

LONG-TERM BOND SUPPLY, TERM PREMIUM, AND THE DURATION OF CORPORATE INVESTMENT

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Motivation

- In the aftermath of GFC, central banks resorted to **QE**
 - **Key feature:** ↓ LT bond supply → ↓ *term premium*
- Limited evidence of **effect on corporate investment:**
 - Effects may be *distributional*
 - * Term premium affects more the valuation of *investments with long cash flow duration*
- **Question:**
 - ↑ LT bond supply ⇒ ↓ duration of real investments?
- **Policy relevance:**
 - Several govt. interventions affect the supply of LT bonds
 - Governments target LT investment: tax incentives for R&D, infrastructure, renewable energy projects, etc.

Theoretical framework

ST and LT bond markets with limited arbitrage (e.g. Greenwood et al., 2010)

- ST bonds with exo. returns **unknown for future periods**

- LT bonds with **endogenous price/return**
 - Exo. supply by government net of natural demand
 - Mean-variance arbitrageurs clearing the market
 - ↑ LT bond (net) supply ⇒ ↑ term premium

New: firms with heterogeneous duration of investment

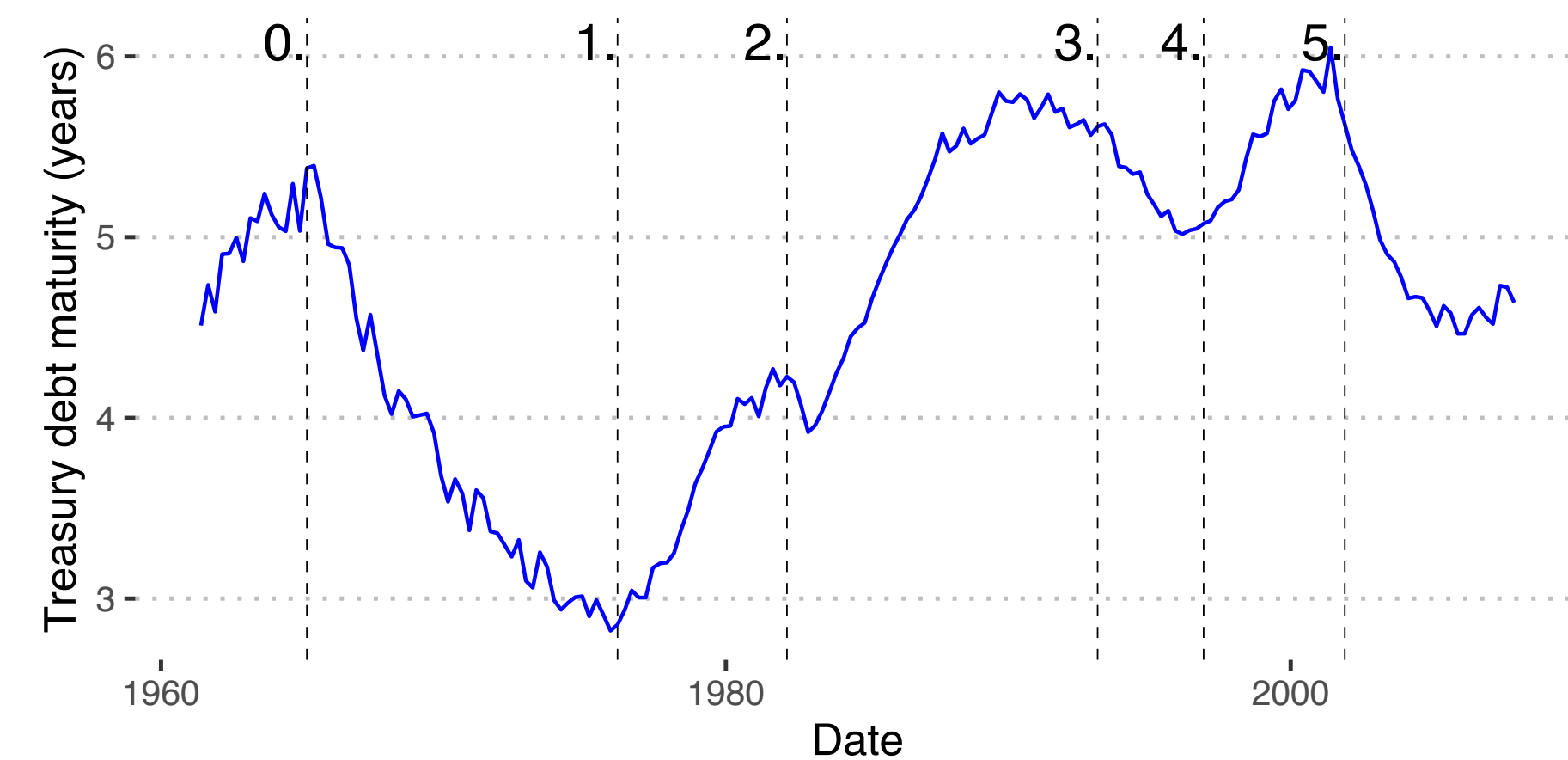
- **A1.** Fixed cash flow duration of investment
- **A2.** Investment financed with bonds
 - perfect substitutes for gvt bonds
- **A3.** Assets-Liabilities maturity matching
 - Motivation: avoid refinancing and inefficient liquidation
- **Optimisation:** Choose investment scale to maximise final period cash flows after debt repayment

