# Financial Shock Transmission to Heterogeneous Firms: the Earnings-Based Borrowing Constraint Channel*

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*The views expressed in this paper are those of the authors and do not necessarily reflect the views of the European Central Bank nor of the IMF, its Executive Board, or IMF Management.

# Motivation

**What we know:**

- Firm heterogeneity and financial frictions play a role in the transmission of monetary policy shocks (e.g. Alder et al. 2024; Anderson & Cesa-Bianchi 2021; Cloyne et al. 2023; Gürkaynak et al. 2022; Jeenas, 2019; Ottonello & Winberry 2020; Palazzo & Yamarthy, 2022)

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**What we understand less:**

- Other types of shocks – global risk shocks – may matter and transmit heterogeneously across firms
- Limited firm-level literature on the transmission of global risk and MP shocks → challenge to disentangle the two shocks
- How the type of borrowing constraint affects transmission: asset-based vs. earnings-based borrowing constraint → Lian & Ma 2021: *Large US firms have 80% of their debt based on earnings, only 20% is collateralised by physical assets*

## Research Agenda

### Our contribution:

- Identification strategy to disentangle global risk and monetary policy shocks in an **integrated** daily BVAR exploiting cross-asset price movements
- We study two interrelated dimensions
  (1) **firm heterogeneity**
  (2) the **type of shocks**
  to understand how shocks transmit to firms' financing conditions (bonds & equity) and default prospects
- Tease out mechanisms by contrasting asset-based with earnings-based borrowing constraints, differentiating firms across leverage and earnings

### Why does it matter?

- Shocks that tighten firms' financing conditions ⇒ possibly adverse consequences for investment and production
- Timely & policy relevant ⇒ US/global corporate sector recently hit simultaneously by these 2 shocks: monetary policy tightening and global risk aversion

# Potential mechanisms

**Testable hypothesis**

Heterogeneous effects across firms depending on the **type of borrowing constraint**:

(1) **Asset-based collateral constraint**: Expect stronger responses from firms in the upper tail of the leverage distribution (i.e. higher leveraged firms)

(2) **Earnings-based borrowing constraint**: Expect stronger responses from firms in the lower tail of the earnings distribution (i.e. less profitable firms)

# Key Findings

**Monetary policy and global risk shocks...**

- Global risk shocks have stronger and more heterogeneous effects on corporate funding conditions which depend on firms' position within the earnings distribution

**... and the earnings-based borrowing constraint transmission channel**

- Responses of firms' funding costs to financial shocks are
  (i) more muted for the upper tail of firm distribution by *leverage* (higher-leveraged firms)
  (ii) more pronounced for the lower tail of firm distribution by *earnings* (less profitable firms)

# Data

- Non-financial S&P 500 corporates (current and historical constituents)
- Sample period: 1,117 weeks from 7-Jan-2000 to 17-Dec-2021
- **Bond-level:** Bloomberg Selection/Cleaning
  - USD-denominated bonds
  - Option-adjusted spreads (OAS), composite ratings
  - Additional bond characteristics: duration, age, coupon, volume, embedded options, call dates
- **Firm-level:**
  - Datastream: equity prices and balance sheet
  - Moody's CreditEdge: expected default frequencies (EDFs)
  - Bloomberg: 5Y model-implied CDS spreads
- **Raw sample:** 436 firms, 12,996 bonds
- **Matched sample: 407 firms, 7,825 bonds**
- **Aggregate-level:**
  - US 3m and 10Y yield, CESI, VIX, S&P 500 index, CAPE, US dollar NEER, US corp spread

# Large firms exhibit considerable heterogeneity

Table 1: Firm characteristics – Summary statistics

| | Mean | P25 | Median | P75 |
|---|---|---|---|---|
| EDF 1-Year (%) | 0.41 | 0.03 | 0.05 | 0.19 |
| Leverage ratio | 47.68 | 30.70 | 42.46 | 57.51 |
| Realized earnings per share | 4.04 | 1.51 | 2.68 | 4.60 |
| Expected earnings per share | 4.52 | 1.69 | 2.94 | 5.03 |
| Interest coverage ratio | 12.92 | 3.45 | 7.25 | 13.72 |
| S&P Issuer Rating | BBB+ | BBB- | BBB+ | A- |

Note: Sample period: 2000/01/07 – 2021/12/17; Number of bond-week observations: 2,274,822; Number of bonds: 7,674; Number of firms: 407. The sample statistics are based on trimmed data.

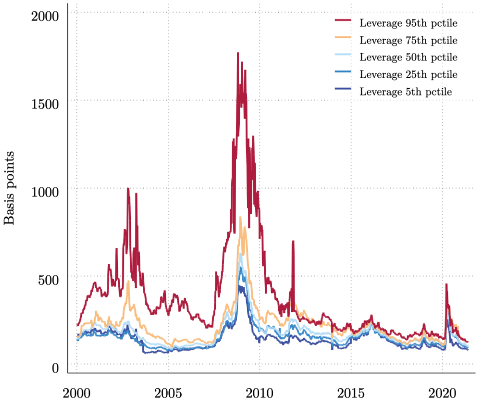
## Heterogeneity in bond characteristics

