Global Corporate Bond Markets and Local Monetary Policy Transmission

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EEA-ESEM 2022

August 22, 2022

Rising Corporate Bond Market in the Euro Area

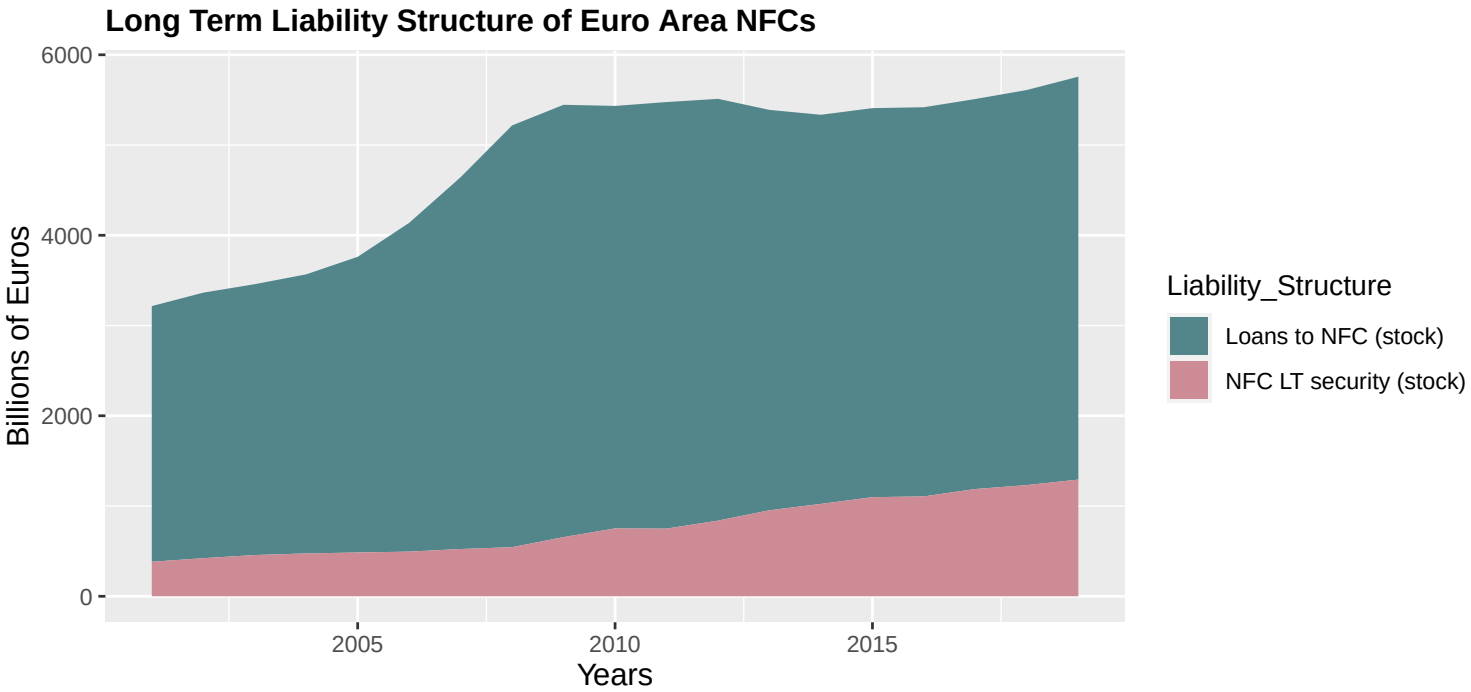

Figure 1: Long-Term Liability Structure of Euro Area NFCs. *Source:* ECB.

Rising Corporate Bond Market in the Euro Area

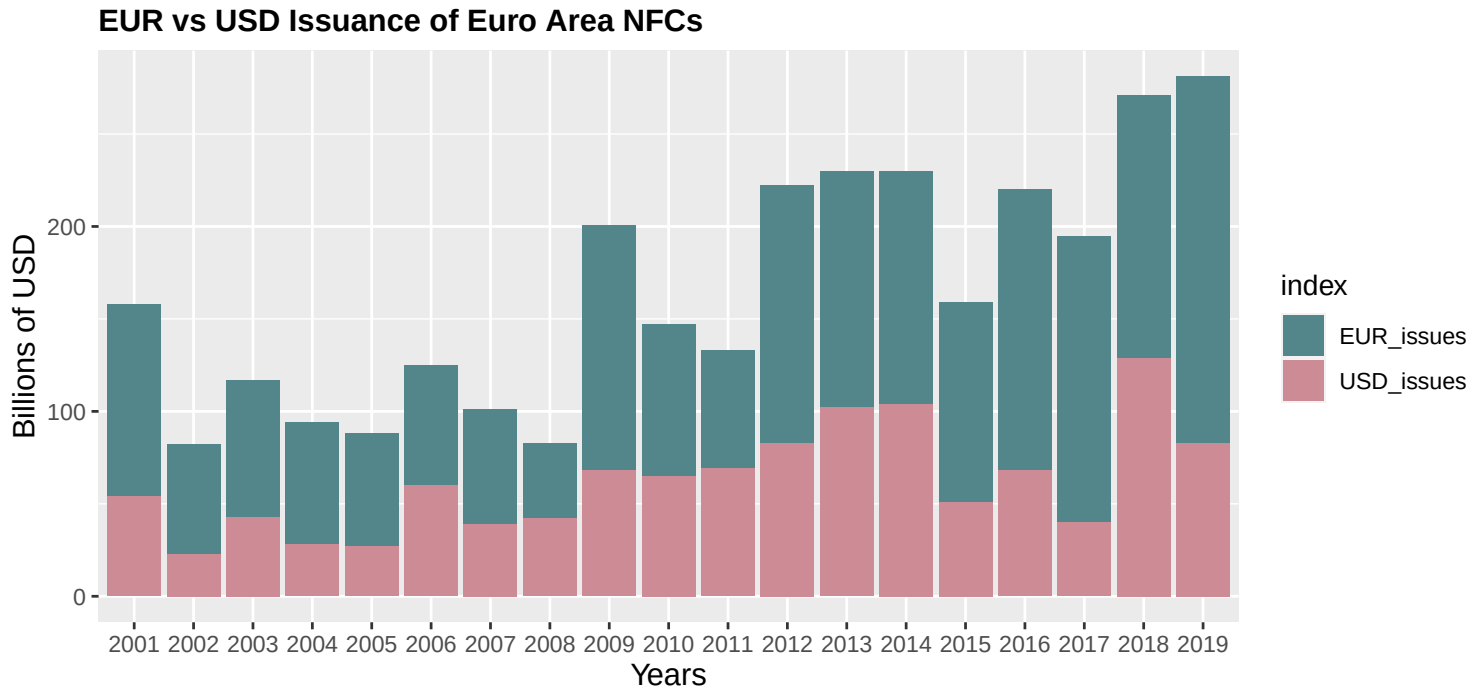

Figure 2: EUR vs USD Issuance of Euro Area NFCs. *Source:* Refinitiv Eikon.

Motivation and the Research Questions

Motivation

- Implications of global funding opportunities for firms' financing decisions and for the transmission of monetary policy.
- The leakage effect?

Two main questions

- Do firms borrow opportunistically in global corporate bond markets?
- Do opportunistically borrowing firms differ in terms of their investment response to monetary tightening?

