US non-financial corporations: share of loans in total debt
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Non-mortgage loans

All loans
What are the implications for monetary policy?

1. Has the “typical” firm really become less bank-dependent?
2. Do less bank-dependent firms respond less to monetary policy shocks?
3. Has monetary pass-through declined as a result?
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- Should the bank dependence of firms matter for monetary policy?
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  bank lending channel
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1. Have US corporations really become less bank-dependent?
The share of loans at public vs. private corporations

![Graph showing the share of loans at public vs. private corporations from 1960 to 2015. The graph indicates a decreasing trend in the share of loans provided by public corporations over time.](image-url)
The share of loans at public vs. private corporations

- **All corporations**
- **Public corporations**

The graph shows the percentage share of loans at public vs. private corporations from 1960 to 2015. The share of loans at public corporations has steadily declined over the years, while the share at private corporations has fluctuated but generally increased.
Has the share of loans at the average public corporation changed?

\[ \hat{\Delta S}_t = \Delta s_t + \Delta B_t + \Delta cov_t \]
Has the share of loans at the average public corporation changed?

\[ \hat{\Delta S_t} = \Delta s_t + \Delta B_t + \Delta \text{cov}_t \]

- \( \Delta s_t \): within-firm
- \( \Delta B_t \): between-firm
- \( \Delta \text{cov}_t \): covariance

Graph showing changes in share of loans from 1990 to 2015.
Has the share of loans at the average public corporation changed?

\[ \Delta S_t = \Delta s_t + \Delta B_t + \Delta \text{cov}_t \]
2. Do bank-dependent firms respond more to monetary policy shocks?
Estimating the pass-through of monetary policy shocks

- US public corporations, quarterly data
- Monetary policy shocks: \( \eta_{HF_t} \) intraday change in Fed Funds futures (Kuttner, 2001)
- 164 FOMC announcement days, 1990q4-2007q4 (Ottonello and Winberry, 2018)

- Average \((\beta)\) and differential \((\delta)\) effects on investment:
  \[
  \Delta \log(k_{jt}, t+1) = \alpha_j + \text{(macro controls)} + \beta \eta_{HF_t} + \varepsilon_{jt},
  \quad \Delta \log(k_{jt}, t+1) = \alpha_j + \text{(sector \times quarter f.e.)} + \delta \left( \eta_{HF_t} \times s_{jt}, t-1 \right) + \varepsilon_{jt},
  \]

\(s_{jt}, t-1 \equiv \) bank loans as % of total debt
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  \[
  \Delta \log(k_{j,t+1}) = \alpha_j + (\text{macro controls}) + \beta \eta_t^{HF} + \varepsilon_{j,t}
  \]

  \[
  \Delta \log(k_{j,t+1}) = \alpha_j + (\text{sector } \times \text{ quarter f.e.}) + \delta (\eta_t^{HF} \times s_{j,t-1}) + \varepsilon_{j,t}
  \]

  $s_{j,t-1} \equiv$ bank loans as % of total debt

(Kuttner, 2001)

(Ottonello and Winberry, 2018)
The effect of a 100bps shock to the Fed Funds rate

<table>
<thead>
<tr>
<th>4-quarter investment response</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\eta_{t}^{HF}$</td>
<td>-4.15*</td>
<td>-4.12*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.28)</td>
<td>(2.28)</td>
<td></td>
</tr>
<tr>
<td>$\eta_{t}^{HF} \times s_{j,t-1}$</td>
<td>-1.07</td>
<td>-1.33**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.67)</td>
<td>(0.66)</td>
<td></td>
</tr>
<tr>
<td>Macro controls</td>
<td>✔</td>
<td>✔</td>
<td>✗</td>
</tr>
<tr>
<td>Firm controls</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Sector-time f.e.</td>
<td>✗</td>
<td>✗</td>
<td>✔</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.259</td>
<td>0.259</td>
<td>0.274</td>
</tr>
<tr>
<td>N</td>
<td>189794</td>
<td>189794</td>
<td>189794</td>
</tr>
</tbody>
</table>
The cumulative response of investment
The cumulative response of investment
3. Has disintermediation changed the pass-through of monetary policy shocks?
Constructing the pre- and post-1990 pass-through

- Fed Funds futures based shocks only available after 1990q4
- Use an alternative measure of shocks, $\eta_{RR_t}$, with longer time series
  - Deviation of implemented rate from internal forecasts (Wieland and Yang, 2016)
  - Drawback: potentially correlated with other macro shocks
- In overlapping sample, $\text{corr}(\eta_{RR_t}, \eta_{HF_t}) = 0.34$
  - $\sigma_{RR} \approx 2 \times \sigma_{HF}$
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\[
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Drawback: potentially correlated with other macro shocks

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  \[ \sigma_{RR} \approx 2 \times \sigma_{HF} \]
MP shock pass-through is stronger in the pre-1990 sample

4-quarter investment response, **post-1990**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\eta_{RR}^{t}$</td>
<td>-2.81**</td>
<td>-2.79**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.32)</td>
<td>(1.32)</td>
<td></td>
</tr>
<tr>
<td>$\eta_{RR}^{t} \times s_{j,t-1}$</td>
<td>-0.85***</td>
<td>-1.00***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.29)</td>
<td>(0.28)</td>
<td></td>
</tr>
</tbody>
</table>