Table 3: Bond characteristics – Summary statistics

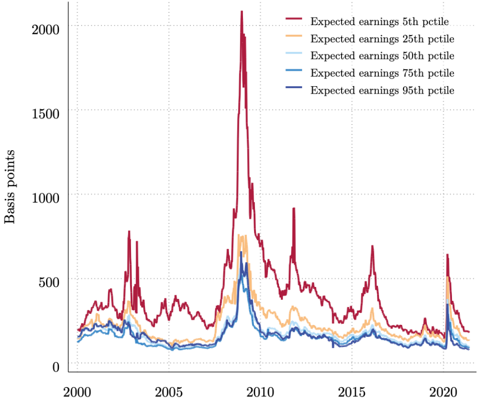
| | Mean | P25 | Median | P75 |
|---|---|---|---|---|
| No. of bonds per firm/week | 38.24 | 6.00 | 12.00 | 23.00 |
| Bond volume ($ mil) | 640.72 | 250.00 | 500.00 | 800.00 |
| Maturity at issue (years) | 15.73 | 9.50 | 10.03 | 29.98 |
| Term to maturity (years) | 10.49 | 3.93 | 7.31 | 16.43 |
| BB Composite Bond Rating | BBB+ | BBB | BBB+ | A |
| OAS spread (bsp) | 174.25 | 85.56 | 138.24 | 209.36 |
| Duration (years) | 6.91 | 3.29 | 5.91 | 10.09 |
| Coupon rate (pct) | 5.18 | 3.75 | 5.05 | 6.62 |
| Bond options (pct) | 0.46 | | | |

Note: Sample period: 2000/01/07 – 2021/12/17; Number of bond-week observations: 2,274,822; Number of bonds: 7,674; Number of firms: 407. The sample statistics are based on trimmed data.

# **Heterogeneity** in corporate bond spreads across the **leverage** and **earnings** distribution




(a) by leverage




(b) by earnings

Figure 1: Credit spreads across the firm distribution ▸ bond rating distribution

# Road map: Empirical approach

**Step 1: Set up Bayesian VAR model**

- Explore daily dynamics in financial variables which determine financial conditions of firms to identify US monetary policy and global risk shocks

**Step 2: Explore firm heterogeneity**

- Assess how firms' funding costs react differently depending on the type of borrowing constraint
- Panel local projections using the shocks identified in Step 1

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# Shock Identification

- **Daily Bayesian VAR model** identified with sign, relative magnitude and narrative restrictions, similar to Brandt et al. (2021)

$$A y_t = c + \sum_{l=0}^{p} B^l y_{t-l} + \varepsilon_t$$

- $y_t \equiv$ short-term and long-term UST yields, equity prices (CAPE), US dollar effective exchange rate, corporate spread
- Exploit cross-asset price movements that capture a wide range of financing costs for firms (Cieslak & Schrimpf 2019; Bobasu et al. 2023)
- Daily data Jan-1995 to Apr-2022, variables in (log first) differences, 4 lags
- Estimation follows Arias et al. (2018) and Antolin-Diaz & Rubio-Ramírez (2018)

# Why a daily BVAR?

- **Simultaneous identification** of US monetary policy and global risk shock ⇒ consistent approach
- **Continuous shock series**: incorporates daily dynamics in market pricing of US monetary policy and global risk shock

▸ Model validation: global risk

## Shock Identification: Sign, relative magnitude & narrative restrictions

Table 5: Sign restriction identification

| | US policy |
|---|---|
| Short-term rate | $+$ |
| Long-term rate | $+$* |
| CAPE | $-$ |
| Effective FX rate | $+$ |
| Corporate spread | |

($>$ foreign MP shock)

US MP tightening
$\rightarrow$ pushes up yields
$\rightarrow$ depresses equity prices
$\rightarrow$ USD appreciates

Note: A * denotes that relative magnitude or narrative restrictions are imposed in addition to the specified sign. CAPE refers to cyclically-adjusted price to earnings ratio and policy to monetary policy shocks.

# Shock Identification: Sign, relative magnitude & narrative restrictions

Table 5: Sign restriction identification

| | US policy | US macro risk |
|---|---|---|
| Short-term rate | + | |
| Long-term rate | +* | + |
| CAPE | − | +* (> foreign macro shock) |
| Effective FX rate | + | + |
| Corporate spread | | − |

Positive US macro shock
→ supports long-term yields and the USD
→ boosts equity prices
→ compresses corp. spreads

Note: A * denotes that relative magnitude or narrative restrictions are imposed in addition to the specified sign. CAPE refers to cyclically-adjusted price to earnings ratio and policy to monetary policy shocks.

## Shock Identification: Sign, relative magnitude & narrative restrictions

Table 5: Sign restriction identification

| | US policy | US macro risk | global risk |
|---|---|---|---|
| Short-term rate | + | | |
| Long-term rate | +* | + | − |
| CAPE | − | +* | −* (narrative Lehman) |
| Effective FX rate | + | + | +* (> foreign macro risk) |
| Corporate spread | | − | |

Global risk shock
→ flight to safety into US safe assets
→ safe haven USD appreciation

Note: A * denotes that relative magnitude or narrative restrictions are imposed in addition to the specified sign. CAPE refers to cyclically-adjusted price to earnings ratio and policy to monetary policy shocks.

## Shock Identification: Sign, relative magnitude & narrative restrictions

Table 5: Sign restriction identification

| | US policy | US macro risk | global risk | foreign policy |
|---|---|---|---|---|
| Short-term rate | + | | | |
| Long-term rate | +* | + | − | + |
| CAPE | − | +* | −* | − |
| Effective FX rate | + | + | +* | − |
| Corporate spread | | − | | |

Foreign MP tightening
→ raises US LT yields
→ pushes down US equities
→ USD depreciates

Note: A * denotes that relative magnitude or narrative restrictions are imposed in addition to the specified sign. CAPE refers to cyclically-adjusted price to earnings ratio and policy to monetary policy shocks.

# Shock Identification: Sign, relative magnitude & narrative restrictions

Foreign macro shock
→ similar to US macro shock
→ USD depreciates

Table 5: Sign restriction identification

| | US policy | US macro risk | global risk | foreign policy | foreign macro risk |
|---|---|---|---|---|---|
| Short-term rate | + | | | | |
| Long-term rate | +* | + | − | + | + |
| CAPE | − | +* | −* | − | + |
| Effective FX rate | + | + | +* | − | − |
| Corporate spread | | − | | | |

Note: A * denotes that relative magnitude or narrative restrictions are imposed in addition to the specified sign. CAPE refers to cyclically-adjusted price to earnings ratio and policy to monetary policy shocks.