The Leakage Mechanism

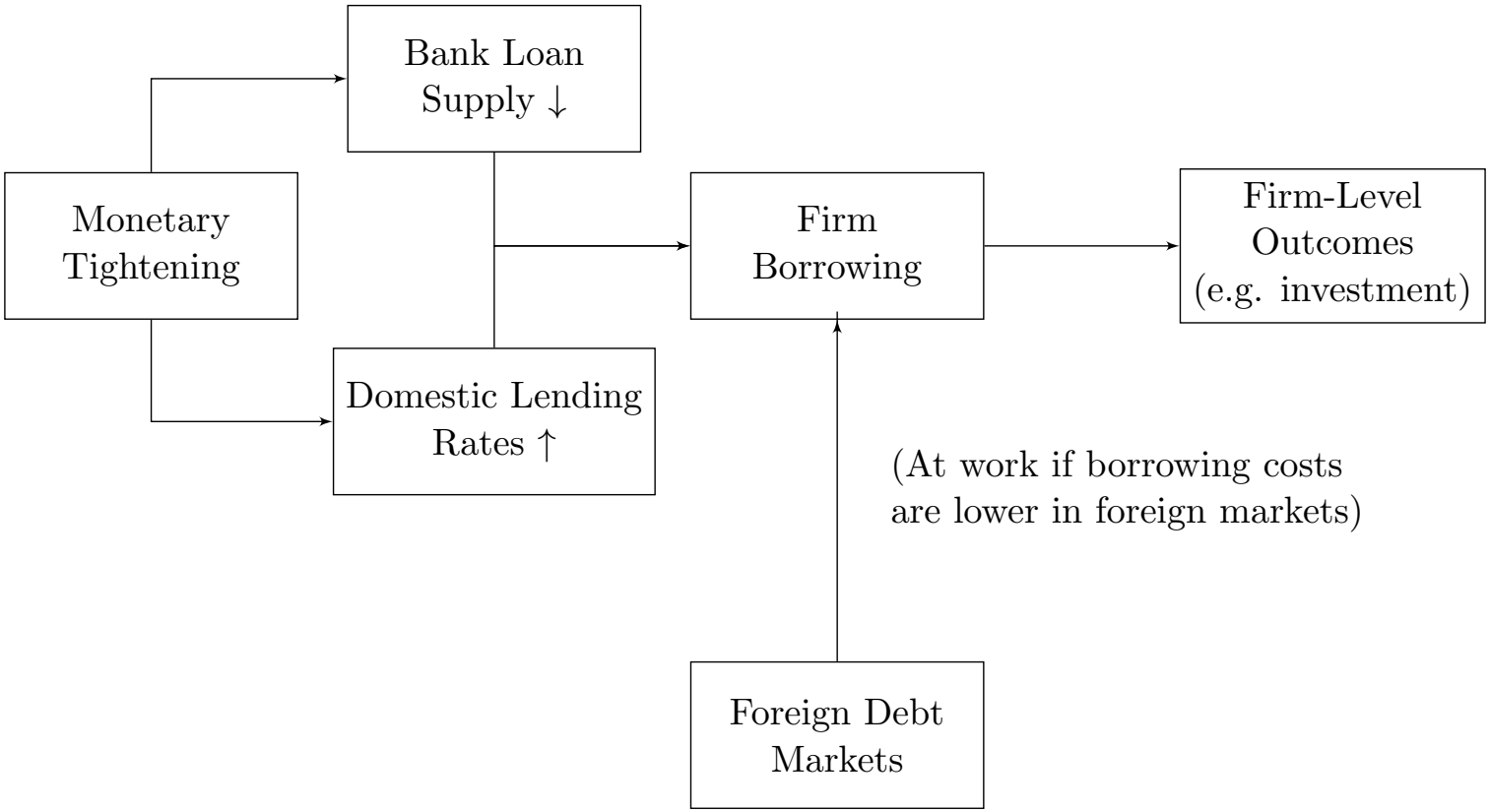

Figure 3: The Exposition of How Global Corporate Bond Markets Can Impair Monetary Policy Transmission

Main Findings

- Borrowing cost differential between USD and EUR is a major driver of Euro Area NFCs' USD issuance decisions.
- Firms that have the means to borrow opportunistically in global markets reduce their fixed capital investment less compared to other firms in response to monetary tightening.

Related Literature

Related Literature I – Bond vs Loan Debate and Monetary Policy

- A large corporate finance literature: bond vs loan debate (substitute vs imperfect substitutes). Comparing borrowing costs: Schwert (2020).
- Implications of bond-loan mix on monetary policy transmission: Crouzet (2017, 2021), Bolton and Freixas (2006), IMF (2016), Darmouni et al (2019).
- Closed economy models: absolutely nothing on international finance dimension. Switching markets could change imperfect substitution.
- Cortina et al. (2021) show firms switch internationally across markets in times of crises.

Related Literature

Related Literature II – Determinants of Offshore Issuance and Opportunistic Borrowing

- Munro and Wooldridge (2009), Black and Munro (2010), Allayannis et al. (2003):
  Market incompleteness, borrowing cost differentials, desire to hedge foreign currency cash flows, funding diversification, signalling etc.
- Opportunistic foreign currency borrowing (an extension of static trade-off theory): Graham and Harvey (2001), McBrady and Schill (2007), McBrady et al (2010), Liao (2020), Gambacorta et al (2020). In a different context: Bruno and Shin (2017).
- Not an established relation to monetary policy and associated firm-level effects.

Related Literature III – Impairment of Local Monetary Policy Transmission

- Various leakage effects
  - Open economy setting
    - Fendoglu et al. (2019): External funding opportunities decrease the pass through of domestic policy rate to loan rates.
    - Ongena et al. (2021): Foreign currency lending of banks is less affected by domestic monetary policy compared to their domestic currency lending.
    - Barajas et al. (2018): Remittances inflows reduce monetary policy effectiveness.
  - Closed economy setting
    - Acharya et al. (2020): High risk banks' balance sheets are adversely affected by monetary easing.
    - Elliott et al. (2019): Nonbanks reduce the effectiveness of tighter monetary policy.

Related Literature

Related Literature IV – Heterogeneous firm responses to monetary policy and the role of financial frictions

- **Fixed capital investment:** Jeenas (2019a), Jeenas (2019b), Cloyne et al. (2019), Ottonello and Winberry (2020), Crouzet (2021), Ippolito et al. (2018), Chava and Roberts (2008), Durante et al. (2020).
- **Inventory investment:** Ippolito et al. (2018), Kashyap et al. (1994), Gertler and Gilchrist (1994).
- **Stock price reaction:** Darmouni et al. (2019), Ippolito et al. (2018), Ehrmann and Fratzscher (2004), Gorodnichenko and Weber (2016), Gurkaynak et al. (2019), Ozdagli (2017), Ozdagli and Velihov (2020).

Contribution

- The first study analyzing the implications of global funding opportunities of firms for monetary policy transmission.
- Nothing done so far considering the international aspect of the interaction of loan-bond mix and monetary policy.
- A new impairment channel for monetary policy transmission (Fendoglu et al. (2019), Ongena et al. (2021), Barajas et al. (2018)).
- A novel form of firm-level heterogeneity: access to global bond markets.

Calculation of Corporate Basis I

$$CB_t = (rb_t^{€} - rb_t^{\$}) + (f_t - s_t)$$

$rb_t^{€}$ = Risky Bond Yield in Euro

$rb_t^{\$}$ = Risky Bond Yield in Dollar

$f_t - s_t$ = Forward Premium

- Corporate basis measures how much a Euro area firm can expect to gain by issuing in \$ instead of € and swapping \$ into € i.e. cost saving resulting from synthetic local currency borrowing.
- Add and subtract risk-free yields ($rf_t^{€}$ and $rf_t^{\$}$) to CB_t:

$$CB_t = [(rb_t^{€} - rf_t^{€}) - (rb_t^{\$} - rf_t^{\$})] + [(rf_t^{€} - rf_t^{\$}) + (f_t - s_t)]$$

Calculation of Corporate Basis II

- Calculation of CSD based on Liao (2020). Bond pricing model:

$$S_i = \alpha + \beta^{€} D_i^{€} + \sum_{k \in \{r,m,a,ai\}} \sum_{j=2}^{3} \beta_{ji}^{k} D_{ji}^{k} + \sum_{j=2}^{F} \beta_{ji}^{f} D_{ji}^{f} + \varepsilon_i$$

$$CSD_{€\$t} = \hat{\beta^{€}}$$

$$CB_{€\$t} = CSD_{€\$t} + CIPdev_{€\$t}$$

- Merging bond characteristics (source: Refinitiv Eikon) with secondary market pricing data (source: Datastream) via ISINs.
- Spread is calculated by subtracting the maturity-matched USD or EUR swap rate from bond i's yield.
- CIP deviations measured as the 5-year cross currency basis swap based on USD LIBOR and EURIBOR.

