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Decomposing the Investment Channel of Monetary Policy

EUROPEAN CENTRAL BANK

EUROSYSTEM

Decomposing the Investment Channel of Monetary Policy

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THIS PAPER AT A GLANCE

MOTIVATION

- **This paper**: How does monetary policy affect firm investment?
- Identification Challenge arises from **'Information Effect'**
  - MP shocks simultaneously affect borrowing costs and beliefs about future fundamentals
  - If FED cuts rates, borrowing gets cheaper (↑ Inv.), but economic outlook declines (↓ Inv.)
  - [Romer and Romer (2000); Campbell et al. (2012); Nakamura and Steinsson (2018)]
- Proposed fixes for high-frequency monetary policy shocks:
  - [Jarociński and Karadi (2020); Miranda-Agrippino and Ricco (2021); Bauer and Swanson (2023)]
  - Existing corrections require additional and potentially restrictive assumptions (no silver bullets)
- **Identification Strategy**: Use heterogeneous exposure of European firms to the ECB's Corporate Sector Purchasing Program to estimate structural investment elasticities.

MAIN FINDINGS

- **CSPP exposure generates quasi-experimental borrowing-cost variation**
  - ECB's CSPP lowered yields on eligible corporate bonds relative to ineligible bonds
  - Firms differed in pre-CSPP exposure due to sticky debt portfolios
  - ⇒ Cross-sectional variation isolates a **pure cost-of-debt shock**
- **Investment reacts more strongly to pure borrowing-cost shocks**
  - Main 2SLS estimates imply sizable investment elasticity to cost of debt
  - Aggregate MP-shock estimates are about **one third smaller** than the borrowing-cost channel
- **Three Implications**
  1. Aggregate investment channel of monetary policy is offset by sizable information effect.
  2. Conventional estimates understate the investment channel of MP absent CB information
  3. Calibration of macro models using the aggregate investment response can be misspecified.

A SIMPLE MODL OF FIRM INVESTMENT WITH INFORMATION EFFECTS

Environment

- Two periods $t = 1,2$ (short-run, long-run). Economy's state $\theta \in \{G,B\}$ in Period 2 is stochastic.
- In Period 1, a firm invests in projects k with state-dependent returns $R_k(G) > R_k(B)$
- Firm faces user cost of capital $(i+r)$ with idiosyncratic component r.

Information Channel

- CB receives a private noisy signal $s \in \{H,L\}$ that the economy does well in the long run.
- Central bank announces a MP surprise from i_{old} to $i \rightarrow$ perfect signal for $s \in \{H,L\}$
- Firms update beliefs on economy's future state from p to $p_s = P(\theta = G \mid s)$

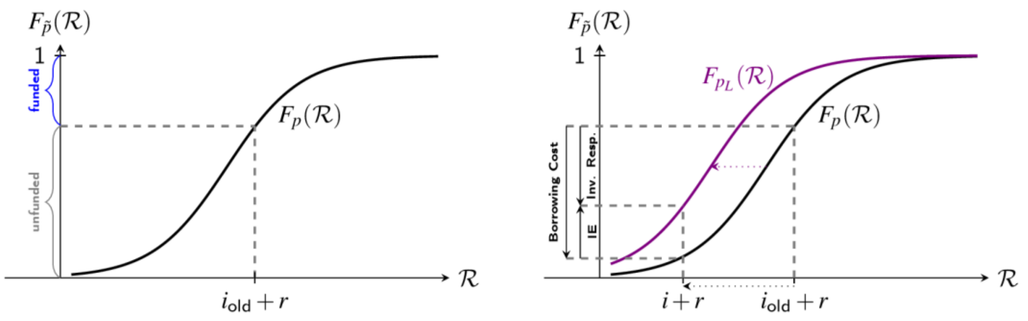
Investment Decision

- Conditional on belief $\tilde{p} \in \{p_L, p, p_H\}$, project k has expected gross returns of:

$$\mathcal{R}_k(\tilde{p}) := \tilde{p}R_k(G) + (1-\tilde{p})R_k(B)$$

- $F_{\tilde{p}}(\mathcal{R})$ denotes the CDF for expected gross returns → Share of funded projects is $1 - F_{\tilde{p}}(i+r)$.

Decomposing the Investment Response



Proposition

If the central bank cuts rates from i_{old} to i, signaling $s = L$, the firm's investment response is

$$\Delta_{i_{old} \rightarrow i}\, \mathcal{I} = \underbrace{F_p(r+i_{old}) - F_p(r+i)}_{\text{Borrowing Cost Channel}} - \underbrace{[F_{p_L}(r+i) - F_p(r+i)]}_{\text{Information Effect}}$$

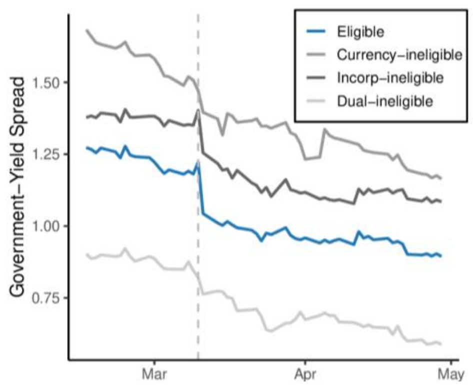
EMPIRICAL SETUP

Institutional Background

- The **Corporate Sector Purchase Program**

"[...] we decided to include investment-grade euro-denominated bonds issued by non-bank corporations established in the euro area in the list of assets that are eligible for regular purchases [...]"