## The two shocks are large **contributors to US financial conditions** historically

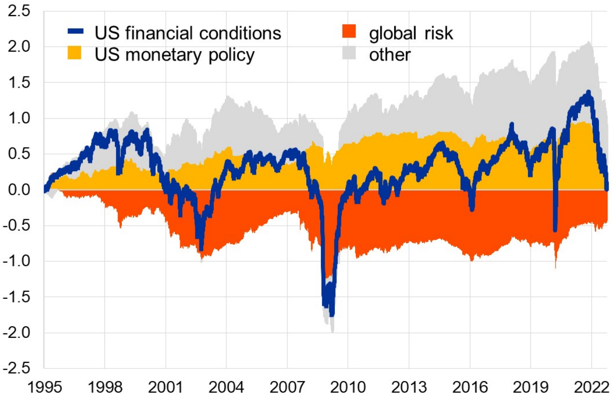


Figure 2: Model-based drivers of US financial conditions (cumulated contributions of shocks to standardized index, rebased to Jan 1995 =0). US financial condition index based on Arrigoni et al. (2022).

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**Step 2: Explore firm heterogeneity**

- Assess how firms financing conditions react differently depending on the type of borrowing constraint
- Panel local projections using the shocks identified in Step 1

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# Empirical Approach: Exploiting **bond-** and **firm-**level heterogeneity

**Step 2.1:**

- Match equity and corporate bond spread indicators at the firm-level
- **Decompose corporate spreads** into credit risk component and excess premium (Gilchrist & Zakrajsek, 2012)

**Step 2.2:**

- Estimate the **response of corporate funding costs** to global risk and US monetary policy shocks using **panel local projections** à la Jordá (2005)
- Analyze if **tail of weak/strong firms** (by leverage, interest coverage ratio, earnings) is **more/less sensitive** to shocks

## Step 2.1: Decompose corporate spreads into **fundamental risk** and **excess premium** components

- Following Gilchrist & Zakrajsek (2012), firm $j$'s option-adjusted spread $s_{j,t}[k]$ on bond $k$ at time $t$ is assumed to be linearly related to

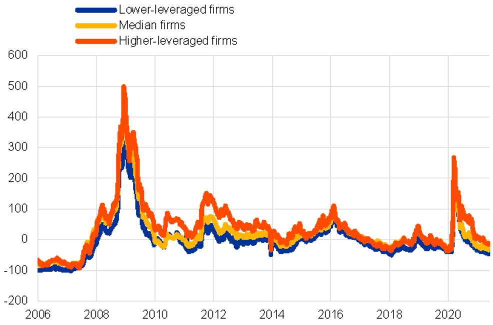
$$s_{j,t}[k] = \underbrace{a_i}_{\text{industry FE}} + \underbrace{\Lambda^j EDF_{j,t}}_{\text{exp. default frequency}} + \underbrace{\Lambda^k \boldsymbol{X}_{j,t}[k]}_{\text{bond characteristics}} + \underbrace{u_{j,t}[k]}_{\text{pricing error}} \tag{1}$$

- $EDF_{j,t}$ : Summary statistic of firm fundamentals
- $\boldsymbol{X}_{j,t}[k]$ : $\text{Duration}_{t,j}[k]$, $\text{Age}_j[k]$, $\text{Volume}_j[k]$, $\text{CALL}_j[k]$
- $u_{j,t}[k]$ : pricing error ⇒ aggregate to the firm-level:

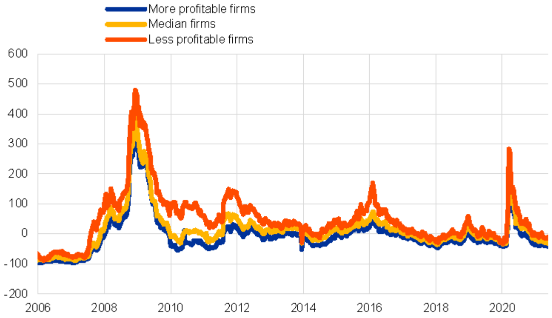
$$u_{j,t} \equiv \underbrace{EBP_{j,t}}_{\textbf{excess bond premium}} = \frac{1}{N_j}\sum_k u_{j,t}[k] \tag{2}$$

▸ Estimation results ▸ Differences to GZ

# Step 2.1: Excess bond premium **spikes, heterogeneously** across firms, during **tail events**




(a) Leverage




(b) Earnings

Figure 3: Excess Bond Premium (EBP) across firm percentiles

## Step 2.2: Estimate **heterogeneous responses** to global risk and monetary policy shocks

- Panel local projections: firm-level regressions for firm $j$ in week $t$ (Jan-2000 to Dec-2021)

$$\Delta_h y_{j,t-1} = \beta_h \underbrace{\epsilon_t^i}_{\text{shock}} + \sum_{q \in \{H,L\}} \beta_{h,q} \epsilon_t^i \underbrace{\times \mathbb{1}_{j,q,t}}_{\text{tail firm}} + \underbrace{\phi_{j,h}(L) X_{j,t-1}}_{\text{controls}} + \epsilon_{j,t+h} \qquad \text{for} \quad h = 1, \ldots H \tag{3}$$