Corporate Basis

Calculation of Corporate Basis III

- **Homogeneity related filters:** floating rate coupon, convertible, asset-based (covered), perpetual, callable bonds are excluded.
- **Liquidity related filters:** bonds with face value less than \$ 10m. notional, bonds with remaining maturity < 1 year are excluded.
- **Other filters:** bonds whose issuer's ultimate parent domicile is other than the Euro area, bonds with principal currency other than \$ and €, bonds issued before 01.01.2001, bonds with maturity at issuance < 1 year, bonds without ISIN.
- Winsorized bond yields at %5 level to remove bonds with outlier prices.

Calculation of Corporate Basis IV

- 61802 bonds issued by 3512 firms = 52713 € + 9089 $.
- Final filter: bonds whose issuer has no other bond outstanding in the other currency are excluded.
- Then merge bond characteristics with bond spreads: 15722 bonds = 12957 € + 2815 $.
- 2825 observations of yield spread on average (over quarters).

Corporate Basis

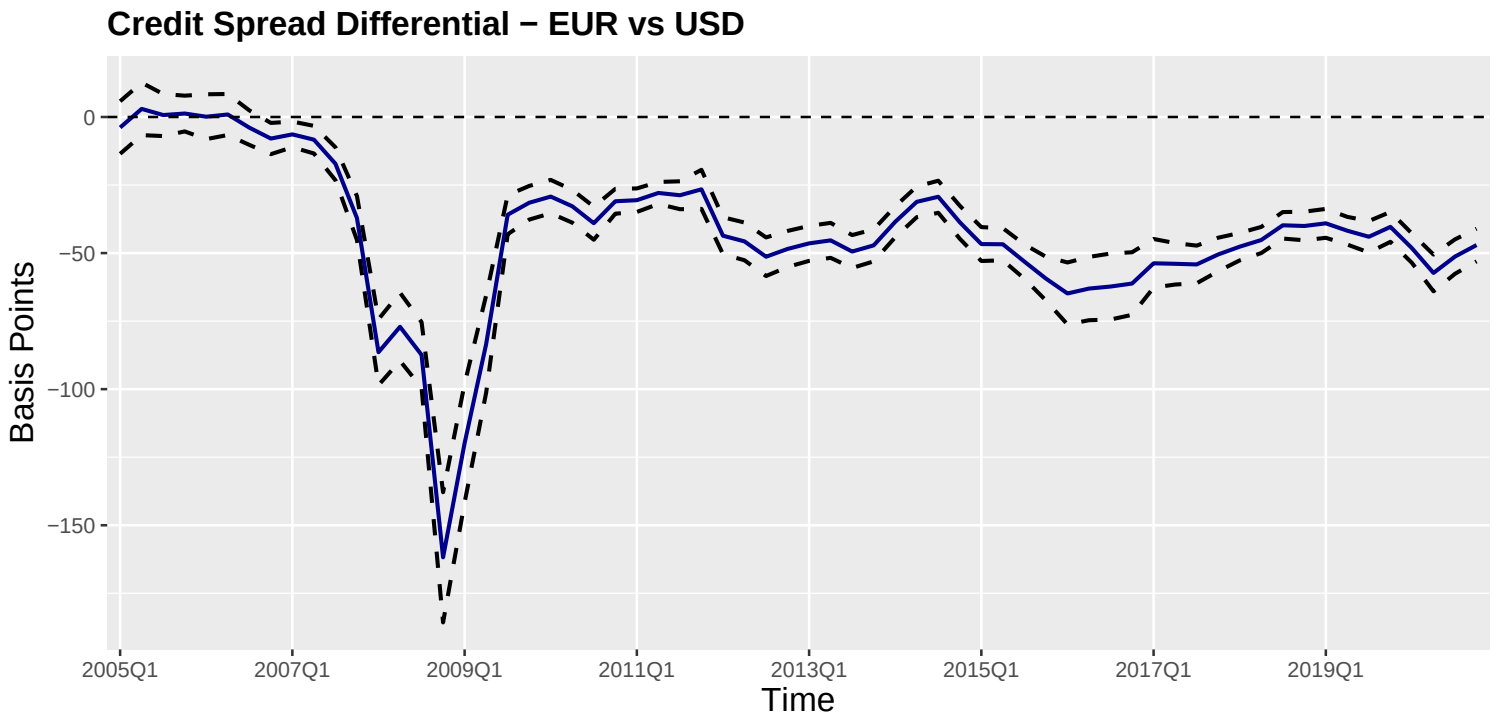

Figure 4: Credit Spread Differential - EUR vs USD. *Source:* Author's calculations, Refinitiv Eikon and Datastream.

Corporate Basis

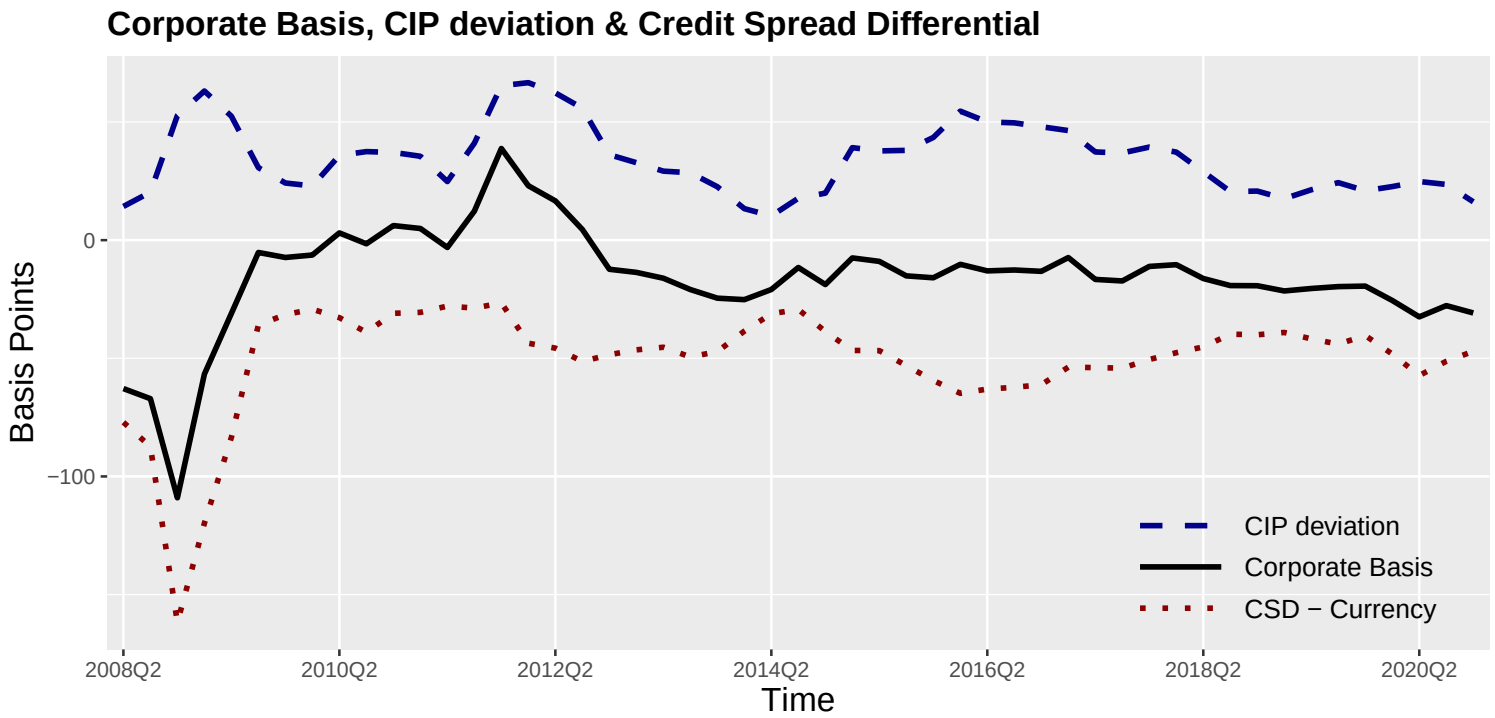

Figure 5: Corporate Basis, CIP Deviations & Credit Spread Differential
Source: Author's calculations, Refinitiv Eikon and Datastream.

