# Credit Disintermediation and Monetary Policy
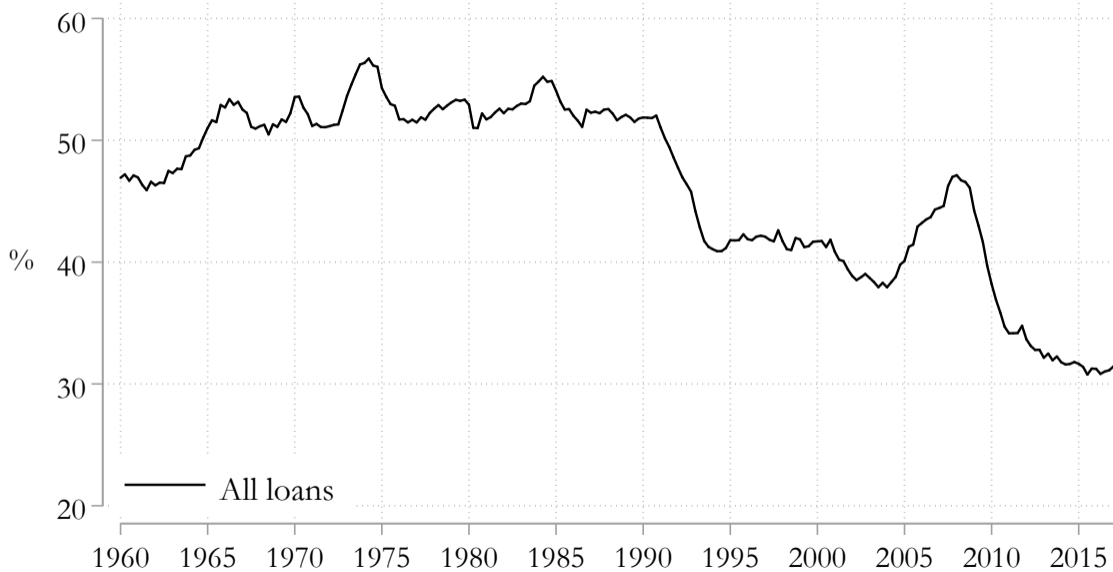
Nicolas Crouzet

Northwestern University and Chicago Fed
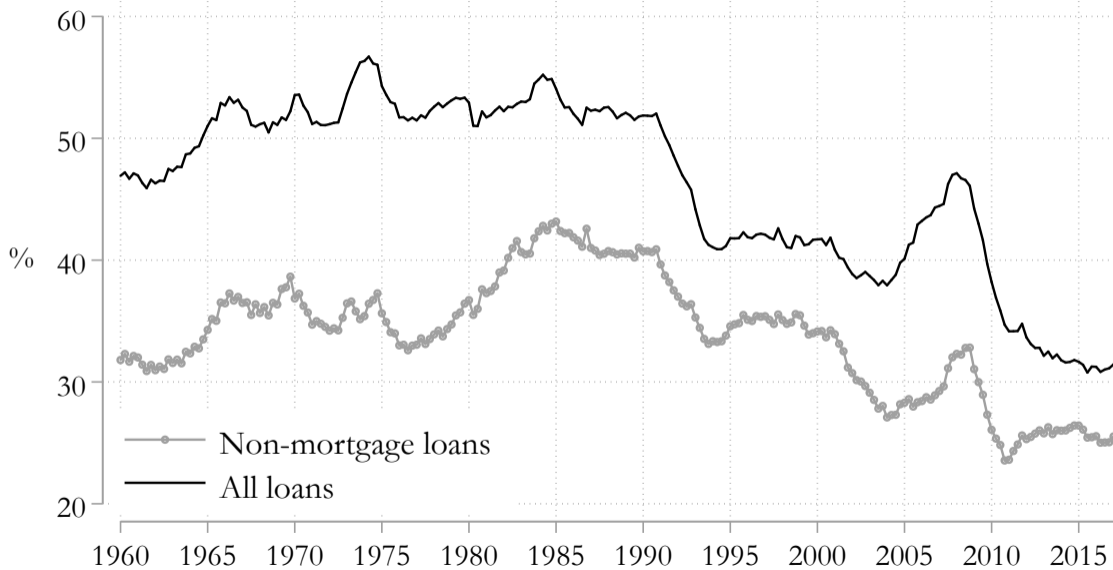
Prepared for the 20th Jacques Polak Annual Research Conference

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



Legend: All loans

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

**What are the implications for monetary policy?**

# What are the implications for monetary policy?

- Should the bank dependence of firms matter for monetary policy?

**What are the implications for monetary policy?**

- Should the bank dependence of firms matter for monetary policy?

  bank lending channel (Bernanke and Blinder, 1992)

**What are the implications for monetary policy?**

- Should the bank dependence of firms matter for monetary policy?

    bank lending channel                                    (Bernanke and Blinder, 1992)

    collateral intensity                                    (Kiyotaki and Moore, 1997)

# What are the implications for monetary policy?

- Should the bank dependence of firms matter for monetary policy?

    bank lending channel (Bernanke and Blinder, 1992)

    collateral intensity (Kiyotaki and Moore, 1997)

    floating vs. fixed rate (Ippolito, Ozdagli and Perez-Orive, 2018)

# What are the implications for monetary policy?

- Should the bank dependence of firms matter for monetary policy?

  bank lending channel (Bernanke and Blinder, 1992)

  collateral intensity (Kiyotaki and Moore, 1997)

  floating vs. fixed rate (Ippolito, Ozdagli and Perez-Orive, 2018)

  flexibility (Bolton and Freixas, 2006)

**What are the implications for monetary policy?**

- Should the bank dependence of firms matter for monetary policy?

  bank lending channel (Bernanke and Blinder, 1992)

  collateral intensity (Kiyotaki and Moore, 1997)

  floating vs. fixed rate (Ippolito, Ozdagli and Perez-Orive, 2018)

  flexibility (Bolton and Freixas, 2006)