- $y_{j,t}$ : credit spread, EBP, EDF, equity price (CDS spread)
- $\epsilon_t^i$ : monetary policy shock $\epsilon_t^m$, global risk shock $\epsilon_t^r$
- $\mathbb{1}_{j,q,t}$ : dummy variable for $q = \{20^{\text{th}}, 80^{\text{th}}\}$ pct. of weak/strong firms by leverage, interest coverage ratio, expected earnings
- $\phi_{j,h}(L)X_t$ : 4 lags of VIX, CESI, GFC dummy, Covid dummy, industry FE

- **Weak/strong firms:** percentiles of firms defined according to their balance sheet characteristics (every 2 years, starting 2005)

## Results: impact of **monetary policy** shock $\epsilon_t^m$ on all firms

Table 7: Sensitivity of asset prices of tail firms upon impact of shocks.

| | (1) Credit spread | (2) EBP | (3) Default risk | (4) ln(Equity Price) |
|---|---|---|---|---|
| $\epsilon_t^m$ | 7.395*** | 5.889** | 0.028* | -0.035*** |
| Industry FE | YES | YES | YES | YES |
| Observations | 222,060 | 219,513 | 220,710 | 220,964 |

Note: Estimates at horizon h = 0, i.e. upon impact of the identified monetary policy shock $\epsilon_t^m$. Indicator variables for leverage (LEV), interest coverage ratio (ICR), and expected earnings (EPSE) are computed based on the tails of firms (20th and 80th percentiles). Shocks are calibrated to a 10 bsp increase in the US 10y yield. SEs are clustered along the time and industry dimension.

# Results: heterogeneous impact of **monetary policy** shock $\epsilon_t^m$ by **leverage**

Table 7: Sensitivity of asset prices of tail firms upon impact of shocks.

| | (1)<br>Credit spread | (2)<br>EBP | (3)<br>Default risk | (4)<br>ln(Equity Price) |
|---|---|---|---|---|
| $\epsilon_t^m$ | 7.395*** | 5.889** | 0.028* | -0.035*** |
| | | | | |
| $\epsilon_t^m$ | 7.261*** | 6.220*** | 0.020** | -0.035*** |
| LowLEV $\times$ $\epsilon_t^m$ | -1.167 | -1.277 | -0.003 | 0.000 |
| HighLEV $\times$ $\epsilon_t^m$ | 1.842 | -0.537 | 0.045 | -0.002 |
| Industry FE | YES | YES | YES | YES |
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Note: Estimates at horizon h = 0, i.e. upon impact of the identified monetary policy shock $\epsilon_t^m$. Indicator variables for leverage (LEV), interest coverage ratio (ICR), and expected earnings (EPSE) are computed based on the tails of firms (20th and 80th percentiles). Shocks are calibrated to a 10 bsp increase in the US 10y yield. SEs are clustered along the time and industry dimension.

## Results: heterogeneous impact of **monetary policy** shock $\epsilon_t^m$ by **interest coverage ratio**

Table 7: Sensitivity of asset prices of tail firms upon impact of shocks.

| | (1) Credit spread | (2) EBP | (3) Default risk | (4) ln(Equity Price) |
|---|---|---|---|---|
| $\epsilon_t^m$ | 7.395*** | 5.889** | 0.028* | -0.035*** |
| | | | | |
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| | | | | |
| $\epsilon_t^m$ | 7.001*** | 6.145*** | 0.016** | -0.034*** |
| LowICR $\times$ $\epsilon_t^m$ | 2.670 | -1.178 | 0.073 | -0.007* |
| HighICR $\times$ $\epsilon_t^m$ | -0.358 | -0.126 | -0.005** | 0.001 |
| Industry FE | YES | YES | YES | YES |
| Observations | 222,060 | 219,513 | 220,710 | 220,964 |

Note: Estimates at horizon h = 0, i.e. upon impact of the identified monetary policy shock $\epsilon_t^m$. Indicator variables for leverage (LEV), interest coverage ratio (ICR), and expected earnings (EPSE) are computed based on the tails of firms (20th and 80th percentiles). Shocks are calibrated to a 10 bsp increase in the US 10y yield. SEs are clustered along the time and industry dimension.

## Results: heterogeneous impact of **monetary policy** shock $\epsilon_t^m$ by **earnings**

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| | | | | |
| $\epsilon_t^m$ | 7.140*** | 5.938*** | 0.021** | -0.034*** |
| LowEPSE $\times$ $\epsilon_t^m$ | 1.861 | -0.652 | 0.048* | -0.004* |
| HighEPSE $\times$ $\epsilon_t^m$ | 0.034 | 0.468 | -0.006 | -0.001* |
| Industry FE | YES | YES | YES | YES |
| Observations | 222,060 | 219,513 | 220,710 | 220,964 |

Note: Estimates at horizon h = 0, i.e. upon impact of the identified monetary policy shock $\epsilon_t^m$. Indicator variables for leverage (LEV), interest coverage ratio (ICR), and expected earnings (EPSE) are computed based on the tails of firms (20th and 80th percentiles). Shocks are calibrated to a 10 bsp increase in the US 10y yield. SEs are clustered along the time and industry dimension.