The Choice of Foreign Currency Issuance

Data

- Applied filters to the newly originated bond data: issue date later than $2008Q1$; primary currency: € or \$; issuer type: only corporate sector (public enterprises, banks and other financial firms are excluded); maturity $>$ 1 year; ultimate parent domicile: Euro Area countries; bonds without ISIN, currency, issuer, issue date or maturity info removed.
- 5375 bonds by 1199 firms $=$ 4302 € $+$ 1073 \$.
- Bonds are consolidated at the ultimate parent level.

Methodology

- Probit and Tobit models with following dependent variables:

$$USD_{it}^{1} = \begin{cases} 1, & \text{if } USDiss_{it} > 0 \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

$$USD_{it}^{2} = \begin{cases} 1, & \text{if } USDiss_{it} > 0 \\ 0, & \text{if } USDiss_{it} = 0 \ \& \ EURiss_{it} > 0 \\ NA, & \text{if } USDiss_{it} = 0 \ \& \ EURiss_{it} = 0 \end{cases} \tag{2}$$

$$USD_{it}^{3} = \begin{cases} \frac{USDiss_{it}}{USDiss_{it}+EURiss_{it}}, & \text{if } USDiss_{it} + EURiss_{it} > 0 \\ 0, & \text{otherwise} \end{cases} \tag{3}$$

$$USD_{it}^{4} = \begin{cases} \frac{USDiss_{it}}{USDiss_{it}+EURiss_{it}}, & \text{if } USDiss_{it} + EURiss_{it} > 0 \\ NA, & \text{otherwise} \end{cases} \tag{4}$$

The Choice of Foreign Currency Issuance

- Firm-level controls (source: Refinitiv Eikon):
  - Size: log of total assets
  - Leverage: total debt/total assets
  - Balance sheet liquidity: cash + short-term inv. over total assets
  - Sales growth: quarterly change in net sales
  - Cash flow over total assets
  - Short term debt over total assets
- Corporate basis
- Quarter FE & Country FE & Industry (2-digit level) FE
- Lagged one quarter & Standardized & Winsorized

The Choice of Foreign Currency Issuance

Table 1: Regression Results of Firms' Currency Choice Model

	1	2	3	4	5	6	7	8	9	10
Size	0.684***	0.492***	8.073***	2.383***	0.693***	0.533***	8.228***	2.592***	0.816***	0.599***
	(0.057)	(0.092)	(1.550)	(0.597)	(0.060)	(0.096)	(1.682)	(0.668)	(0.086)	(0.081)
Leverage	0.075*	0.069	0.932*	0.199	0.066	0.012	0.843	0.208	0.050	0.130**
	(0.040)	(0.073)	(0.491)	(0.350)	(0.043)	(0.076)	(0.535)	(0.381)	(0.061)	(0.055)
Bal. Sheet Liq.	0.016	0.160*	0.203	0.631	0.037	0.163*	0.456	1.007**	0.067	−0.066
	(0.047)	(0.089)	(0.564)	(0.431)	(0.051)	(0.092)	(0.613)	(0.485)	(0.066)	(0.075)
Corporate Basis	0.132***	0.203***	1.579***	1.142***	0.132***	0.218***	1.591**	1.122**	0.144**	−0.001
	(0.043)	(0.078)	(0.577)	(0.437)	(0.045)	(0.084)	(0.620)	(0.467)	(0.057)	(0.049)
Sales Growth	−0.022	−0.121	−0.297	−0.829*	−0.010	−0.107	−0.162	−0.736	−0.023	−0.013
	(0.048)	(0.099)	(0.594)	(0.494)	(0.050)	(0.101)	(0.632)	(0.536)	(0.077)	(0.065)
Cash Flow	−0.143***	−0.081	−1.751***	−1.119***	−0.075	−0.114	−0.922	−0.534	−0.116*	−0.179***
	(0.041)	(0.077)	(0.566)	(0.402)	(0.051)	(0.086)	(0.637)	(0.452)	(0.064)	(0.055)
ST Debt	0.053	0.035	0.622	−0.019	0.043	0.008	0.508	0.117	0.043	0.042
	(0.044)	(0.080)	(0.541)	(0.421)	(0.052)	(0.099)	(0.638)	(0.510)	(0.067)	(0.062)
Intercept	−2.945***	−2.378***	−35.15***	−10.48***	−2.889***	−2.103***	−35.49***	−10.55***	−3.192***	−2.824***
	(0.196)	(0.289)	(6.542)	(2.212)	(0.205)	(0.314)	(7.04)	(2.46)	(0.301)	(0.268)
Mean (Y)	0.021	0.231	0.019	0.214	0.020	0.234	0.019	0.216	0.024	0.018
Marginal Effect of										
Corporate Basis	0.005***	0.037***	0.005***	0.039***	0.005***	0.041***	0.005***	0.038***	0.006**	−0.000
	(0.002)	(0.014)	(0.002)	(0.014)	(0.002)	(0.016)	(0.002)	(0.014)	(0.002)	(0.002)
Observations	10782	963	10782	963	9850	845	9850	845	5298	5484
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quarter FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Note:	*p<0.1; **p<0.05; ***p<0.01									

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

High Frequency Identification of Monetary Policy Surprises

- High frequency identification following Bernanke and Kuttner (2005), Gürkaynak et al. (2005).
- Euro Area Monetary Policy Event Study Database (Altavilla et al. 2019): Intraday changes in OIS rates of different maturities.
- Purging MP surprises from the information effect: poor man's sign restrictions á la Jarociński and Karadi (2020).

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

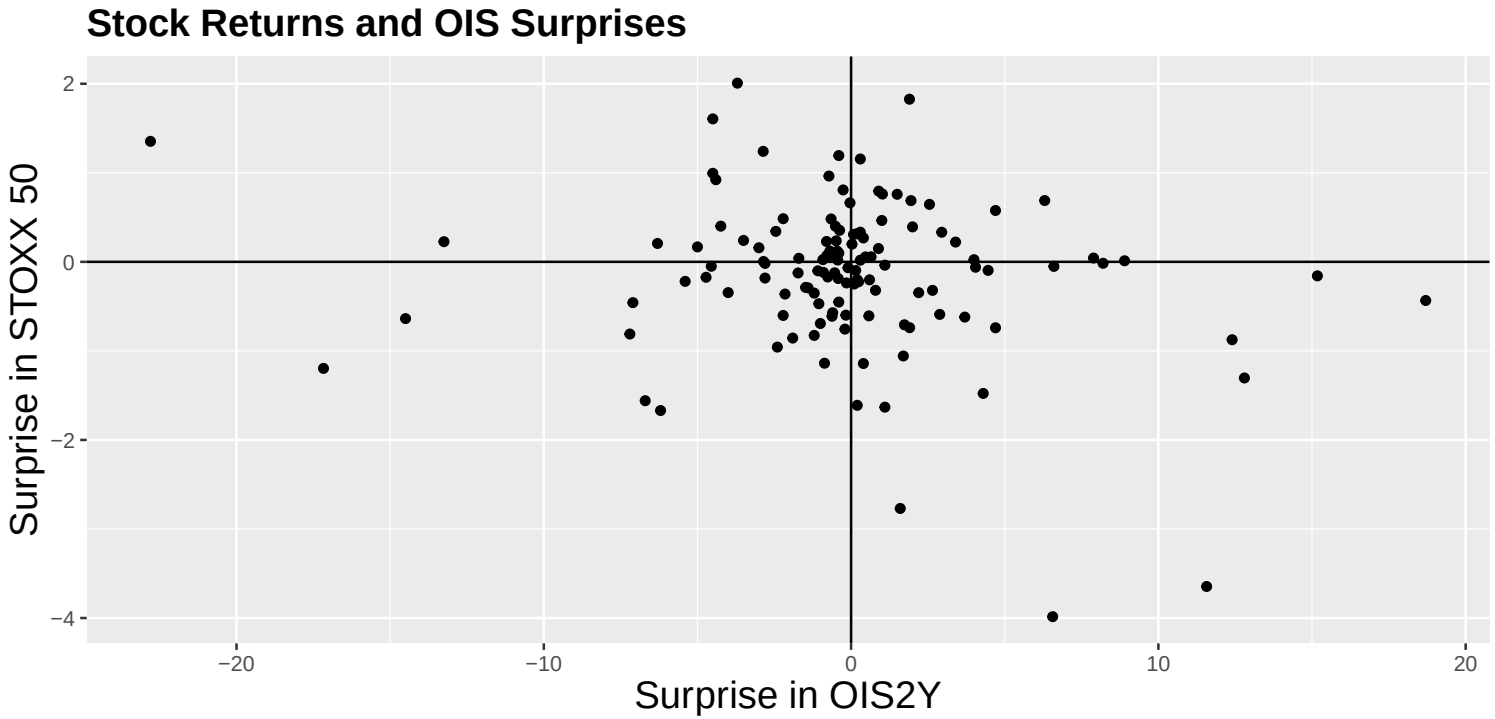

Figure 6: Surprises in STOXX50 and OIS2Y. *Source:* Euro Area Monetary Policy Event Study Database.