- Macro controls: ✓ ✓ ❌
- Firm controls: ✓ ✓ ✓
- Sector-time f.e.: ❌ ❌ ✓
- $R^2$: 0.260 0.260 0.274
- N: 189794 189794 189794
MP shock pass-through is stronger in the pre-1990 sample

4-quarter investment response, pre-1990

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
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<tbody>
<tr>
<td>$\eta_{t}^{RR}$</td>
<td>-4.33*</td>
<td>-4.31*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.48)</td>
<td>(2.48)</td>
<td></td>
</tr>
<tr>
<td>$\eta_{t}^{RR} \times s_{j,t-1}$</td>
<td></td>
<td>-1.48***</td>
<td>-1.61***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.27)</td>
<td>(0.14)</td>
</tr>
</tbody>
</table>

Macro controls  ✓  ✓  ✗
Firm controls    ✓  ✓  ✓
Sector-time f.e. ✗  ✗  ✓
$R^2$             0.323 0.323 0.344
$N$              111913 111913 111913
Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds
Given, choose:

- Total borrowing
- Loan share

\[ s \in [0, 1] \]

Investment \( k = d + e \)

- Key trade-off: flexibility vs. cost

Loans can be restructured if firm is in financial distress

Banks' cost of funds \( = r + \gamma b(r) \)

\[ c = \text{cost of funds of bonholders} \]
Could disintermediation explain the falling pass-through?

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Choosing investment
Choosing investment

\[ \zeta \mathbb{E}(\phi) k^{\zeta-1} \]  
\[ - \quad (1 + r) \]  
\[ \quad \text{MPK} \quad \text{risk-free rate} \]  
\[ = \quad \gamma b(r) \times s \]  
\[ + \quad \frac{\partial L}{\partial d}(d, s) \]  
\[ \text{bank intermediation cost} \quad \text{deadweight liquidation losses} \]
Choosing investment

\[
\frac{\zeta \mathbb{E}(\phi) k^{\zeta - 1}}{\text{MPK}} - (1 + r) = \gamma b(r) \times s + \frac{\partial L}{\partial d}(d, s)
\]

\[
\frac{\partial^2 L}{\partial d^2} > 0,
\]
Choosing investment

\[
\zeta \mathbb{E}(\phi) k^{\zeta - 1} - (1 + r) = \gamma_b(r) \times s + \frac{\partial L}{\partial d}(d, s)
\]

- MPK
- risk-free rate
- bank intermediation cost
- deadweight liquidation losses

\[
\frac{\partial^2 L}{\partial d^2} > 0, \quad \frac{\partial^2 L}{\partial d \partial s} < 0 \quad \text{(flexibility)}
\]
信用供给 (s = 0)

\[ MPK = (1 + r) \]

\[ MPK = (1 + r + \epsilon) \]

\[ \Delta k < 0 \]

信用供给 (s > 0)

\[ \gamma b(r) \cdot s \Delta k < 0 \]
\[
MPK - (1 + r) \quad \text{credit supply } (s = 0)
\]

\[
\Delta k < 0
\]

\[
\gamma b(r) \cdot s \Delta k < 0
\]
\[ \Delta k < 0 \]

\[ \text{credit supply (} s = 0 \text{)} \]

\[ MPK - (1 + r) \]

\[ MPK - (1 + r + \epsilon) \]
\[ \text{MPK} - (1 + r) \]

\[ \text{MPK} - (1 + r + \epsilon) \]

Credit supply \((s = 0)\)

\[ \Delta k < 0 \]
\[ \text{credit supply (s > 0)} \]

\[ \text{MPK-}(1 + r) \]

\[ \text{MPK-}(1 + r + \epsilon) \]

\[ \Delta k < 0 \]
MPK-(1 + r)

MPK-(1 + r + \epsilon)

credit supply (s > 0)

\gamma_b(r) \cdot s
credit supply \((s > 0)\)

\[
MPK-(1 + r) = \gamma b(r) \cdot s
\]

\[
MPK-(1 + r + \epsilon)
\]

\[
\Delta k \ll 0
\]
\[
\Delta k \ll 0
\]
The pass-through of MP shocks to investment
4. Take-aways
Take-aways

1. Has the “typical” firm become less bank-dependent?

2. Do less bank-dependent firms respond less to monetary policy shocks?

3. Has monetary pass-through declined as a result?
Take-aways

1. Has the “typical” firm become less bank-dependent?
   yes; the loan share of the “typical” public firm fell by 1/3 since 1990

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   yes; 1 s.d. lower loan share $\implies$ 25% lower investment response

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   monetary pass-through is 30% lower in the post-1990 sample
Take-aways

1. Has the “typical” firm become less bank-dependent?
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3. Has monetary pass-through declined as a result?
   monetary pass-through is 30% lower in the post-1990 sample
   model suggests disintermediation could help account for this decline
More
Change in the loan share by industry

- Manufacturing
- High-tech
- Healthcare
- Consumer
- Other