# Results: heterogeneous impact of **global risk** shock $\epsilon_t^r$

Table 9: Sensitivity of asset prices of tail firms upon impact of shocks

| | (1) Spread | (2) EBP | (3) Default risk | (4) ln(Equity Price) |
|---|---|---|---|---|
| $\epsilon_t^r$ | 18.628*** | 15.472*** | 0.056* | -0.069*** |
| | | | | |
| $\epsilon_t^r$ | 17.502*** | 15.406*** | 0.039** | -0.068*** |
| LowLEV $\times \epsilon_t^r$ | -4.942 | -5.107** | -0.006 | -0.003 |
| HighLEV $\times \epsilon_t^r$ | 10.456 | 5.000* | 0.099 | -0.002 |
| | | | | |
| $\epsilon_t^r$ | 15.858*** | 14.366*** | 0.027** | -0.065*** |
| LowICR $\times \epsilon_t^r$ | 18.773** | 9.504** | 0.176* | -0.022* |
| HighICR $\times \epsilon_t^r$ | -3.616** | -2.995* | -0.011** | 0.002 |
| | | | | |
| $\epsilon_t^r$ | 16.439*** | 14.232*** | 0.037** | -0.065*** |
| LowEPSE $\times \epsilon_t^r$ | 15.194*** | 8.416*** | 0.126** | -0.019*** |
| HighEPSE $\times \epsilon_t^r$ | -1.695 | -0.788 | -0.013 | -0.005 |
| Industry FE | YES | YES | YES | YES |
| Observations | 222,060 | 219,513 | 220,710 | 220,964 |

Note: Estimates at horizon h = 0, i.e. upon impact of the identified global risk shock $\epsilon_t^r$. Indicator variables for leverage (LEV), interest coverage ratio (ICR), and expected earnings (EPSE) are computed based on the tails of firms (20th and 80th percentiles). Shocks are calibrated to a 10 bps decrease in the US 10y yield. SEs are clustered along the time and industry dimension.

## Results: heterogeneous impact of **global risk** shock $\epsilon_t^r$

Table 11: Sensitivity of asset prices of tail firms upon impact of shocks

| | (1) Spread | (2) EBP | (3) Default risk | (4) ln(Equity Price) |
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# Key Findings

**Monetary policy and global risk shocks...**

- Global risk shocks have stronger and more heterogeneous effects on corporate funding costs which depend on firms' position within the earnings distribution

**... and the earnings-based borrowing constraint transmission channel**

- Responses of firms' financing conditions are more muted for higher levered firms ...
- ... but more pronounced for less profitable firms

## Investors price in **more risks** across the **earnings** distribution of firms

- No difference in corporate bond spreads between median and tail firm by *leverage* since GFC
- Declining relevance of leverage as an indicator of financial constraints

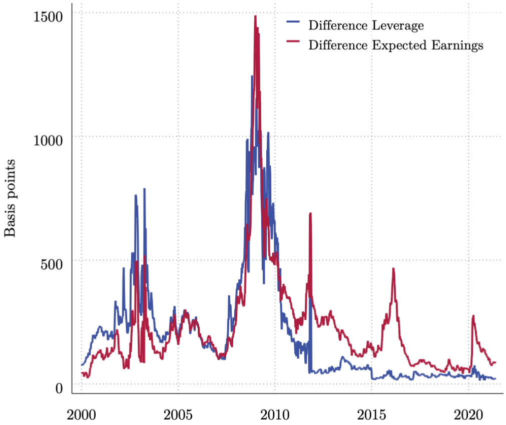


Figure 4: Difference in credit spreads between the tail of weakest firms and the median firm computed based on leverage and earnings

# Results: impact of shock remains fairly **persistent** in the **non-fundamental bond spread component**

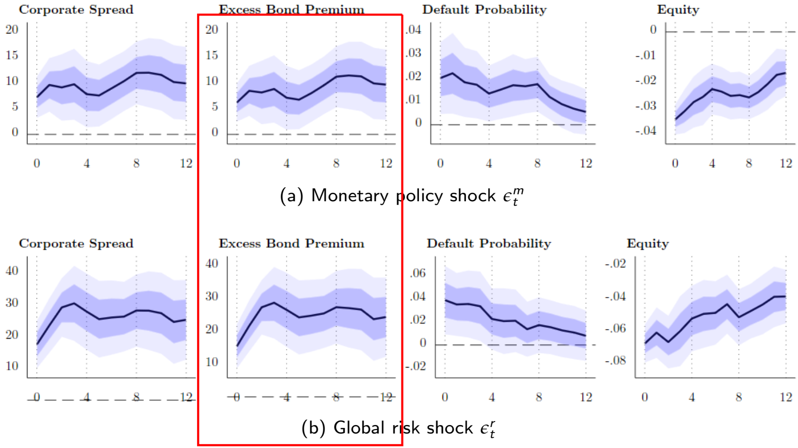


Figure 5: Cumulative responses to identified shocks equivalent to a 10 bps increase (decrease) in US 10y yield

IRFs by tail firms

## Robustness checks

**Robustness of shocks:**

- Additional robustness checks on sign restrictions in BVAR

**Robustness of firm-level results:**

- Sample period 2005-2021 to exclude earlier observations with fewer bonds outstanding
- Lagged dependent variables to account for autocorrelation in asset prices
- Week + week-industry FE $\rightarrow$ macro variables and time-varying industry-exposure
- Alternative measures of firm profitability ▸ Results earnings
- Alternative definition of tails of firms ($15^{th}, 85^{th}$ pct)
- Spread decomposition with log-spread, firm fundamentals as controls, only senior unsecured bonds
- Bond-level regressions

# Conclusion

**This paper:**

- Proposes an integrated framework to identify global risk and monetary policy shocks
- Explores to which extent global risk and monetary policy shocks affect corporate financing conditions heterogeneously depending on borrowing constraint

**Key Takeaway:**

⇒ Global risk shocks have stronger and more heterogeneous effects on corporate financing conditions which depend on firms' position within the earnings distribution: the earnings-based borrowing constraint transmission channel

**Policy implications:**

- Type of borrowing constraint essential for transmission of shocks
- Enhancing the understanding of the type of borrowing constraint prevalent in other countries than the US

Appendix

# Bond filters in Sample Selection

**Download filters:**

(i) Active and matured bonds issued between 1 January 2000 and 28 May 2021
(ii) denominated in USD
(iii) issued by non-financial firms included in the S&P 500 between 2000 and 2021

$\Rightarrow$ download 13,233 bonds $\Rightarrow$ cleaning 10,679 bonds

**Additional filters/trimming:**

(iv) 1 mil $\leq$ volume $\leq$ 5bn
(v) 1 year $\leq$ term-to-maturity $\leq$ 30 years
(vi) -500 $\leq$ OAS $\leq$ 4,500
(vii) Drop OAS if illiquid $>$ 26 weeks in a row
(viii) Drop bond if there exist $<$ 26 consecutive bond-week obs.