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

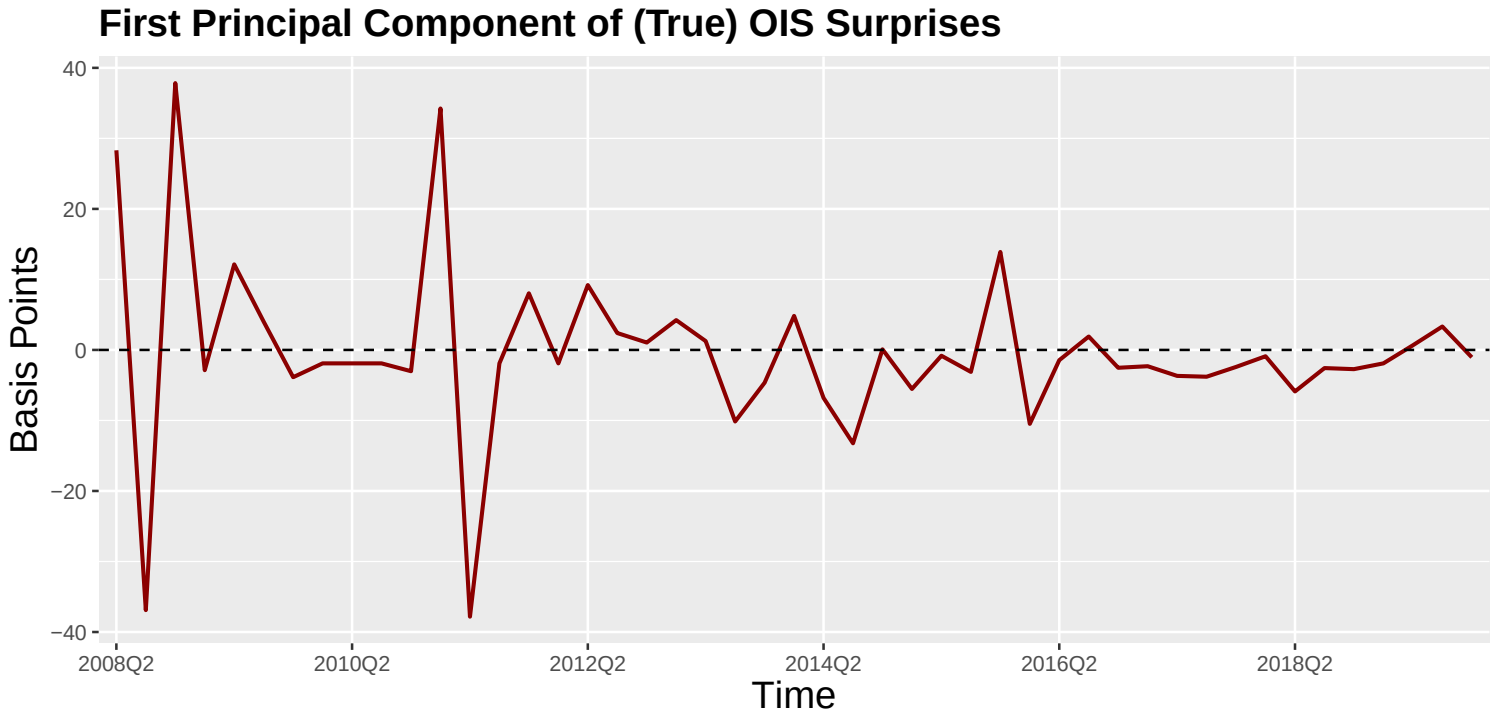

Figure 7: First Principal Component of (True) OIS Surprises. *Source:* Author's calculations based on Euro Area Monetary Policy Event Study Database.

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

Methodology

- Jorda-type local projection analysis:

$$\Delta_h log(k_{i.t+h}) = log(k_{i,t+h}) - log(k_{i,t-1}) = f_i^h + sq_{s,t}^h + \theta^h OB_{i,t}\eta_t + \sum_{w \in W} \alpha_w^h w_{i,t-1}(1+\eta_t) + \varepsilon_{i,t+h} \quad (5)$$

- The leakage effect is likely to be active only during monetary tightening:

$$\Delta_h log(k_{i.t+h}) = log(k_{i,t+h}) - log(k_{i,t-1}) = f_i^h + sq_{s,t}^h + \theta^{h,+} OB_{i,t}\eta_t^+ + \sum_{w \in W} \alpha_w^h w_{i,t-1}(1+\eta_t) + \varepsilon_{i,t+h} \quad (6)$$

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

Opportunistic Borrowing Dummy

$$OB_{it}^{1} = \begin{cases} 1, & \text{if } USDiss_i \text{ until } t-1 > 0 \ \& \ CB_t > 0 \\ 0, & \text{otherwise} \end{cases} \tag{7}$$