• **Prediction:**

- ↑ LT bond (net) supply
 - ⇒ ↑ term premium
 - ⇒ ↑ discount rates used by long-duration firms
 - ⇒ ↓ investment (& debt issuance) by long-duration firms

Identification: US Treasury debt

- **Variation arguably exogenous to LT investment:**
 - UST is *not* a "market timer" → "regular and predictable offering framework" since the 1970's.
 - Why? costs of unpredictable issues + scale effects
 - 6 policy decisions drive most of last 50 years' variation



Policy shocks:

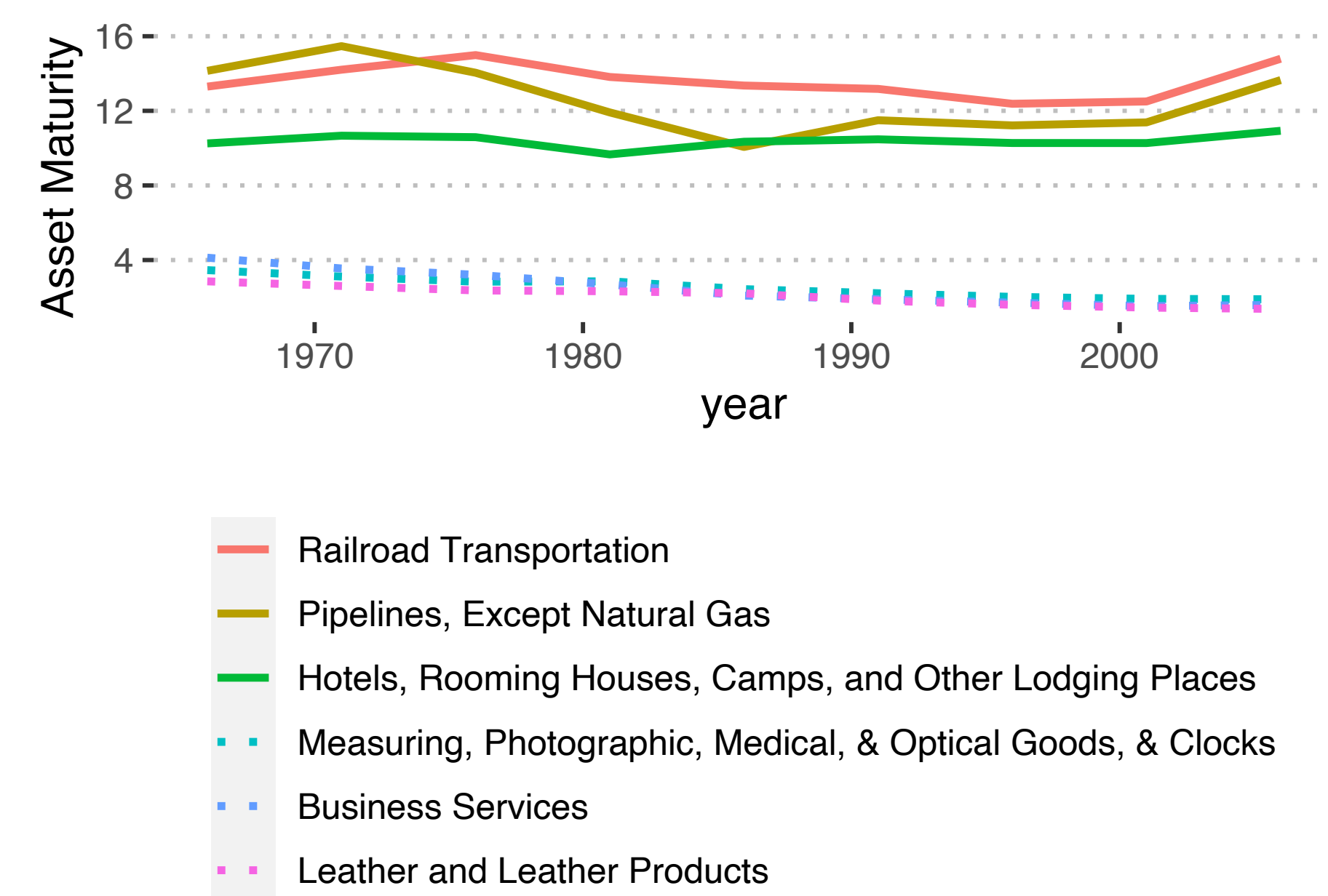
0. **1965:** 50y old statutory constraint on LT bond issuance becomes binding
1. **1976:** First steps in staggered repeal of the statutory constraint
2. **1982:** Significant changes in size of exemptions
3. **1993:** Clinton admin. cuts back on quarterly 30-year bond offerings
4. **1996:** Reintroduction of quarterly 30-year bond offerings
5. **2001:** Suspension of 30-year bonds issuance

