revolvers (6)</th>
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<tbody>
<tr>
<td>Nonbank x MP</td>
<td>0.135***</td>
<td>0.193***</td>
<td>0.0585**</td>
<td>0.0549</td>
<td>0.308**</td>
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<td></td>
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- **Double Interactions**: Yes, Yes, Yes, Yes, Yes, Yes
- **Triple Interactions**: No, No, No, Yes, Yes, Yes
- **Borrower-quarter FEs**: Yes, Yes, Yes, Yes, Yes, Yes
- **Lender FEs**: Yes, Yes, Yes, Yes, Yes, Yes
- **Observations**: 92,971, 14,956, 54,312, 46,900, 4,887, 25,107
- **R-squared**: 0.811, 0.817, 0.829, 0.792, 0.819, 0.804

- Nonbanks relatively increase credit supply by 12% in response to a 1sd increase in MP measure.
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<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Borrower-quarter FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Lender FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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- Stronger effects for high-yield firms, risk shifts to nonbanks → Reduction in the risk-taking channel of monetary policy.
Very Robust Finding

- Using alternative MP measures
  1. Shadow Rate from Wu and Xia (2016)
  2. Federal Funds Rate

- Splitting sample by type of nonbank lender
- Considering pre-crisis period only.
Nonbank Lending and Corporate Policies

- Does this substitution affect corporate policies?
Nonbank Lending and Corporate Policies

- Does this substitution affect corporate policies?

- Idea: Firms with existing nonbank relationships should have more access to credit from nonbanks when MP tightens.
## Impact of US monetary policy on US corporate lending by prior nonbank relationship

<table>
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<tr>
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<th>Leverage</th>
<th>Liquidity</th>
<th>Fixed assets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Nonbank relation x MP</td>
<td>0.070**</td>
<td>0.032***</td>
<td>-0.009**</td>
<td>0.011***</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
<td>(0.007)</td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Double interactions</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Borrower size control</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Borrower FEs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry-quarter FEs</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>316,909</td>
<td>355,957</td>
<td>382,979</td>
<td>368,897</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.89</td>
<td>0.61</td>
<td>0.70</td>
<td>0.90</td>
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Nonbank Lending and Industry-level Outcomes

- Does nonbank lending affect more aggregated outcomes?
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- Aggregate to the industry level.
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- Use industry-level nonbank share 1990-1996 as measure of access to nonbank credit (some outcome variables only available from 1997).
## Quarterly Industry Level Outcomes

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<tr>
<td>Nonbank share × GK</td>
<td>1.054**</td>
<td>0.217*</td>
<td>-0.065</td>
<td>0.151**</td>
</tr>
<tr>
<td></td>
<td>(0.446)</td>
<td>(0.096)</td>
<td>(0.040)</td>
<td>(0.059)</td>
</tr>
<tr>
<td>Macrovar Interactions</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Industry FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Quarter FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>4,115</td>
<td>4,115</td>
<td>4,115</td>
<td>4,115</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.98</td>
<td>0.80</td>
<td>0.81</td>
<td>0.96</td>
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</tbody>
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Consumer Loans
Auto Loan Market - Overview

- Auto loans account for about 30% of consumer loans.
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NY Fed/Equifax Consumer Credit Panel, starting in 1999Q1.
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Auto Loan Market - Identification

- Challenge: Monetary policy affects credit supply and credit demand.

\[ \log(\text{Auto Loan})_{ijt} = \beta_1 \text{Nonbank Share 1999}_Q^j \times MP_t - 1 + \beta_2 \text{Nonbank Share 1999}_Q^j \times \text{Macro Controls}_t - 1 + \gamma X_{ijt} - 1 + \alpha_j + \theta_t + \epsilon_{ijt} \]
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- Challenge: Monetary policy affects credit supply and credit demand.

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  1. Exploit county-level dependence of nonbank auto credit (Benmelech, Meisenzahl, Ramcharan, 2017) and county-level controls.
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  2. Include interactions with macro controls.

\[
\text{Log(Auto Loan)}_{ijt} = \beta_1 \text{Nonbank Share 1999Q1}_j \times MP_{t-1} + \\
\beta_2 \text{Nonbank Share 1999Q1}_j \times \text{Macro Controls}_{t-1} \\
+ \gamma X_{ijt-1} + \alpha_j + \theta_t + \epsilon_{ijt}
\]
Nonbank Dependence in the Auto Loan Market

County-Level Dependence (1999Q1)

Source: Federal Reserve Board / Equifax
### Household-Level Effects on Auto Loans

<table>
<thead>
<tr>
<th></th>
<th>Log Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nonbank (1)</td>
</tr>
<tr>
<td></td>
<td>Bank (2)</td>
</tr>
<tr>
<td></td>
<td>Total (3)</td>
</tr>
<tr>
<td>MP x Share 1999</td>
<td>0.031*** (0.007)</td>
</tr>
<tr>
<td></td>
<td>-0.032*** (0.007)</td>
</tr>
<tr>
<td></td>
<td>-0.000 (0.001)</td>
</tr>
<tr>
<td>Double Interactions</td>
<td>YES</td>
</tr>
<tr>
<td>Household Controls</td>
<td>YES</td>
</tr>
<tr>
<td>County FE</td>
<td>YES</td>
</tr>
<tr>
<td>Time FE</td>
<td>YES</td>
</tr>
<tr>
<td>Birth Year FE</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>54,243,317</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.005 0.007 0.010</td>
</tr>
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Household controls include risk score, mortgage balance, consumer loan balance, credit card balance, bankruptcy indicator, and county-level income.
Is there an Effect on Auto Sales?