1. Has the "typical" firm really become less bank-dependent?

## What are the implications for monetary policy?

- Should the bank dependence of firms matter for monetary policy?

  bank lending channel (Bernanke and Blinder, 1992)

  collateral intensity (Kiyotaki and Moore, 1997)

  floating vs. fixed rate (Ippolito, Ozdagli and Perez-Orive, 2018)

  flexibility (Bolton and Freixas, 2006)

1. Has the "typical" firm really become less bank-dependent?

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

**What are the implications for monetary policy?**

- Should the bank dependence of firms matter for monetary policy?

  bank lending channel                          (Bernanke and Blinder, 1992)
  collateral intensity                          (Kiyotaki and Moore, 1997)
  floating vs. fixed rate            (Ippolito, Ozdagli and Perez-Orive, 2018)
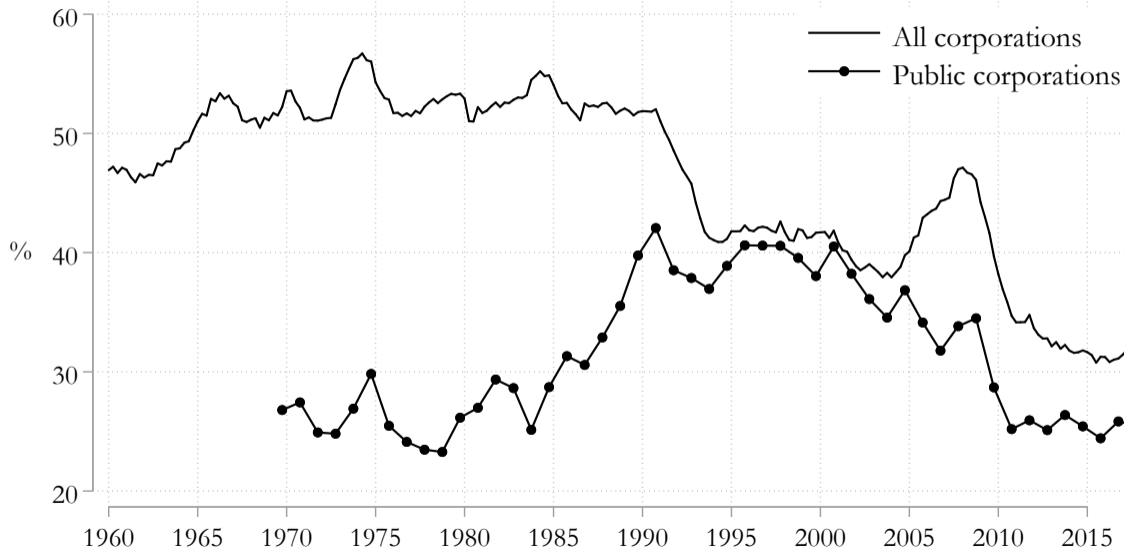  flexibility                                   (Bolton and Freixas, 2006)

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?

# 1. Have US corporations really become less bank-dependent?

# The share of loans at public vs. private corporations
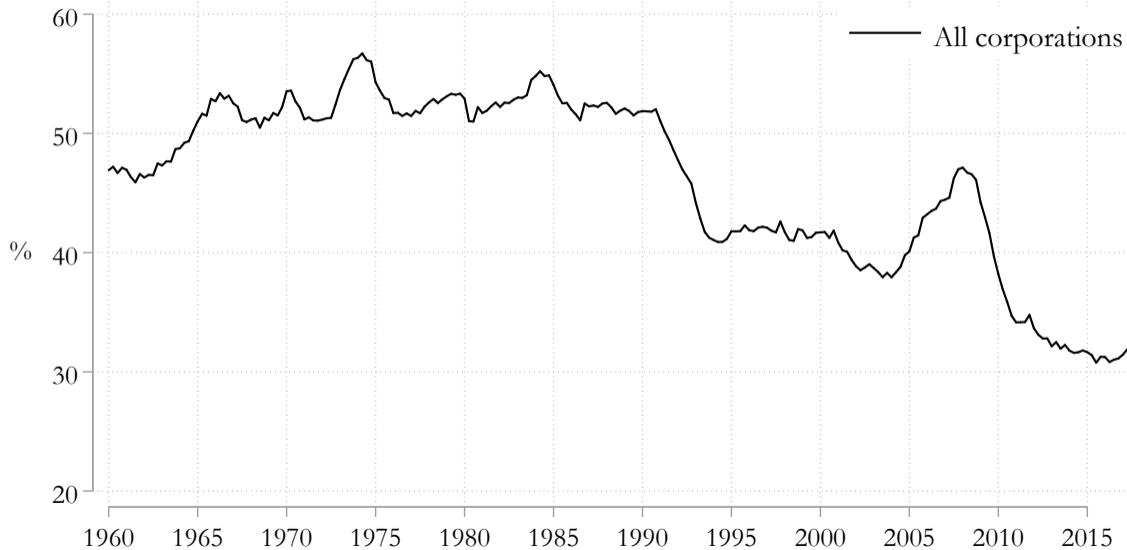
# The share of loans at public vs. private corporations