Measurement of investment duration

$$\text{Asset Maturity} = \frac{\text{Current Assets}}{\text{CA} + \text{PP\&E}} \cdot 1 + \frac{\text{PP\&E}}{\text{CA} + \text{PP\&E}} \cdot \frac{\text{PP\&E}}{\text{Dep.}}$$

- empirically consistent with debt maturity, horizons of investment plans, ...

- Stable measure at the industry level (here SIC2-digits)



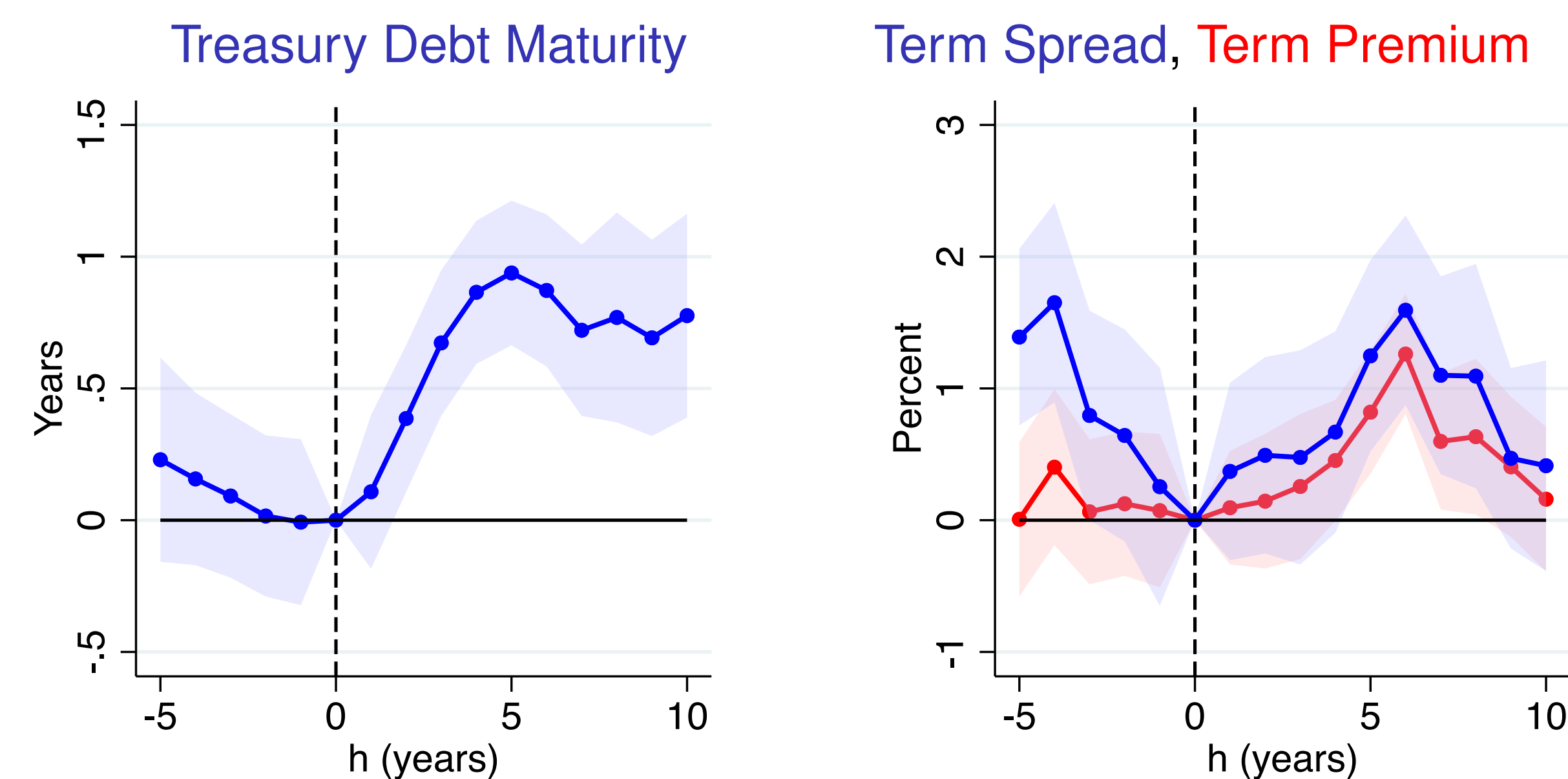
*Figure displays time series variation of the measure for the top 3 and bottom 3 SIC-2d industries.

Long-term bond supply and investment duration

- Run (stacked) event study around 5 shocks for term premium and corporate investment of US public firms

1y ↑ government debt maturity leads to:

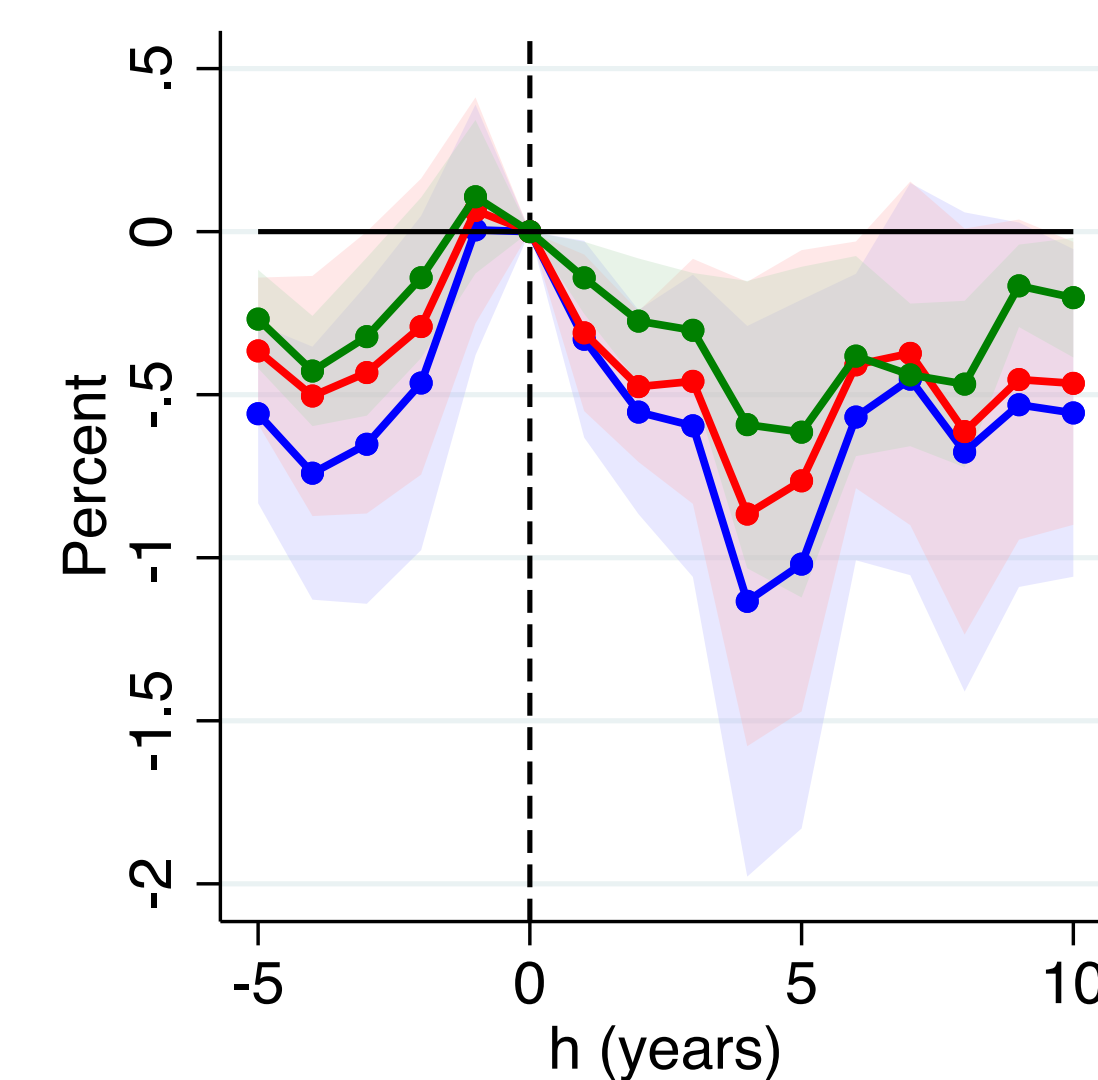
- ↑ **term premium** (0.7-1.1pp)