- Perfect substitution between banks and nonbanks suggests that monetary policy should have little effect on auto sales.
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- Data on new auto registrations from Polk from 2002 on.

\[
\log(Auto Sales)_t = \beta_1 Nonbank Share_{1999Q1,t-1} \times MP_{t-1} + \alpha_j + \theta_l t + \gamma X_{j,t-1} + \epsilon_{j,t}
\]
Is there an Effect on Auto Sales?

- Perfect substitution between banks and nonbanks suggests that monetary policy should have little effect on auto sales.

- Data on new auto registrations from Polk from 2002 on.

\[
\log(\text{Auto Sale})_{j,t} = \beta_1 \text{Nonbank Share 1999Q1}_{j,t-1} \times MP_{t-1} + \\
\alpha_j + \theta_{lt} + \gamma X_{j,t-1} + \varepsilon_{j,t}
\]
# County-Level Effects on Auto Sales

## Table

<table>
<thead>
<tr>
<th></th>
<th>Nonbank</th>
<th>Bank</th>
<th>Total</th>
<th>Auto sales</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MP x 1999 Share</strong></td>
<td>0.503***</td>
<td>-0.587***</td>
<td>0.109</td>
<td>0.034</td>
</tr>
<tr>
<td></td>
<td>(0.099)</td>
<td>(0.119)</td>
<td>(0.107)</td>
<td>(0.023)</td>
</tr>
<tr>
<td><strong>MP x Low Share</strong></td>
<td></td>
<td>-0.117*</td>
<td></td>
<td>-0.075***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.068)</td>
<td></td>
<td>(0.023)</td>
</tr>
</tbody>
</table>

- **Macro Interactions**: YES, YES, YES, YES, YES, YES
- **County Controls**: YES, YES, YES, YES, YES, YES
- **Time FE**: YES, YES, YES, YES, YES, YES
- **County FE**: YES, YES, YES, YES, YES, YES
- **Observations**: 158,461, 158,461, 158,461, 158,461, 122,991, 122,991
- **R²**: 0.49, 0.49, 0.52, 0.54, 0.99, 0.99
## County-Level Effects on Auto Sales: Low Nonbank Presence

<table>
<thead>
<tr>
<th></th>
<th>Nonbank</th>
<th>Bank</th>
<th>Total</th>
<th>Auto sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>MP x 1999 Share</td>
<td>0.503***</td>
<td>-0.587***</td>
<td>0.109</td>
<td>0.034</td>
</tr>
<tr>
<td></td>
<td>(0.099)</td>
<td>(0.119)</td>
<td>(0.107)</td>
<td>(0.023)</td>
</tr>
<tr>
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<td>-0.117*</td>
<td></td>
<td>-0.075***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.068)</td>
<td></td>
<td>(0.023)</td>
<td></td>
</tr>
<tr>
<td>Macro Interactions</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>County Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Time FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>County FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>158,461</td>
<td>158,461</td>
<td>158,461</td>
<td>158,461</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.49</td>
<td>0.49</td>
<td>0.52</td>
<td>0.54</td>
</tr>
</tbody>
</table>
Mortgages
Mortgage Market - Overview

- Nonbank lenders now account for around half of mortgage lending.
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- Nonbanks lenders:
  Mortgage Companies, REITs
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- Limit of nonbanks: mortgage lending requires some local presence. Balance sheet capacity is limited (Buchak et al, 2020).
Nonbank lenders now account for around half of mortgage lending.

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Limit of nonbanks: mortgage lending requires some local presence. Balance sheet capacity is limited (Buchak et al, 2020).