— ECB Monetary policy decisions, 10 March 2016, 14:30 CET



- We conduct a **before-after comparison**

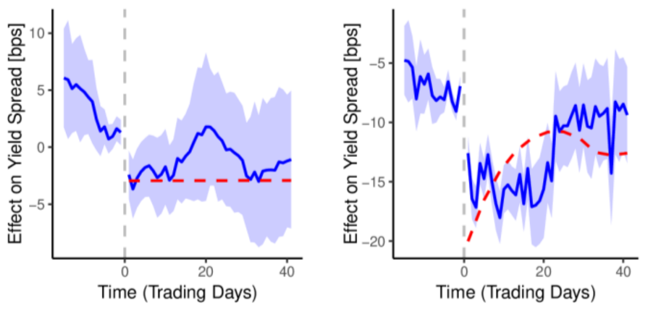
$$y_{it} = \alpha_i + \lambda_t + \gamma_{treat \times post} \times Treat_i \times Post_t + \varepsilon_{it}$$

Dep. Variable	Yields				Yield Spreads			
Control Group	ALL	INCO	CURR	DUAL	ALL	INCO	CURR	DUAL
Post × Treat	-8.6*	7.5	-2.8	-17.5***	-4.8	6.2	5.0	-13.1***
	(4.2)	(15.2)	(4.8)	(2.0)	(4.1)	(15.1)	(4.7)	(1.9)
# Observations	221k	137k	133k	173k	221k	137k	133k	173k
Bond & Time FEs	YES	YES	YES	YES	YES	YES	YES	YES
F-Statistic	67.9	12.6	26.9	2974.2	21.3	8.7	86.0	1698.9

- **Finding 1**: Conducting a before-after comparison on 1,956 European bonds akin to Todorov (2020), we find that the CSPP reduced yield spreads by 13.1 bps.
- Empirically, for each time window h, we estimate the event study regression:

$$\Delta_h y_{i,t_{CSPP}} = \alpha_h + \gamma_h \times D_i + \varepsilon_i$$

- Under a model of segmented corporate bond markets (akin to Greenwood et al. (2018)) we calibrate market segmentation to match the empirical spreads γ_h.

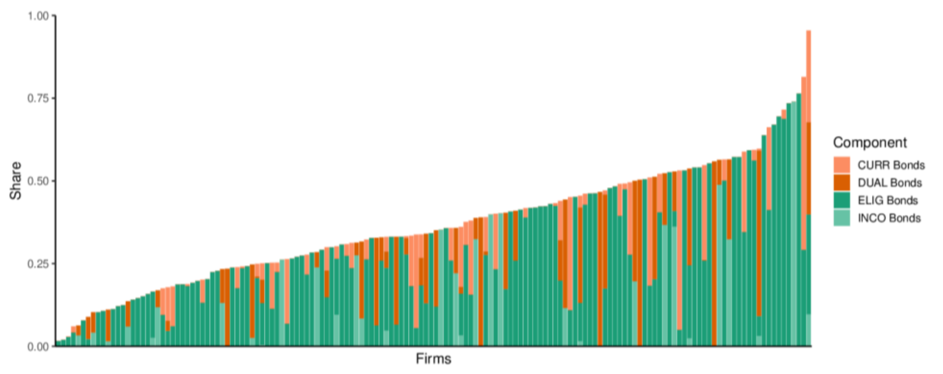


(c) INCO: 100% Generalists (d) DUAL: 40% Generalists

- **Finding 2**: The difference is driven by imperfect arbitrage. We can match heterogeneous effects in a model of market segmentation a la Greenwood et al. (2018)

Firm Exposure

- The scope of our analysis is 183 large European non-financial firms that issue investment-grade corporate bonds. We calculate the pre-CSPP (2015 Q4) reliance on eligible bonds: s_f

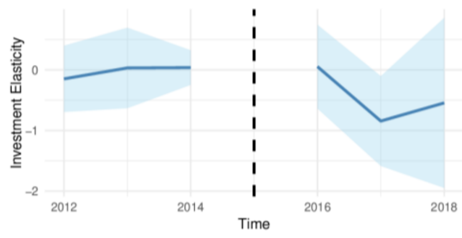


EMPIRICAL RESULTS

Shift-Share Instrument

- We use firm exposure s_f from 2015 as an instrument for the change in firms' interest-to-debt-ratio
- Notation: $\Delta_h X_f \equiv \log(X_{f,2015+h}) - \log(X_{f,2015})$

$$\Delta_h r_f = \alpha s_f + \gamma X_{f0} + \varepsilon_f$$
$$\Delta_h Y_f = \delta \Delta_h \hat{r}_f + \tilde{\gamma} X_{f0} + \tilde{\varepsilon}_f$$



- For the same 183 firms, we study investment elasticities from MP shocks (Altavilla et al., 2019) between 2005 and 2019.
- MP_t reflects aggregated high-frequency changes around ECB monetary policy decisions in the 3-month OIS rate.

$$\Delta r_{f,t} = \alpha MP_t + \gamma X_{f,t} + \varepsilon_{f,t}$$
$$\Delta Y_{f,t} = \delta \Delta \hat{r}_{f,t} + \tilde{\gamma} X_{f,t} + \tilde{\varepsilon}_{f,t}$$

	Borrowing Cost Shock		Joint MP Shock	
	2SLS	Fuller	2SLS	Fuller
Total Asset Growth	0.98**	0.83**	0.30**	0.27**
	(0.47)	(0.38)	(0.14)	(0.12)
First stage F	5.05		6.94	
Obs	138		998	

- Annualized investment elasticities are:
  - Elasticity of 0.414 when isolating the borrowing cost channel (semi-elasticity = 19%).
  - Elasticity of 0.27 for a joint MP shock comprising of the information effect (semi-elasticity = 11.7%).

⇒ **Finding: Aggregate MP-Shock estimates are 33% smaller than the isolated borrowing cost channel.**

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