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

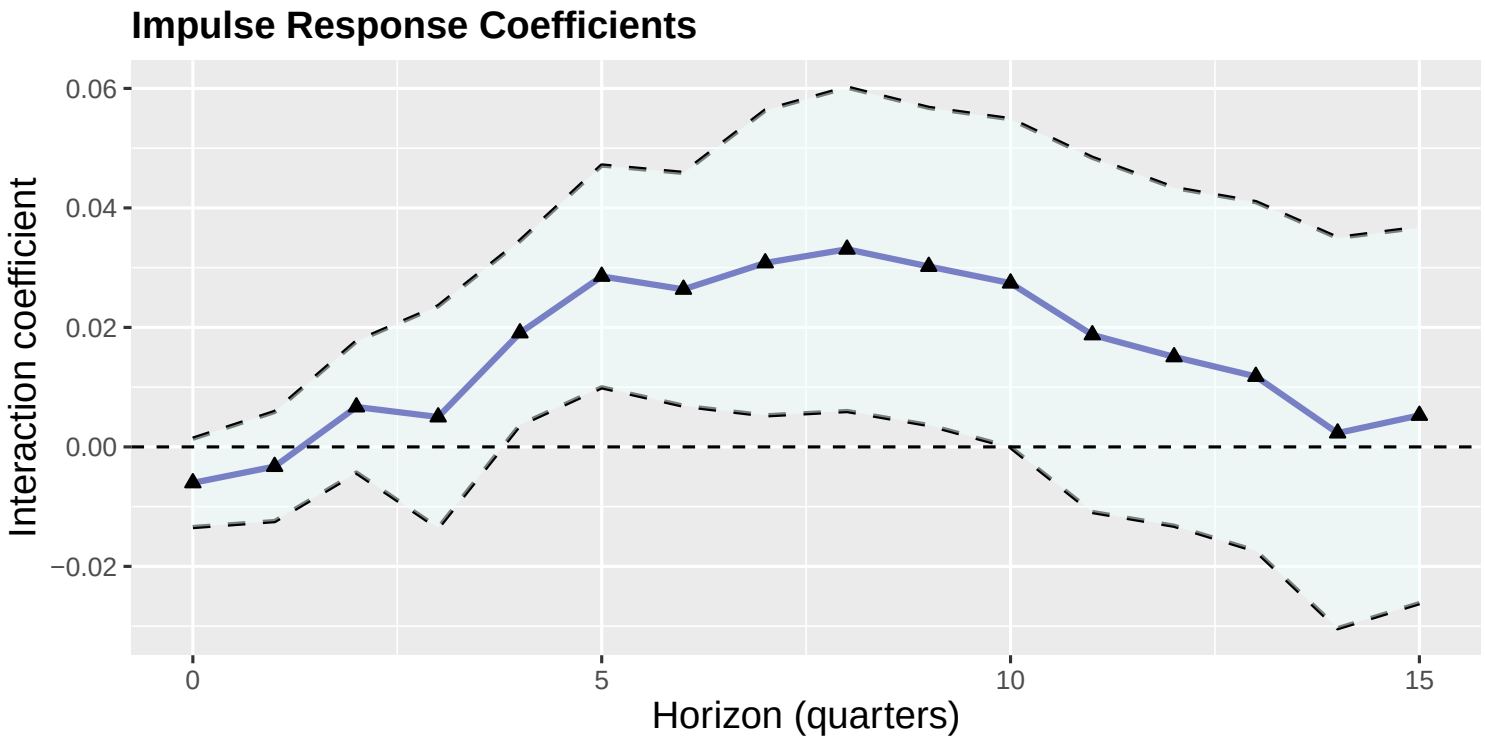

Figure 8: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

Average Effects of Monetary Policy

$$log(k_{i,t+h}) - log(k_{i,t-1}) = f_i^h + \gamma^h \eta_t + \sum_{w \in W} \alpha_w^h w_{i,t-1} + \varepsilon_{i,t+h} \tag{8}$$

$$log(k_{i,t+h}) - log(k_{i,t-1}) = f_i^h + \gamma^{h,+} \eta_t^+ + \sum_{w \in W} \alpha_w^h w_{i,t-1} + \varepsilon_{i,t+h} \tag{9}$$

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

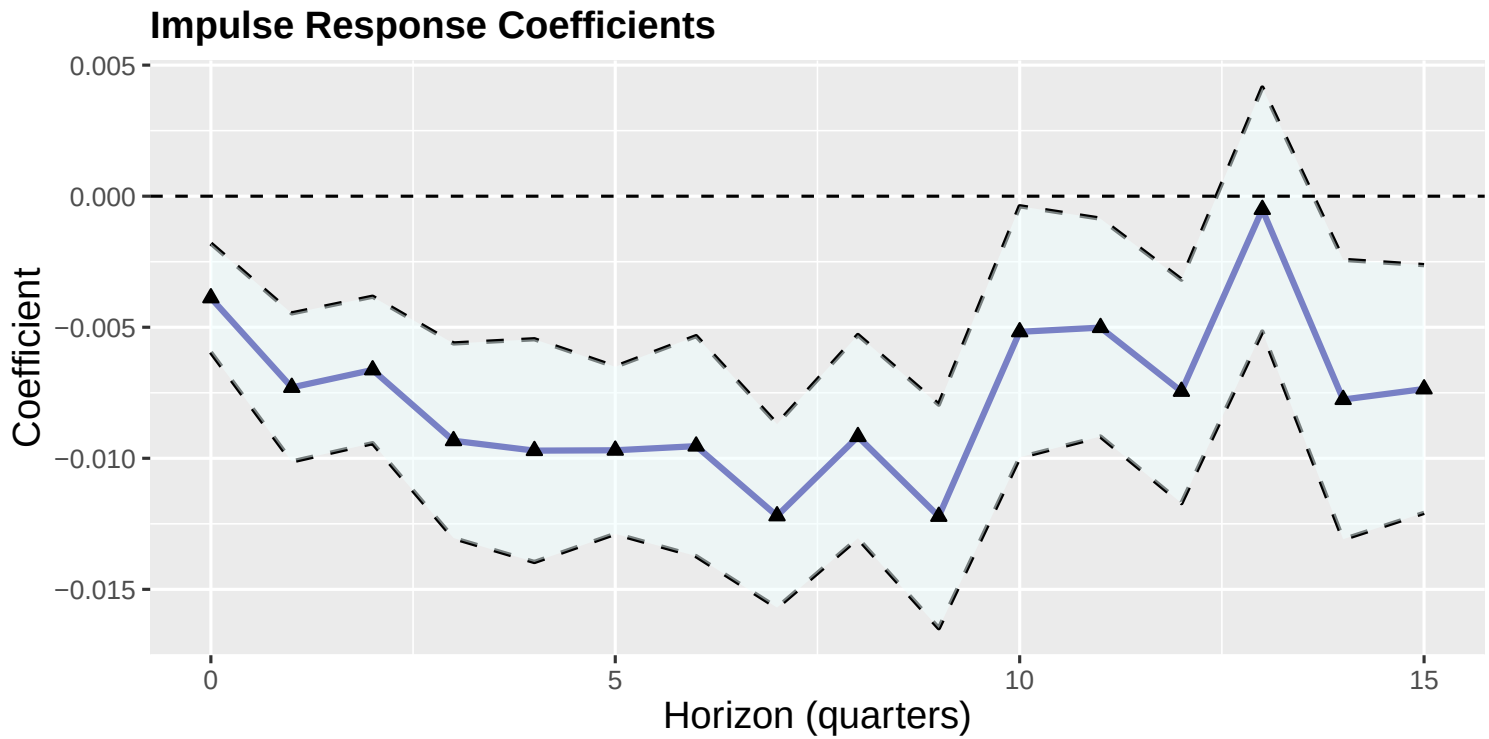

Figure 9: The Average Effect of Monetary Policy Surprises on Firms' Fixed Capital Expenditure

Heterogeneous Firm Reactions to Monetary Policy Surprises – Fixed Capital Investment

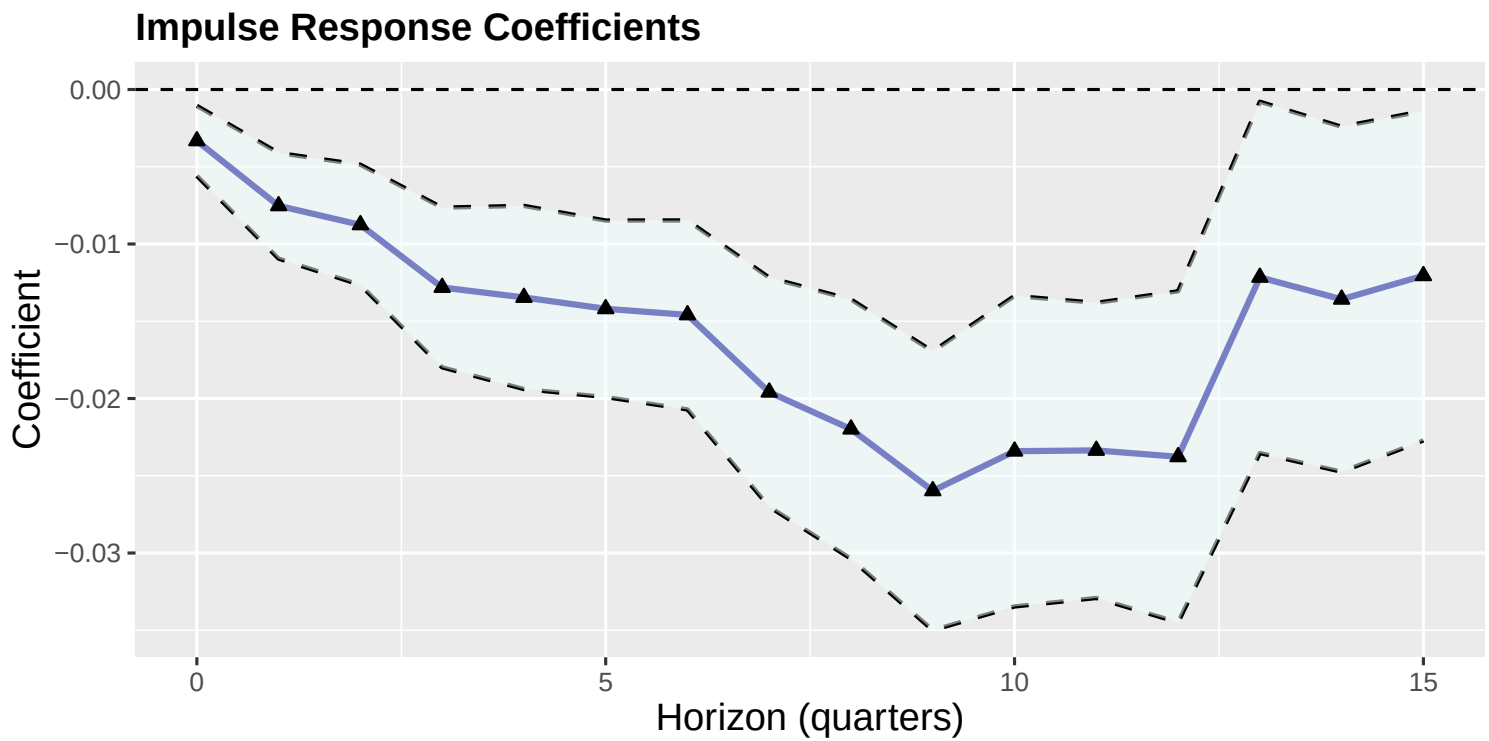

Figure 10: The Average Effect of Monetary Tightening Surprises on Firms' Fixed Capital Expenditure