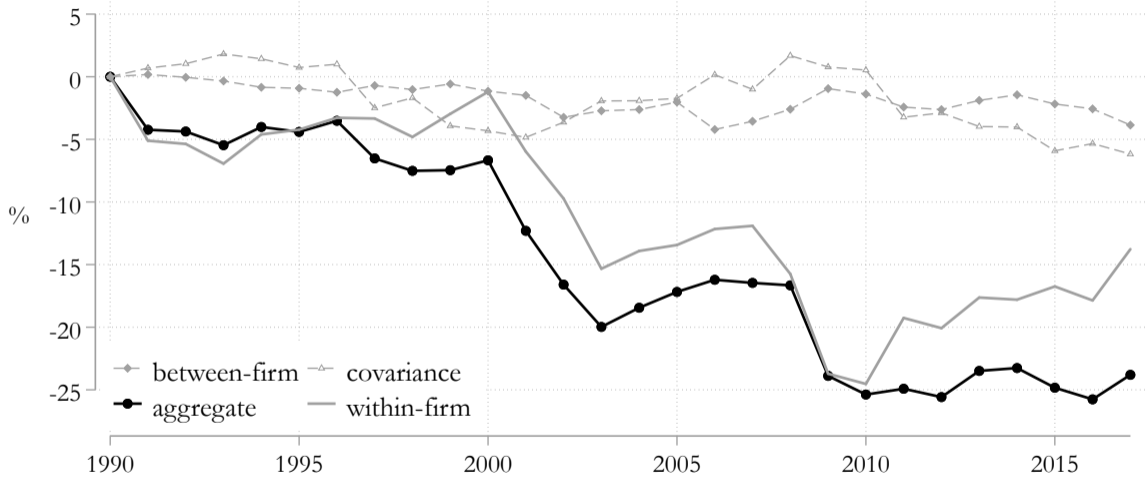**Has the share of loans at the average public corporation changed?**



$$\overbrace{\Delta S_t}^{\text{aggregate}} = \overbrace{\Delta s_t}^{\text{within-firm}} + \overbrace{\Delta B_t}^{\text{between-firm}} + \overbrace{\Delta cov_t}^{\text{covariance}}$$

# Has the share of loans at the average public corporation changed?



$$\overbrace{\Delta S_t}^{\text{aggregate}} = \overbrace{\Delta s_t}^{\text{within-firm}} + \overbrace{\Delta B_t}^{\text{between-firm}} + \overbrace{\Delta cov_t}^{\text{covariance}}$$

# Has the share of loans at the average public corporation changed?



$$\overbrace{\Delta S_t}^{\text{aggregate}} = \overbrace{\Delta s_t}^{\text{within-firm}} + \overbrace{\Delta B_t}^{\text{between-firm}} + \overbrace{\Delta cov_t}^{\text{covariance}}$$

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

**Estimating the pass-through of monetary policy shocks**

# Estimating the pass-through of monetary policy shocks

- US public corporations, quarterly data

**Estimating the pass-through of monetary policy shocks**

- US public corporations, quarterly data

- Monetary policy shocks: $\eta_t^{HF}$

   intraday change in Fed Funds futures                                   (Kuttner, 2001)

   164 FOMC announcement days, 1990q4-2007q4            (Ottonello and Winberry, 2018)

# Estimating the pass-through of monetary policy shocks

- US public corporations, quarterly data

- Monetary policy shocks: $\eta_t^{HF}$

    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:

$$\Delta \log(k_{j,t+1}) = \alpha_j + \text{(macro controls)} + \beta \eta_t^{HF} + \varepsilon_{j,t}$$

$$\Delta \log(k_{j,t+1}) = \alpha_j + \text{(sector} \times \text{quarter f.e.)} + \delta \left( \eta_t^{HF} \times s_{j,t-1} \right) + \varepsilon_{j,t}$$
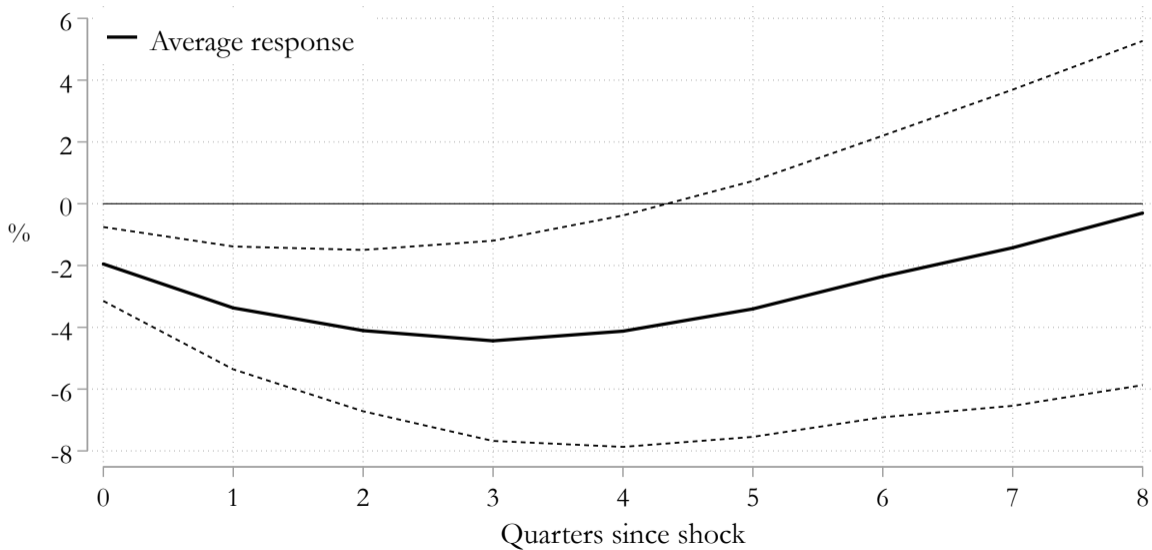
$$s_{j,t-1} \equiv \text{bank loans as \% of total debt}$$
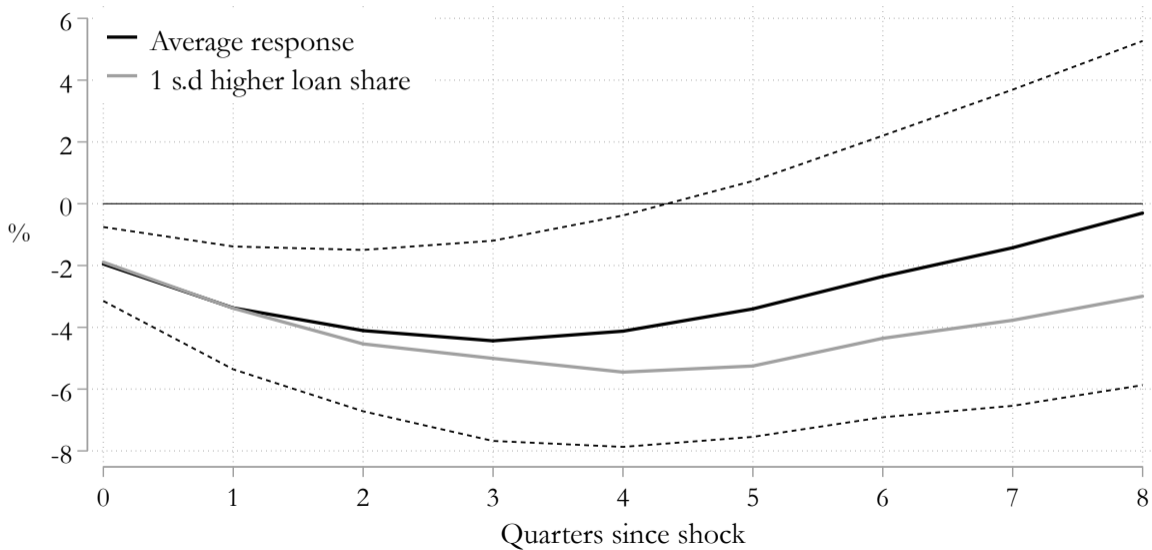
# The effect of a 100bps shock to the Fed Funds rate