- ↓ **duration of corporate investment via redistributions**

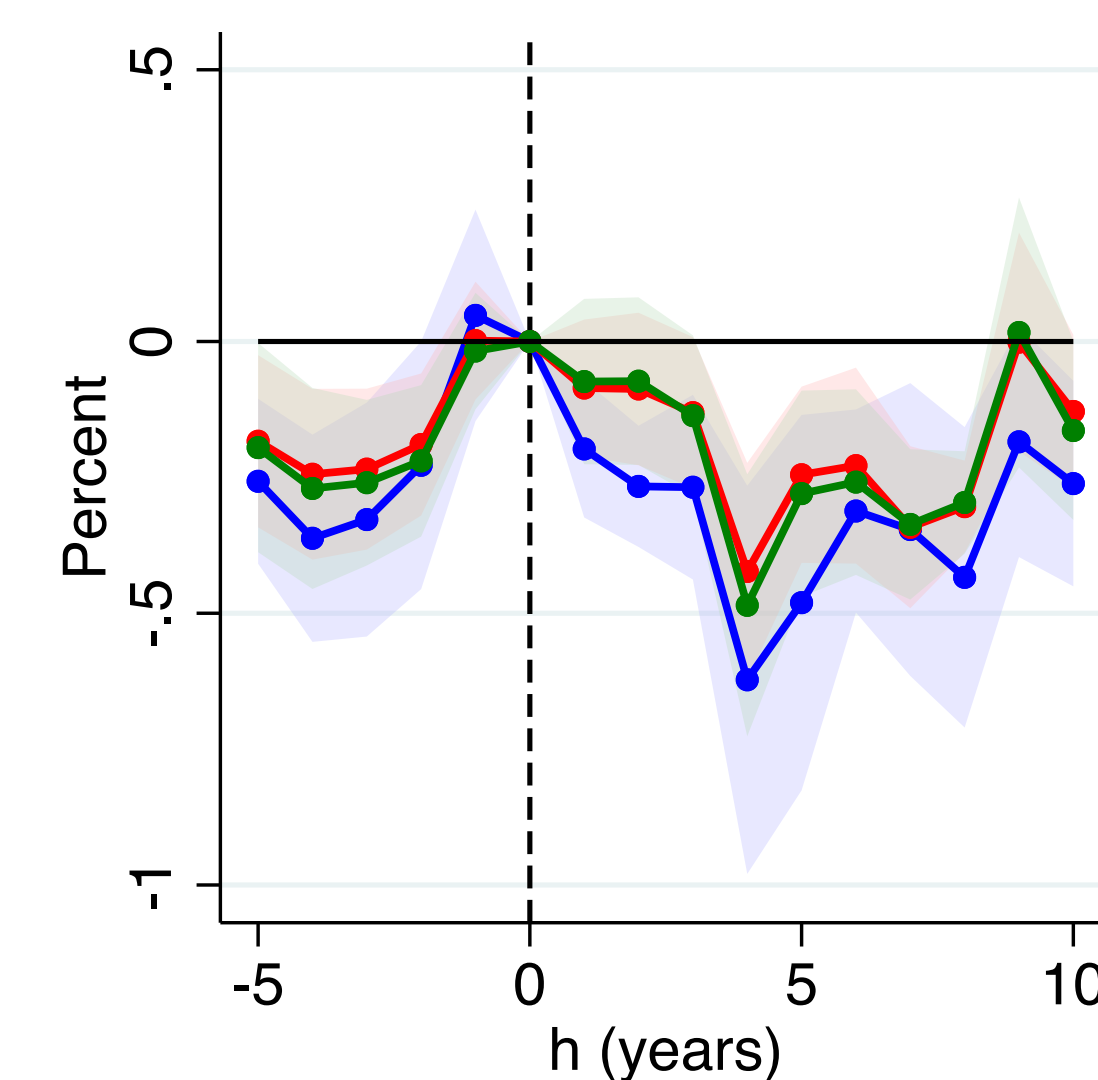
– **Across-industries:** ↓ Invt for long-duration industries (1.4% of assets)

$$\frac{\text{Capex}_{f,s,z,t}}{\text{Assets}_{f,s,z,t-1}} = \beta_h \cdot \text{Sign}_z \cdot \text{AssetMat}_s + \gamma_{z,h} + \alpha_{z,s} + \alpha_{z,f} + \delta_{z,h} \cdot X_{f,s} + \epsilon_{f,s,t,z}$$