Robustness Checks and Extensions

Robustness Checks

i) Different interest rate measures:

- Information effect corrected monetary policy surprises vs original series
- Grouping monetary policy changes in three bins
- A wider term structure
- Nominal interest rates

Robustness Checks and Extensions

Robustness Checks

Two major endogeneity concerns:

ii) Informational asymmetries between USD issuers and EUR-only issuers rather than access to global corporate bond markets may be driving the differential response.

- Interaction terms: $size * \eta_t$, $BSL * \eta_t$ and $cashflow * \eta_t$
- Firm sample: bond issuers. A natural control for financial frictions.
- Additional control: S&P Long-Term Credit Rating
- $$OB_{it}^2 = \begin{cases} 1, & \text{if } USDiss_i \text{ until } t-1 > 0 \ \& \ CB_t < 0 \\ 0, & \text{otherwise} \end{cases} \tag{10}$$

Robustness Checks and Extensions

Robustness Checks

iii) Profitable investment opportunities may be driving both OB and investment.

- Sales growth
- Tobin's Q proxied by price-to-book ratio
- Use OB_{it}^2

Robustness Checks

iv) Others:

- Include sector $*$ monetary policy surprises
- Exclude top % 1 of firms in terms of number of bond issuances
- $$OB_{it}^{3} = \begin{cases} 1, & \text{if } USDiss_i \text{ in the last five years} > 0 \ \& \ CB_t > 0 \\ 0, & \text{otherwise} \end{cases} \quad (11)$$

Inventory Investment

$$log(inv_{i,t+h}) - log(inv_{i,t-1}) = f_i^h + sq_{s,t+h}^h + \theta^h OB_{i,t}\eta_t + \sum_{w \in W} \alpha_w^h w_{i,t-1}(1+\eta_t) + \varepsilon_{i,t+h} \quad (12)$$

$$log(inv_{i,t+h}) - log(inv_{i,t-1}) = f_i^h + sq_{s,t+h}^h + \theta^{h,+} OB_{i,t}\eta_t^+ + \sum_{w \in W} \alpha_w^h w_{i,t-1}(1+\eta_t) + \varepsilon_{i,t+h} \quad (13)$$

Corporate Basis and Monetary Policy

Table 2: Corporate Basis and Monetary Policy (Estimation Results)

	1	2	3	4	5	6
Dep. Variable	CB_t	ΔCB_t	ΔCB_t	CB_t	ΔCB_t	ΔCB_t
Intercept	-2.77^{*}	2.01	2.07	-2.97^{**}	2.13	2.21
	(1.50)	(1.75)	(1.77)	(1.33)	(1.74)	(1.76)
CB_{t-1}	0.62^{***}			0.59^{***}		
	(0.06)			(0.05)		
ΔCB_{t-1}			−0.06			−0.07
			(0.13)			(0.13)
ECB-FED (surp.)	3.19^{*}	5.81^{**}	5.92^{**}			
	(1.82)	(2.42)	(2.45)			
ECB-FED (nom.)				1.53^{***}	1.55^{**}	1.59^{**}
				(0.41)	(0.63)	(0.64)
Multiplier	8.35		5.57	3.76		1.58
R^2	0.70	0.12	0.13	0.76	0.13	0.13
Note:	*p<0.1; **p<0.05; ***p<0.01					

Robustness Checks and Extensions

External Validity Check

- The case of the US: The US tightening cycle & ECB's CBPP drove down credit spreads in EUR (ongoing work).

Conclusion and Policy Implications

Main Findings

- Eurozone NFCs exploit borrowing cost differentials between USD and EUR.
- Firms that have the means to borrow opportunistically do not reduce their investment as much as other firms in response to monetary tightening.
- This heterogeneity is not driven by underlying asymmetries of financial constraints between USD-issuers and EUR-only issuers.

Conclusion and Policy Implications

Policy Implications

- In case of leakages, central banks may have to raise their rates more than what would be required in a closed economy setting.
- The existing literature on bank lending channel and interest rate pass through could be misleading when showing that mon policy rate $\Rightarrow$ domestic rates.
- This leakage effect is likely to get more and more important as global corporate bond markets expand (extension is huge since GFC) and more firms join international markets.

Conclusion

Thank you for listening!

Appendix

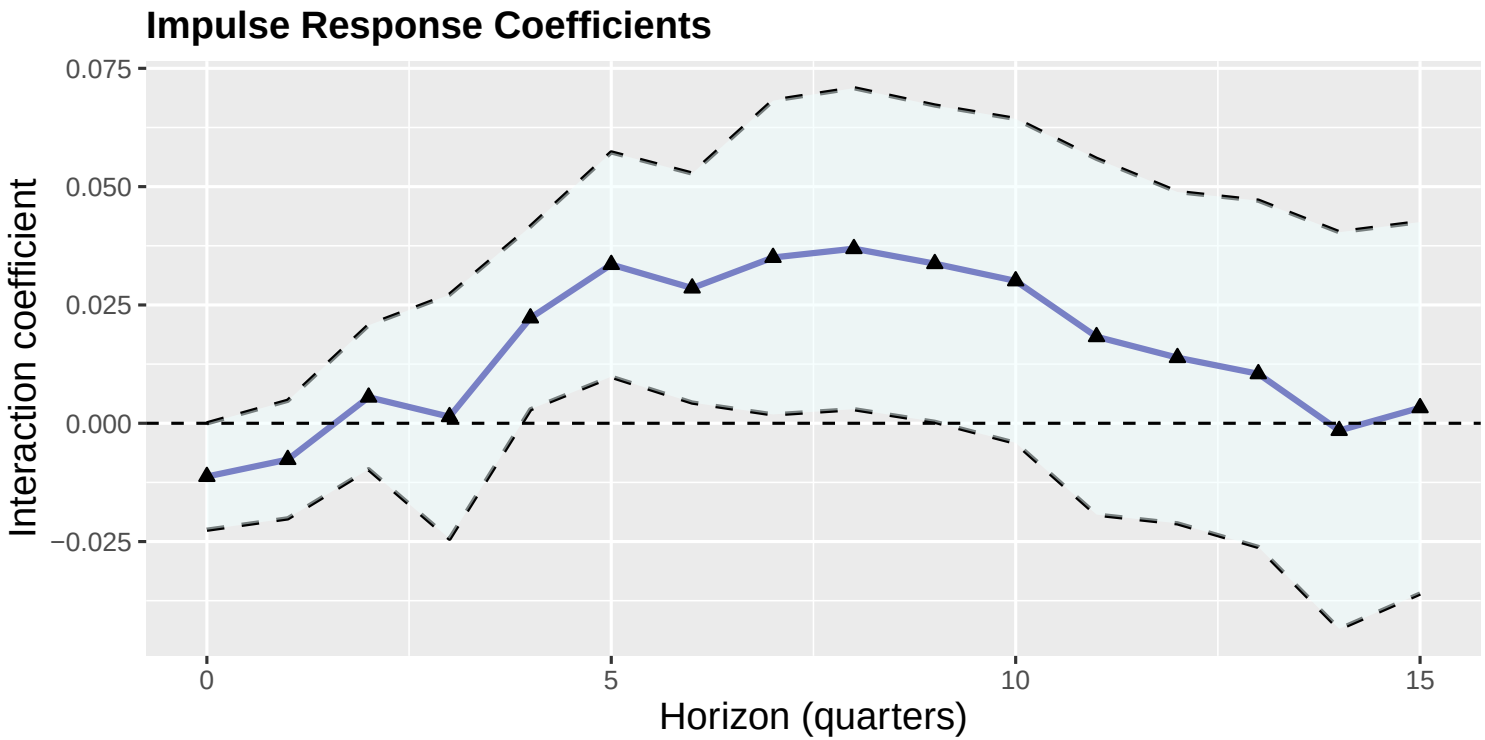

Figure 11: The Differential Impact of Monetary Policy Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (Symmetric Case)