4-quarter investment response

|  | (1) | (2) | (3) |
|---|---|---|---|
| $\eta_t^{HF}$ | -4.15* | -4.12* |  |
|  | (2.28) | (2.28) |  |
| $\eta_t^{HF} \times s_{j,t-1}$ |  | -1.07 | -1.33** |
|  |  | (0.67) | (0.66) |
| Macro controls | ✓ | ✓ | ✗ |
| Firm controls | ✓ | ✓ | ✓ |
| Sector-time f.e. | ✗ | ✗ | ✓ |
| $R^2$ | 0.259 | 0.259 | 0.274 |
| $N$ | 189794 | 189794 | 189794 |

# 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**

# Constructing the pre- and post-1990 pass-through

- Fed Funds futures based shocks only available after 1990q4

# Constructing the pre- and post-1990 pass-through

- Fed Funds futures based shocks only available after 1990q4

- Use an alternative measure of shocks, $\eta_t^{RR}$, with longer time series

  Deviation of implemented rate from internal forecasts  (Wieland and Yang, 2016)

  Drawback: potentially correlated with other macro shocks

## Constructing the pre- and post-1990 pass-through

- Fed Funds futures based shocks only available after 1990q4

- Use an alternative measure of shocks, $\eta_t^{RR}$, with longer time series

  Deviation of implemented rate from internal forecasts <span>(Wieland and Yang, 2016)</span>

  Drawback: potentially correlated with other macro shocks

- In overlapping sample,

$$corr(\eta_t^{RR}, \eta_t^{HF}) = 0.34$$
$$\sigma_{RR} \approx 2 \times \sigma_{HF}$$

# MP shock pass-through is stronger in the pre-1990 sample

4-quarter investment response, post-1990

|  | (1) | (2) | (3) |
|---|---|---|---|
| $\eta_t^{RR}$ | -2.81** | -2.79** | |
|  | (1.32) | (1.32) | |
| $\eta_t^{RR} \times s_{j,t-1}$ | | -0.85*** | -1.00*** |
|  | | (0.29) | (0.28) |
| 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, <span style="color:red">pre-1990</span>

|  | (1) | (2) | (3) |
|---|---|---|---|
| $\eta_t^{RR}$ | -4.33* | -4.31* |  |
|  | (2.48) | (2.48) |  |
| $\eta_t^{RR} \times s_{j,t-1}$ |  | -1.48*** | -1.61*** |
|  |  | (0.27) | (0.14) |
| 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?**

# Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

## Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

- Given $e$, choose:

## Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

- Given $e$, choose:

  total borrowing $d$

# Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

- Given $e$, choose:

    total borrowing    $d$

    loan share       $s \in [0, 1]$

# Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

- Given $e$, choose:

  | | |
  |---|---|
  | total borrowing | $d$ |
  | loan share | $s \in [0, 1]$ |
  | investment | $k = d + e$ |

# Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

- Given $e$, choose:

  | | |
  |---|---|
  | total borrowing | $d$ |
  | loan share | $s \in [0, 1]$ |
  | investment | $k = d + e$ |

- Key trade-off: flexibility vs. cost

# Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

- Given $e$, choose:

  | | |
  |---|---|
  | total borrowing | $d$ |
  | 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

# Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

- Given $e$, choose:

  total borrowing $\quad d$

  loan share $\qquad s \in [0, 1]$

  investment $\qquad k = d + e$

- Key trade-off: flexibility vs. cost

  loans can be restructured if firm is in financial distress

  banks' cost of funds $= r + \gamma_b(r) > r =$ cost of funds of bonholders

# Could disintermediation explain the falling pass-through?

- Firms with heterogeneous internal funds $e$

- Given $e$, choose:

  |  |  |
  |---|---|
  | total borrowing | $d$ |
  | 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 $= r + \gamma_b(r) > r =$ cost of funds of bonholders