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# Bond spread trimming

| | No. of remaining bond-week obs. |
|---|---|
| No. OAS observations before trimming | 2,272,931 |
| (i) Drop volume $<$ 1mil and volume $>$ 5bn | 2,262,348 |
| (ii) Drop term-to-maturity $<$ 1 year and $>$ 30 years | 2,194,404 |
| (iii) Drop OAS $< -500$ and OAS $> 4,500$ | 2,186,060 |
| (iv) Drop OAS if illiquid $>$ 26 weeks in a row | 2,186,060 |
| (v) Drop bond if there exist $<$ 26 consecutive bond-week obs. | 2,185,478 |
| **No. OAS observations after trimming** | **2,185,478** |

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# **Heterogeneity** in corporate bond spreads across **bond rating categories**

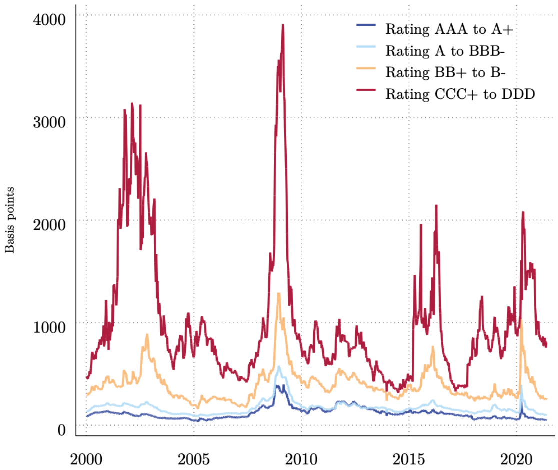


Figure 6: Average credit spread across bond ratings. Ratings are based on the Bloomberg composite bond rating. Go back

# BVAR **model validation**: Global risk shock correlated with VIX around major events

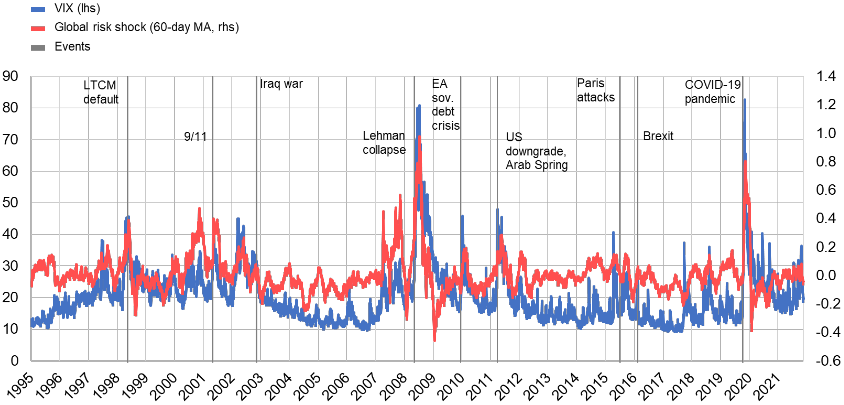


Figure 7: Comovement of global risk shock with the VIX and selected narrative events

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# BVAR **model validation**: Global risk shock correlated with other indicators

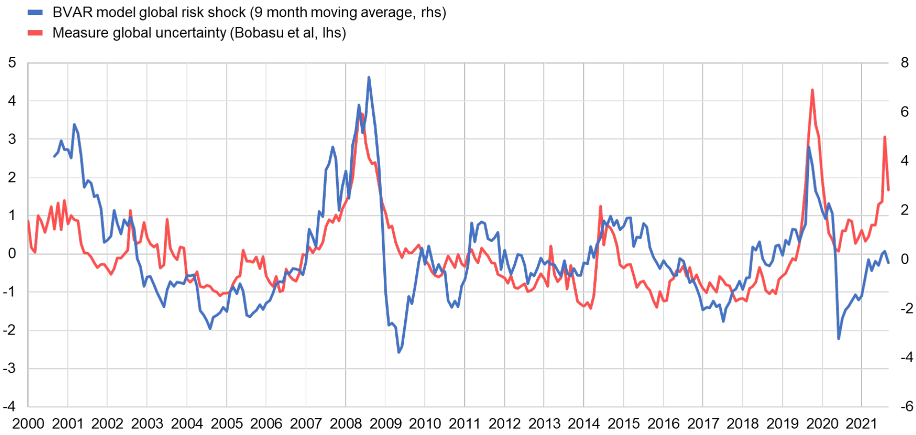


Figure 8: Comovement of global risk shock with global uncertainty measure by Bobasu et al. 2023

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# Excess bond premium estimation results

Table 13: Spread decomposition following Gilchrist & Zakrajsek (2012) with a level-dependent variable, $S_j[k]$, i.e the spread of bond $k$ of firm $j$.