Confidential HMDA
Mortgage Market - County-Level Identification

1. Exploit 1995Q1 county-level dependence of nonbank mortgage credit and county-level controls.

\[
\log(\text{Mortgage})_{jt} = \beta_1 \text{Nonbank Share}_j, 1995Q1 \times \text{MP}_{t-1} + \beta_2 \text{Nonbank Share}_j, 1995Q1 \times \text{Macro Controls}_{t-1} + \gamma X_{jt-1} + \alpha_j + \theta_t + \epsilon_{jt}
\]
Mortgage Market - County-Level Identification

1. Exploit 1995Q1 county-level dependence of nonbank mortgage credit and county-level controls.

2. Include interactions with macro controls (GDP, GDP Forecast, Inflation, VIX).
Mortgage Market - County-Level Identification

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\[
\log(\text{Mortgage})_{jt} = \beta_1 \text{Nonbank Share}_{j, 1995Q1} \times MP_{t-1} +
\beta_2 \text{Nonbank Share}_{j, 1995Q1} \times \text{Macro Controls}_{t-1} +
\gamma X_{jt-1} + \alpha_j + \theta_t + \epsilon_{jt}
\]
Nonbank Dependence in the Mortgage Market

Dependence 1995Q1
## County-Level Mortgage Lending: Conforming loans

<table>
<thead>
<tr>
<th>Nonbank Share 1995Q1 x MP</th>
<th>Held New Loans Conforming</th>
<th>Bank (1)</th>
<th>Nonbank (2)</th>
<th>Total (3)</th>
<th>Nonbank Share (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.045</td>
<td>0.367*</td>
<td>0.309</td>
<td>0.049</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.425)</td>
<td>(0.214)</td>
<td>(0.319)</td>
<td>(0.069)</td>
</tr>
<tr>
<td>Macro Variable Interactions</td>
<td></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Time-varying Controls</td>
<td></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Time FE</td>
<td></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>County FE</td>
<td></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td></td>
<td>59,547</td>
<td>59,547</td>
<td>59,547</td>
<td>59,547</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td></td>
<td>0.78</td>
<td>0.80</td>
<td>0.78</td>
<td>0.75</td>
</tr>
</tbody>
</table>
## County-Level Mortgage Lending: Jumbo loans

<table>
<thead>
<tr>
<th></th>
<th>Bank (1)</th>
<th>Nonbank (2)</th>
<th>Total (3)</th>
<th>Nonbank Share (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonbank Share 1995Q1 x MP</td>
<td>-0.691 (0.913)</td>
<td>3.192*** (0.886)</td>
<td>-0.064 (0.856)</td>
<td>0.390*** (0.040)</td>
</tr>
<tr>
<td>Macro Variable Interactions</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Time-varying Controls</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Time FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>County FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>59,547</td>
<td>59,547</td>
<td>59,547</td>
<td>59,547</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.79</td>
<td>0.73</td>
<td>0.78</td>
<td>0.62</td>
</tr>
</tbody>
</table>
## House Prices and Nonbank Lending

<table>
<thead>
<tr>
<th>Nonbank Share 1995Q1 x MP</th>
<th>All New Mortgages (1)</th>
<th>All Mortgages (2)</th>
<th>House Prices (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.583†</td>
<td>0.509†</td>
<td>0.425**</td>
</tr>
<tr>
<td></td>
<td>(0.370)</td>
<td>(0.318)</td>
<td>(0.191)</td>
</tr>
<tr>
<td>Macro Variable Interactions</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>County Income</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>County FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>55,062</td>
<td>55,062</td>
<td>55,062</td>
</tr>
<tr>
<td>Adjusted $R^2$</td>
<td>0.98</td>
<td>0.98</td>
<td>0.84</td>
</tr>
</tbody>
</table>
Towards General Equilibrium Effects

- So far, identification of credit supply by controlling for demand with granular fixed effects (e.g. Borrower-Time or County-Time Fixed effects).
Towards General Equilibrium Effects

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- Allow for demand effects and control for macro variables.
Towards General Equilibrium Effects

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- Allow for demand effects and control for macro variables.

- Check whether nonbanks attenuate real effects of monetary policy in each of the three markets.

- Instrument FFR with Gertler-Karadi measures.
### Table: Corporate Borrowing and Real Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Corporate Borrowing and Output</th>
<th>Auto Loans &amp; Sales</th>
<th>Mortgages &amp; House Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Debt (1)</td>
<td>Annual Output (2)</td>
<td></td>
</tr>
<tr>
<td>FFR x Past Nonbank Share</td>
<td>0.228** (0.101)</td>
<td>0.278** (0.112)</td>
<td></td>
</tr>
<tr>
<td>FFR</td>
<td>-0.012 (0.011)</td>
<td>-0.032*** (0.012)</td>
<td></td>
</tr>
<tr>
<td>Macro Cont.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Macro Cont. x Past Nonbank Share</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry FE</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Industry Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>County FE</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>County Controls</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Crisis Interactions</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Kleinbgen-Paap first-stage F-Stat</td>
<td>260.83</td>
<td>97.26</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>4,115</td>
<td>863</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

- After a monetary contraction, increased nonbank credit supply to firms and households (partially) offsets the reduction in bank credit.
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- In all markets, the results are stronger for riskier borrowers.
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- Nonbank credit channel has real effects in all markets.
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- In all markets, the results are stronger for riskier borrowers.

- Nonbank credit channel has real effects in all markets.

- Potency of monetary policy in lending markets depends on respective size of nonbank presence.