# Choosing investment
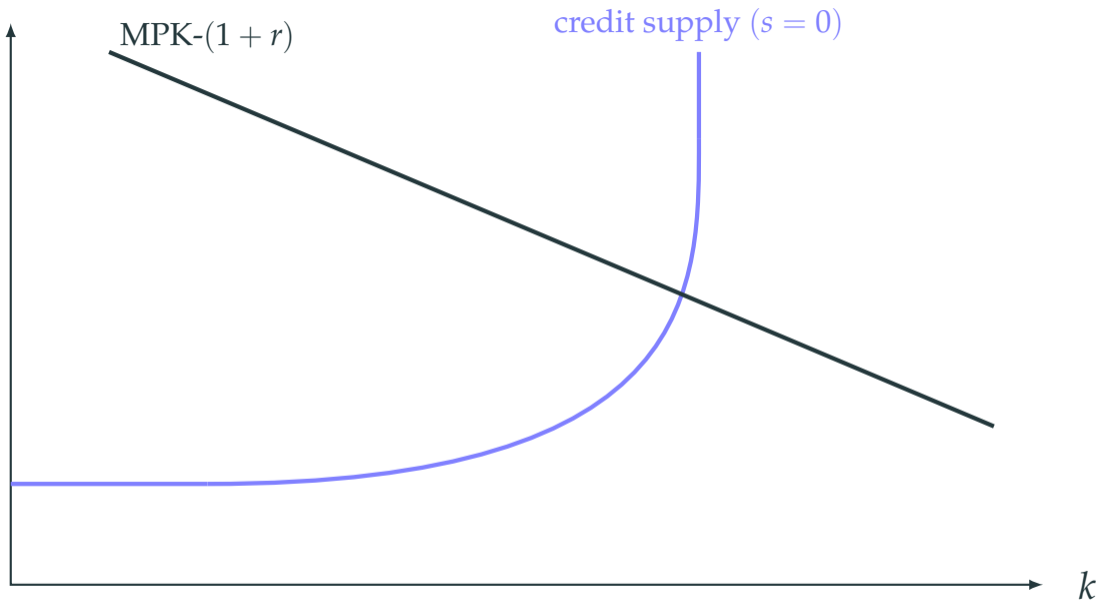
# Choosing investment

$$\underbrace{\zeta \mathbb{E}(\phi)k^{\zeta-1}}_{\text{MPK}} - \underbrace{(1+r)}_{\text{risk-free rate}} = \underbrace{\gamma_b(r) \times s}_{\substack{\text{bank intermediation} \\ \text{cost}}} + \underbrace{\frac{\partial L}{\partial d}(d, s)}_{\substack{\text{deadweight} \\ \text{liquidation losses}}}$$
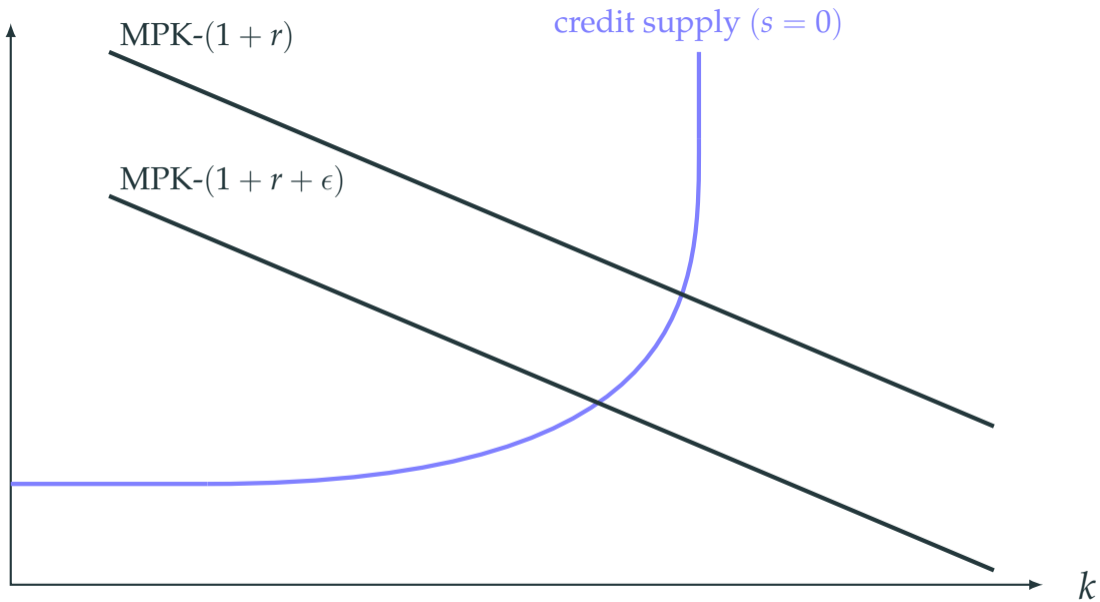
# Choosing investment

$$\underbrace{\zeta \mathbb{E}(\phi) k^{\zeta-1}}_{\text{MPK}} - \underbrace{(1+r)}_{\text{risk-free rate}} = \underbrace{\gamma_b(r) \times s}_{\substack{\text{bank intermediation} \\ \text{cost}}} + \underbrace{\frac{\partial L}{\partial d}(d, s)}_{\substack{\text{deadweight} \\ \text{liquidation losses}}}$$