| | (1) Est. | SE | (2) Est. | SE |
|---|---|---|---|---|
| $\text{EDF}_{j,t}$ | 59.396*** | 9.207 | 54.617*** | 17.333 |
| $\text{Duration}_{j,t}[k]$ | 3.316*** | 0.448 | 4.680*** | 0.681 |
| $\text{Coupon}_j[k]$ | 27.350*** | 2.312 | 20.905*** | 2.901 |
| $\text{Age}_{j,t}[k]$ | -1.986*** | 0.565 | -0.684 | 0.601 |
| $\text{Volume}_j[k]$ | -5.979 | 4.838 | -9.527 | 6.120 |
| $\text{CALL}_j[k]$ | 3.599 | 4.657 | -34.402** | 13.505 |
| $\text{EDF}_{j,t} \times \text{CALL}_j[k]$ | | | 7.258 | 16.264 |
| $\text{Duration}_{j,t}[k] \times \text{CALL}_j[k]$ | | | -2.257*** | 0.674 |
| $\text{Coupon}_j[k] \times \text{CALL}_j[k]$ | | | 12.778*** | 2.881 |
| $\text{Age}_{j,t}[k] \times \text{CALL}_j[k]$ | | | -4.463*** | 0.871 |
| $\text{Volume}_j[k] \times \text{CALL}_j[k]$ | | | 7.611 | 5.961 |
| Industry FE | YES | | YES | |
| Observations | 2,207,373 | | 2,207,373 | |
| Adjusted $R^2$ | 0.424 | | 0.430 | |

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# BVAR **robustness**: Shocks remain highly correlated across various tests

Table 15: Robustness BVAR: correlation between US MP and global risk shock of the benchmark BVAR model and shocks identified in alternative versions

| | US mon policy shock | global risk shock |
|---|---|---|
| Test 1: no rel. restriction on US NEER | 0.9993 | 0.9910 |
| Test 2: corp. spread not restricted after US macro | 0.9944 | 0.9865 |
| Test 3: US policy and global risk shock only | 0.9634 | 0.9671 |
| Test 4: 1 lag | 0.9972 | 0.9792 |
| Test 5: 2 lags | 0.9991 | 0.9817 |
| Test 6: 3 lags | 0.9988 | 0.9838 |
| Test 7: 5 lags | 0.9979 | 0.9834 |
| Test 8: 6 lags | 0.9973 | 0.9838 |

Notes: Test 1 does not impose the relative magnitude restriction that a global risk shock should have larger effects on the US nominal effective exchange rate than a foreign macro risk shock; test 2 leaves out the sign restriction on corporate bond spreads following a US macro risk shock; test 3 only identifies the US monetary policy and the global risk shock in the BVAR model (using the same restrictions for the two shocks as in Table 5), leaving the other shocks unidentified; test 4-8 test the structural shock correlations for different lag lengths of the endogenous variables in the BVAR. Go back

## How our estimation differs from Gilchrist & Zakrajsek (2012)

- **Firm sample:** We use S&P500 firms, GZ use a broader set of firms
- **Time period:** Our time period is 2000-2021, GZ 1973-2010 (in the initial paper);
- **Frequency:** GZ use month-end credit spreads and estimate at a monthly frequency. We use weekly frequency.
- **Updating:** unclear how often GZ rebalance their sample of bonds used to compute the EBP. We include bonds issued before 28 May 2021.
- **Measure of credit risk:** we use Moody's EDF, GZ own estimates of distance to default
- **Measure of spreads:** we use option adjusted spreads (OAS) in bps, GZ use log-spreads (and log explanatory variables) and construct themselves the so-called "GZ spread" - by constructing a synthetic risk-free security that mimics exactly the cash flows of the corresponding corporate debt instrument (following Gürkaynak, Sack and Wright, 2007)
- **Magnitude:** GZ spreads range from 5 bsp to 3500 bsp. Our spreads range from -500 bsp to 4500 bsp due to the nature of OAS spreads.

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# How our estimation differs from Gilchrist & Zakrajsek (2012)

**Differences in the regression model:**

- GZ uses bond characteristics and, additionally, interaction terms of callable bond dummy with bond characteristics; we use only bond characteristics as the option adjusted spreads correct for pricing effects of embedded options.
- GZ control for call options and liquidity premia by interacting regressors with a CALL dummy and with the slope/level/curvature of the yield curve. We account for this through our OAS spread measure
- GZ include firm-level ratings fixed effects (S&P rating). We use for some specifications bond-level ratings fixed effects (Bloomberg composite rating), although not in the baseline.
- GZ use industry fixed effects based on three-digit NAICs industry codes, which is very granular. We use industry fixed effects based on Bloomberg industry classifications which is much less granular.

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# Robustness: results remain robust to **different measures of earnings**

Table 17: Earnings-based tails of firms: estimated **monetary policy shock** impact on corporate spreads (1), their predicted and excess bond premium components (2-3), CDS spreads (4), equity prices (5), and default probabilities (6).

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | $\Delta$Spread | $\Delta\widehat{\text{Spread}}$ | $\Delta$EBP | $\Delta$CDS | $\Delta$ln(PI) | $\Delta$EDF |
| *Panel (a): Monetary policy shock* | | | | | | |
| $s_t^m$ | 7.007*** | 1.048* | 5.982*** | 2.790*** | 0.019** | -0.035*** |
| LowROE $\times$ $s_t^m$ | 2.026 | 3.227** | -0.988 | 2.531* | 0.057** | -0.004* |
| HighROE $\times$ $s_t^m$ | 0.351 | -0.037 | 0.367 | -0.427 | 0.000 | 0.002* |
| $s_t^m$ | 6.838*** | 0.782** | 6.018*** | 2.770*** | 0.014** | -0.034*** |
| LowPE $\times$ $s_t^m$ | 4.269* | 4.455** | 0.018 | 2.281 | 0.076** | -0.009** |
| HighPE $\times$ $s_t^m$ | 0.680 | 1.348 | -0.549 | 0.662 | 0.022 | -0.002* |
| $s_t^m$ | 7.051*** | 1.097* | 6.036*** | 2.767*** | 0.020* | -0.034*** |
| LowEPSEgrowth $\times$ $s_t^m$ | 3.275 | 3.080** | -0.084 | 3.196* | 0.052*** | -0.007* |
| HighEPSEgrowth $\times$ $s_t^m$ | 1.229 | 2.412* | -1.385 | 1.075 | 0.044* | -0.008*** |
| $s_t^m$ | 6.900*** | 1.271* | 5.695*** | 2.852*** | 0.024* | -0.034*** |
| LowEPSTgrowth $\times$ $s_t^m$ | 5.016* | 1.915** | 2.947 | 1.972* | 0.032** | -0.005* |
| HighEPSTgrowth $\times$ $s_t^m$ | 0.357 | 1.086* | -0.818 | 0.886 | 0.016* | -0.006*** |