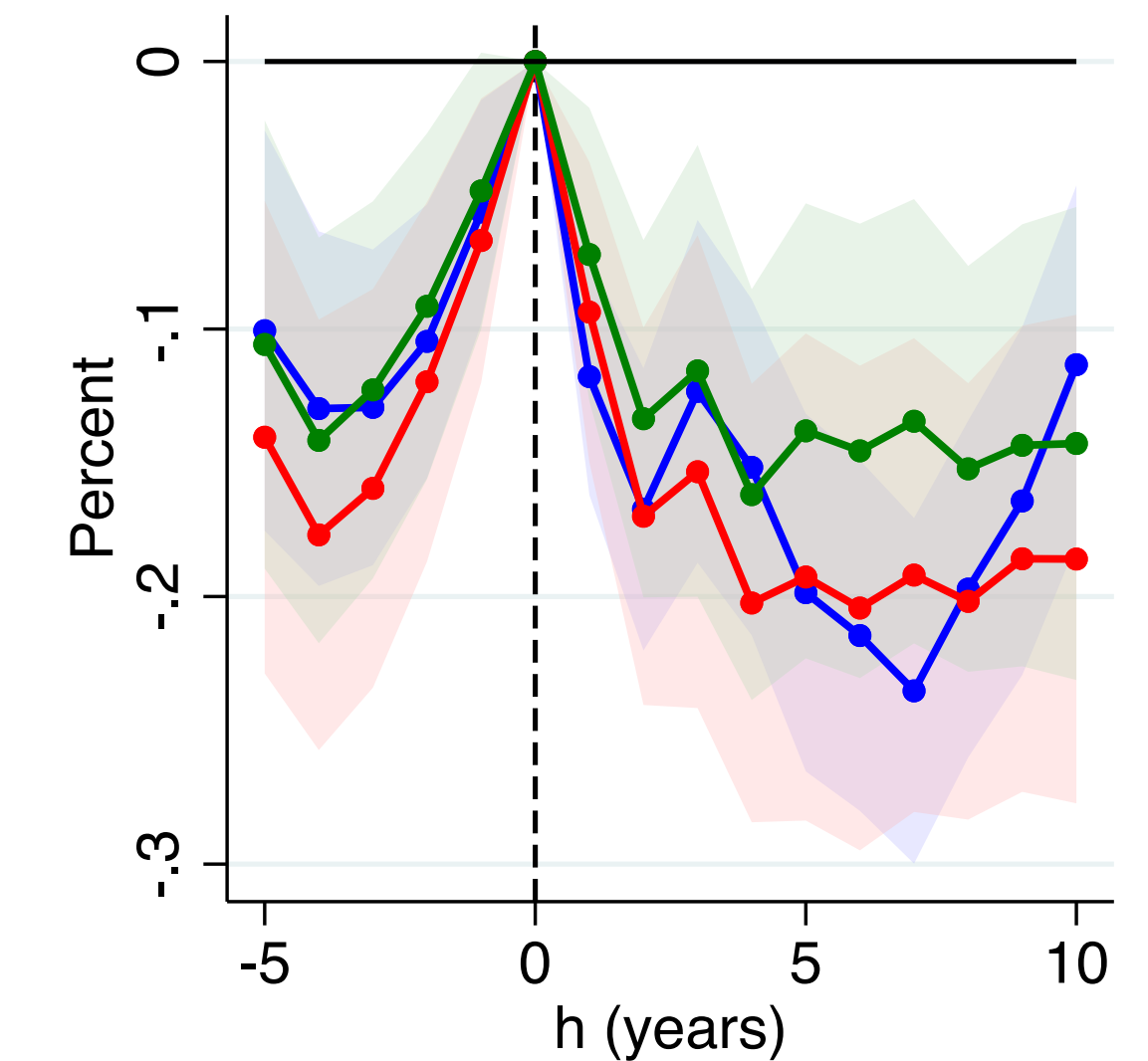
– **Within-industry:** ↓ Invt for long-duration firms (0.8% of assets)

$$\frac{\text{Capex}_{f,s,z,t}}{\text{Assets}_{f,s,z,t-1}} = \beta_h \cdot \text{Sign}_z \cdot \text{AssetMat}_f + \gamma_{z,h} + \alpha_{z,f} + \gamma_{z,h,s}^{\text{SIC2}} + \gamma_{z,h,s}^{\text{SIC3}} + \epsilon_{f,s,t,z}$$



– **Within-firm:** ↓ Invt for long-duration divisions (0.5% of assets)

$$\frac{\text{Capex}_{f,d,z,t}}{\text{Assets}_{f,d,z,t-1}} = \beta_h \cdot \text{Sign}_z \cdot \text{AssetMat}_{s(d)} + \dots + \alpha_{z,h,f} + \delta_{z,h} \cdot X_{f,d} + \epsilon_{f,d,t,z}$$



Debt redistribution and debt maturity

- 3 pieces of evidence:
 - Investment redistribution on the basis of duration
 - Investment redistribution matched by debt redistribution (≈ 50%)
 - Assets-Liabilities *maturity matching*
- Implication for corporate debt maturity :
 - ↑ LT bond (net) supply ⇒ ↓ corporate debt maturity

Selected robustness tests

1. External validity using an exogenous demand shock for long-term bonds
 - UK Pensions Act of 2004
2. Baseline results not explained by
 - long-duration firms responding differently to business cycle fluctuations
 - a "collateral channel" (Chaney et al., 2012)

Takeaways

- Higher supply of LT government bond crowds out LT investment and LT debt issuance by firms via different redistributions
 - *across industries, within industries across firms, and within firms across divisions*
- Policy implications: Trade-off over maturity of government debt in good times or QE at the zero lower bound