$$\frac{\partial^2 L}{\partial d^2} > 0,$$

# Choosing investment

$$\underbrace{\zeta \mathbb{E}(\phi) k^{\zeta-1}}_{\text{MPK}} - \underbrace{(1+r)}_{\text{risk-free rate}} = \underbrace{\gamma_b(r) \times s}_{\substack{\text{bank intermediation} \\ \text{cost}}} + \underbrace{\frac{\partial L}{\partial d}(d, s)}_{\substack{\text{deadweight} \\ \text{liquidation losses}}}$$
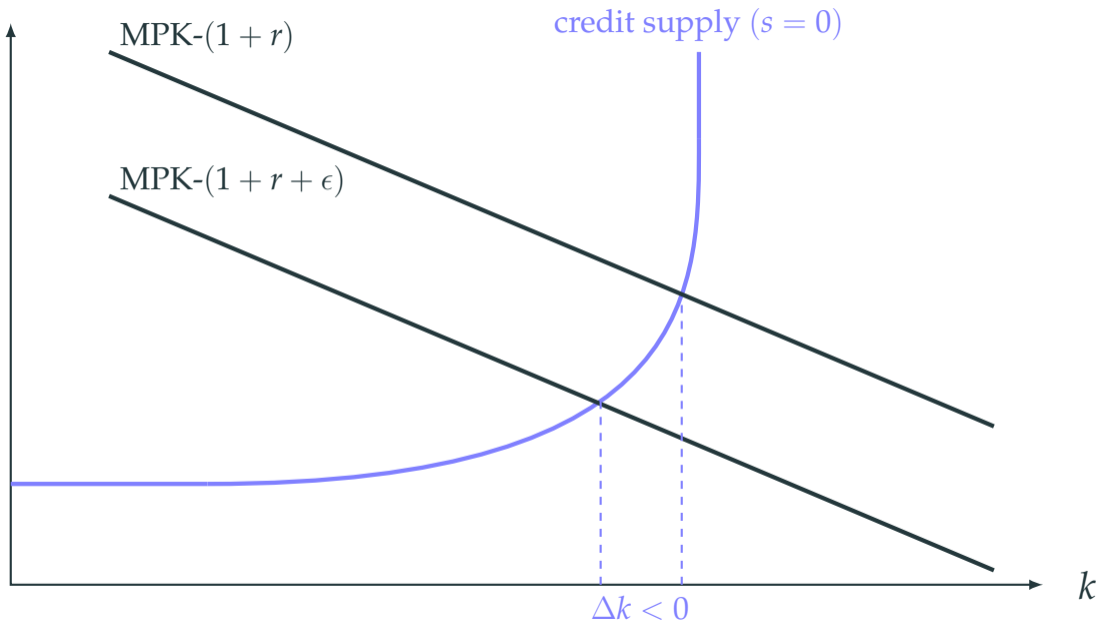
$$\frac{\partial^2 L}{\partial d^2} > 0, \qquad \frac{\partial^2 L}{\partial d \partial s} < 0 \quad \text{(flexibility)}$$
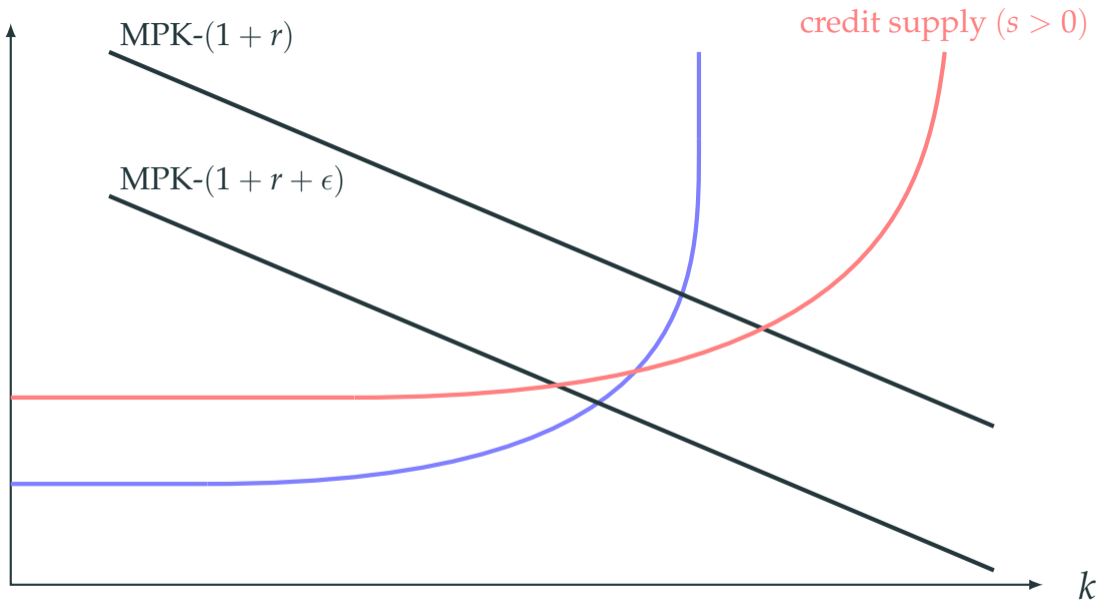
credit supply ($s = 0$)

MPK-$(1+r)$

credit supply ($s = 0$)

$k$

MPK-$(1 + r)$

MPK-$(1 + r + \epsilon)$

credit supply $(s = 0)$

$k$

MPK-$(1+r)$

MPK-$(1+r+\epsilon)$

credit supply ($s=0$)

$\Delta k < 0$

$k$

MPK-$(1+r)$

MPK-$(1+r+\epsilon)$

credit supply ($s > 0$)