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# Robustness: results remain robust to **different measures of earnings**

Table 19: Earnings-based tails of firms: estimated **global risk shock** impact on corporate spreads (1), their predicted and excess bond premium components (2-3), CDS spreads (4), equity prices (5), and default probabilities (6).

| | (1) $\Delta$Spread | (2) $\Delta\widehat{\text{Spread}}$ | (3) $\Delta$EBP | (4) $\Delta$CDS | (5) $\Delta\ln(\text{PI})$ | (6) $\Delta$EDF |
|---|---|---|---|---|---|---|
| *Panel (b): Global risk shock* | | | | | | |
| $s_t^r$ | 16.414*** | 1.979* | 14.521*** | 5.686*** | 0.035* | -0.068*** |
| LowROE $\times$ $s_t^r$ | 15.342*** | 7.769*** | 8.024** | 7.423** | 0.135*** | -0.015*** |
| HighROE $\times$ $s_t^r$ | -1.553 | -0.028 | -1.568 | -1.543* | 0.003 | 0.010* |
| $s_t^r$ | 14.898*** | 1.294** | 13.516*** | 5.329*** | 0.023** | -0.064*** |
| LowPE $\times$ $s_t^r$ | 25.218** | 11.454*** | 14.385** | 8.297** | 0.194*** | -0.036*** |
| HighPE $\times$ $s_t^r$ | 5.048** | 2.856 | 2.364 | 2.143 | 0.048 | -0.006 |
| $s_t^r$ | 16.652*** | 2.134* | 14.653*** | 5.605*** | 0.038* | -0.065*** |
| LowEPSEgrowth $\times$ $s_t^m$ | 18.337*** | 7.637*** | 10.039** | 8.501*** | 0.128*** | -0.025*** |
| HighEPSEgrowth $\times$ $s_t^m$ | 6.455 | 5.267* | 0.889 | 3.607 | 0.093* | -0.020** |
| $s_t^r$ | 15.756*** | 2.447* | 13.431*** | 5.810*** | 0.044* | -0.065*** |
| LowEPSTgrowth $\times$ $s_t^m$ | 21.520*** | 5.583*** | 15.593** | 6.133*** | 0.093*** | -0.028*** |
| HighEPSTgrowth $\times$ $s_t^m$ | 9.726* | 2.656 | 6.816* | 2.673 | 0.041 | -0.018*** |

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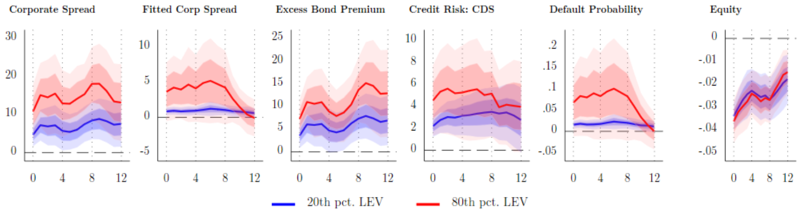
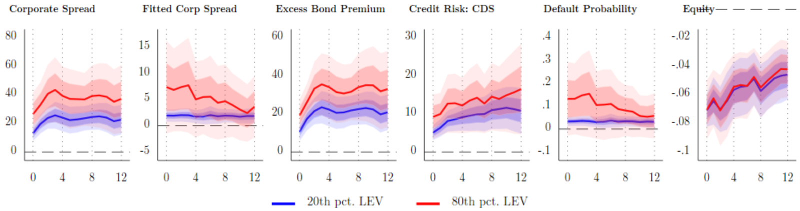
# Results: shock responses across high/low **leverage** firms




(a) Monetary policy shock $\epsilon_t^m$

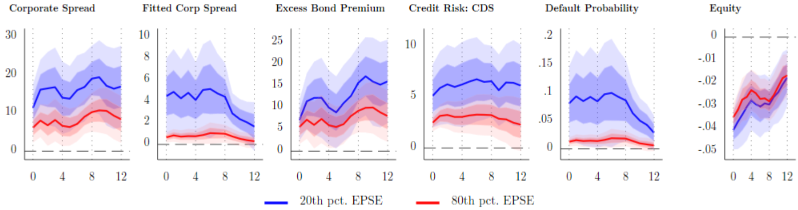



(b) Global risk shock $\epsilon_t^r$

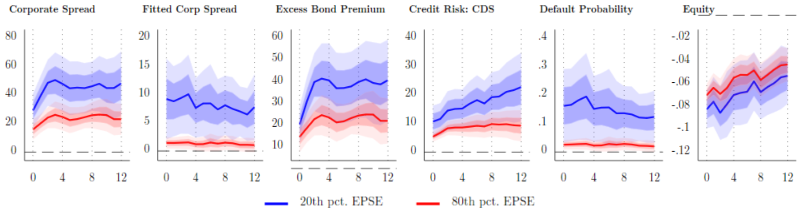
Figure 9: Cumulative responses for weak/strong firms by leverage (**LEV**)

◂ Go back

# Results: shock responses across high/low **earnings** firms




(a) Monetary policy shock $\epsilon_t^m$




(b) Global risk shock $\epsilon_t^r$

Figure 10: Cumulative responses for weak/strong firms by earnings (**EPSE**)

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