$k$

MPK-$(1+r)$

MPK-$(1+r+\epsilon)$
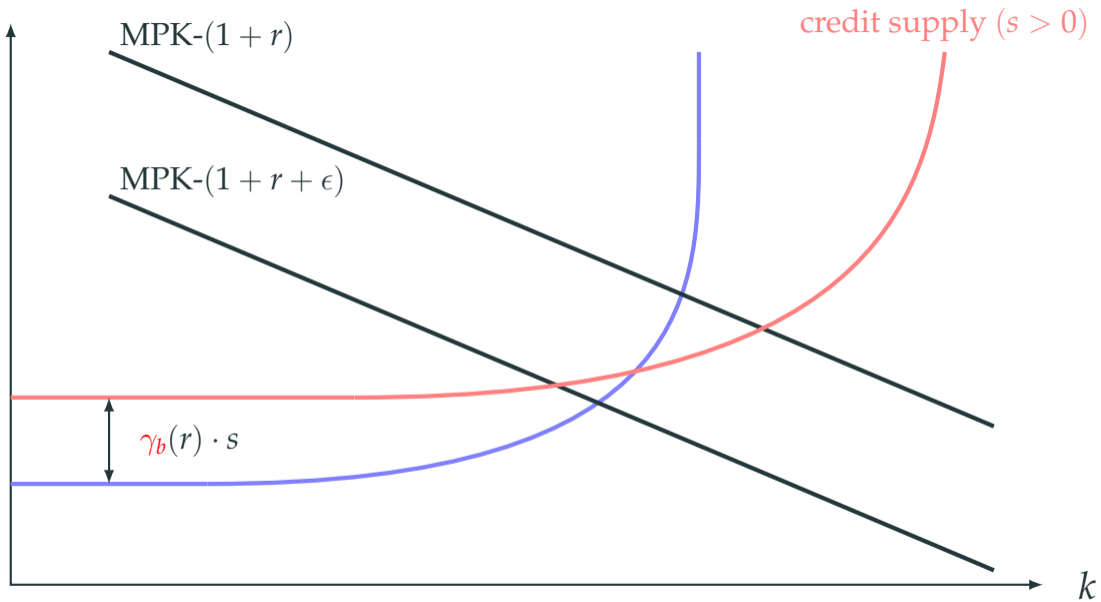
credit supply $(s > 0)$
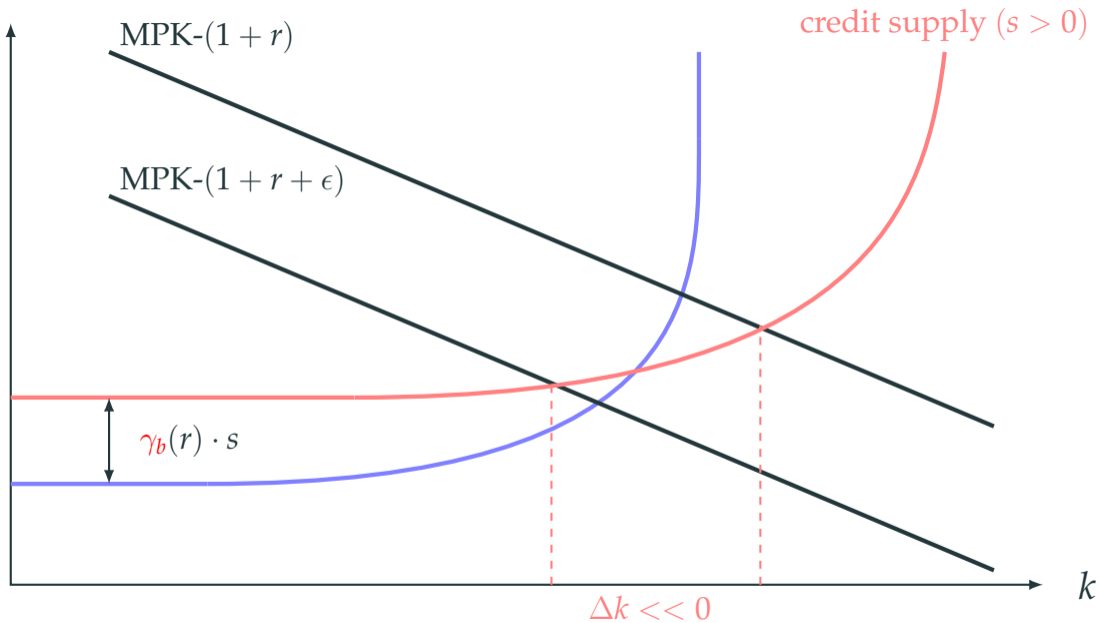
$\gamma_b(r) \cdot s$
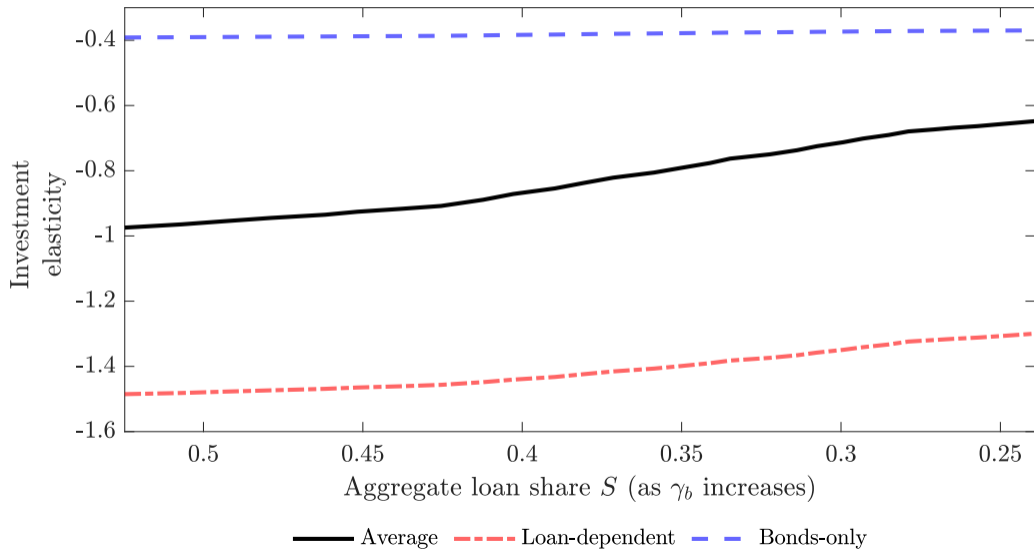
$\Delta k << 0$

$k$
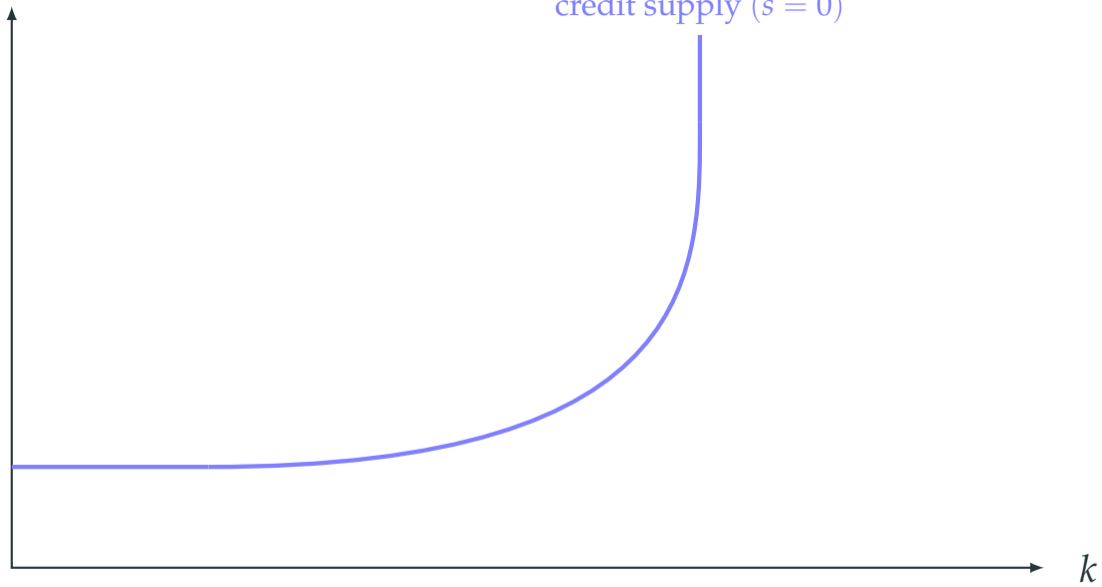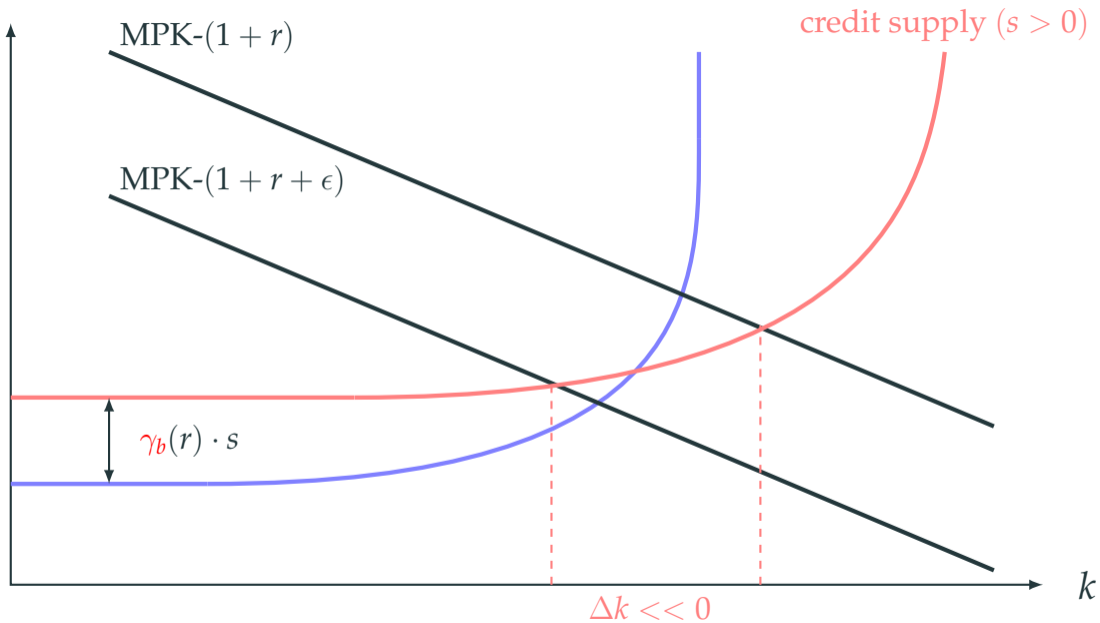
# The pass-through of MP shocks to investment

# 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

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

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

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

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

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

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

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

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

## 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

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

    yes; 1 s.d. lower loan share $\implies$ 25% lower investment response
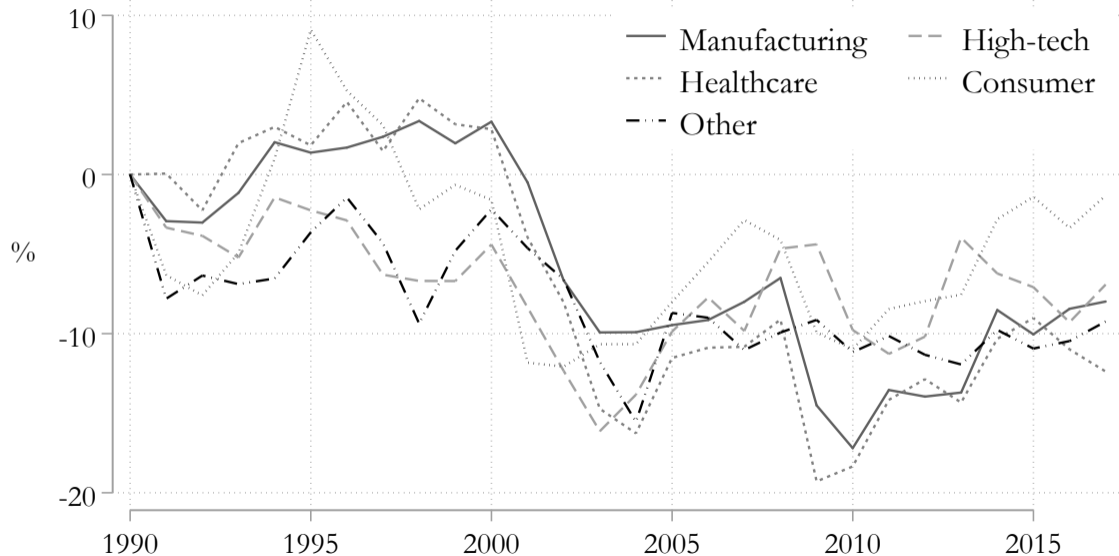
3. Has monetary pass-through declined as a result?

    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

Change in the loan share by LT credit rating

A- and above
BBB+ and below
No long-term rating