Appendix

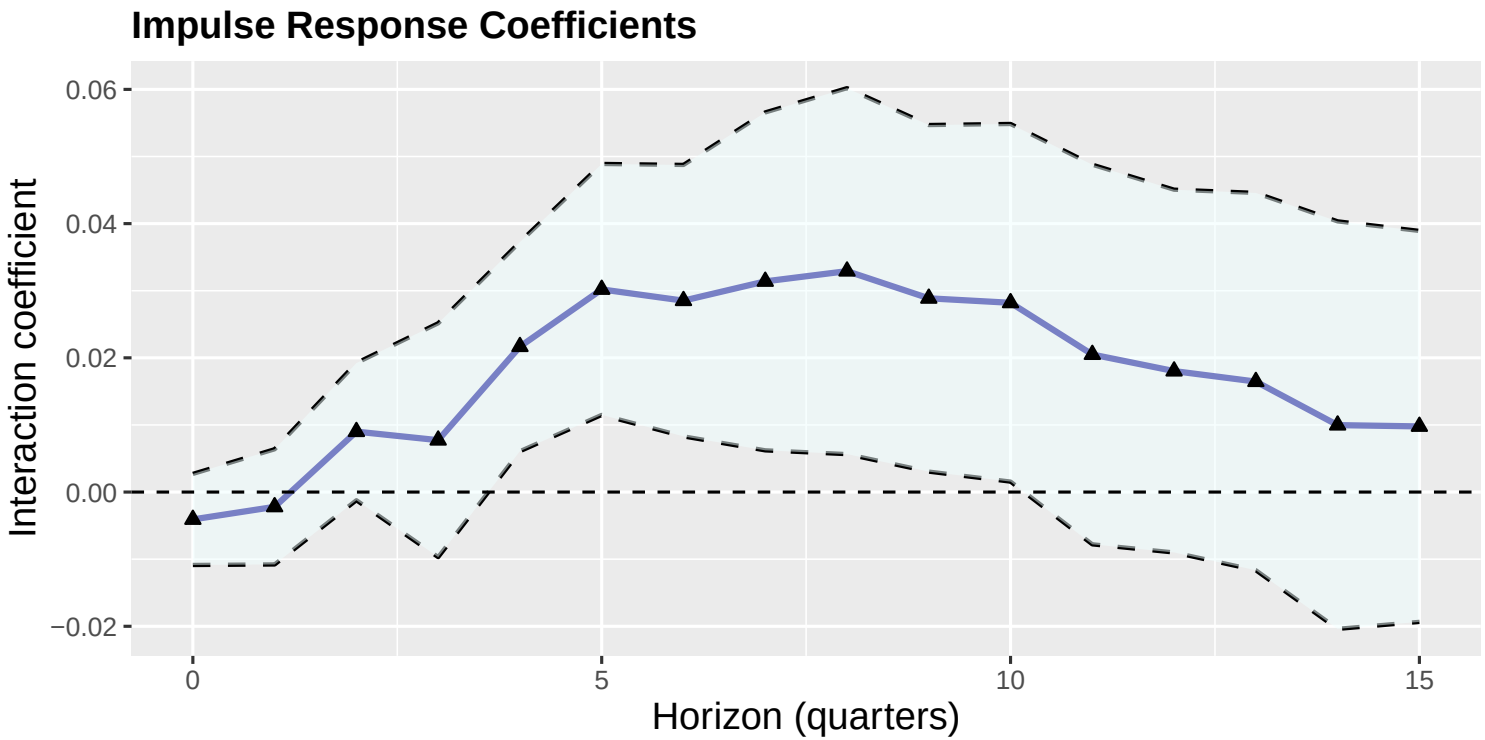

Figure 12: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (OISPRC)

Appendix

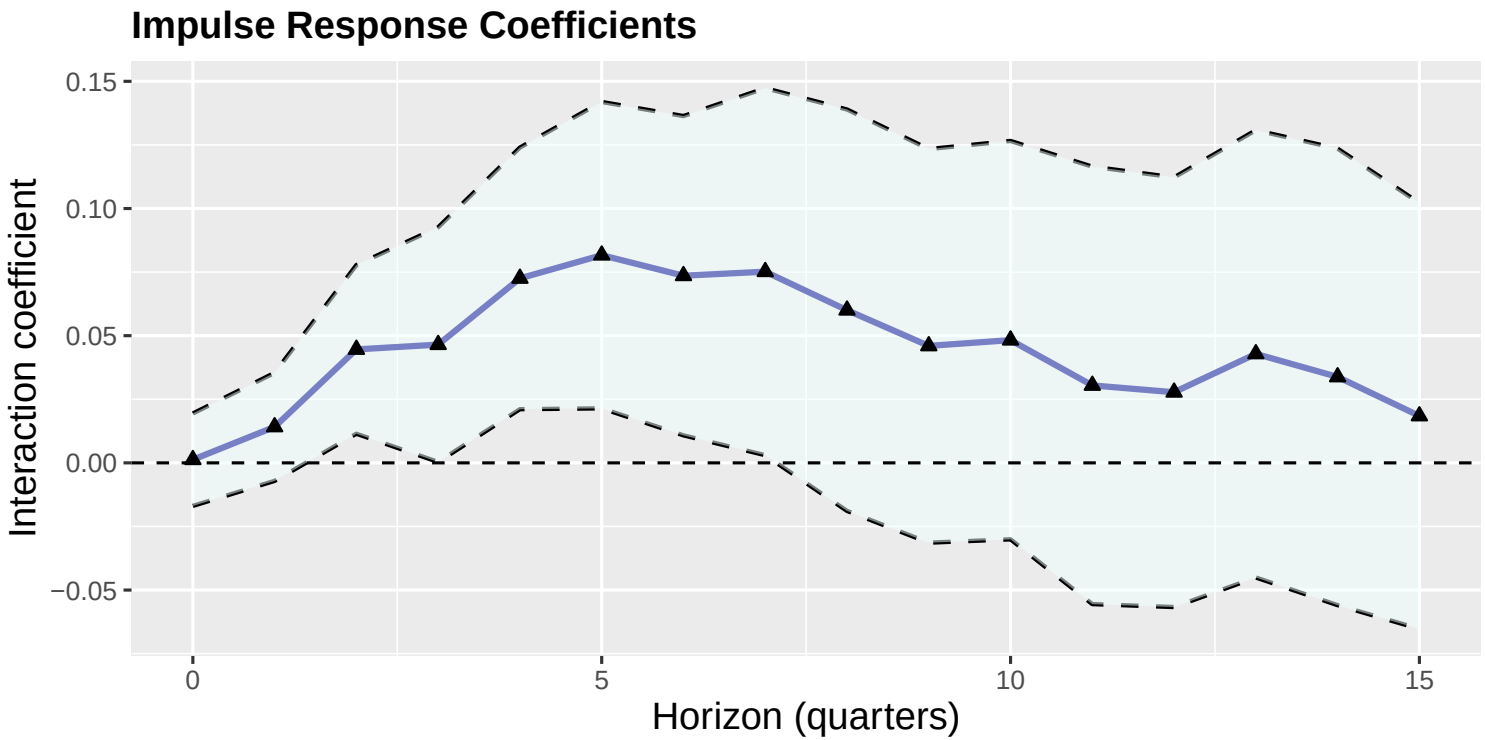

Figure 13: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (OISPRCbins)

Appendix

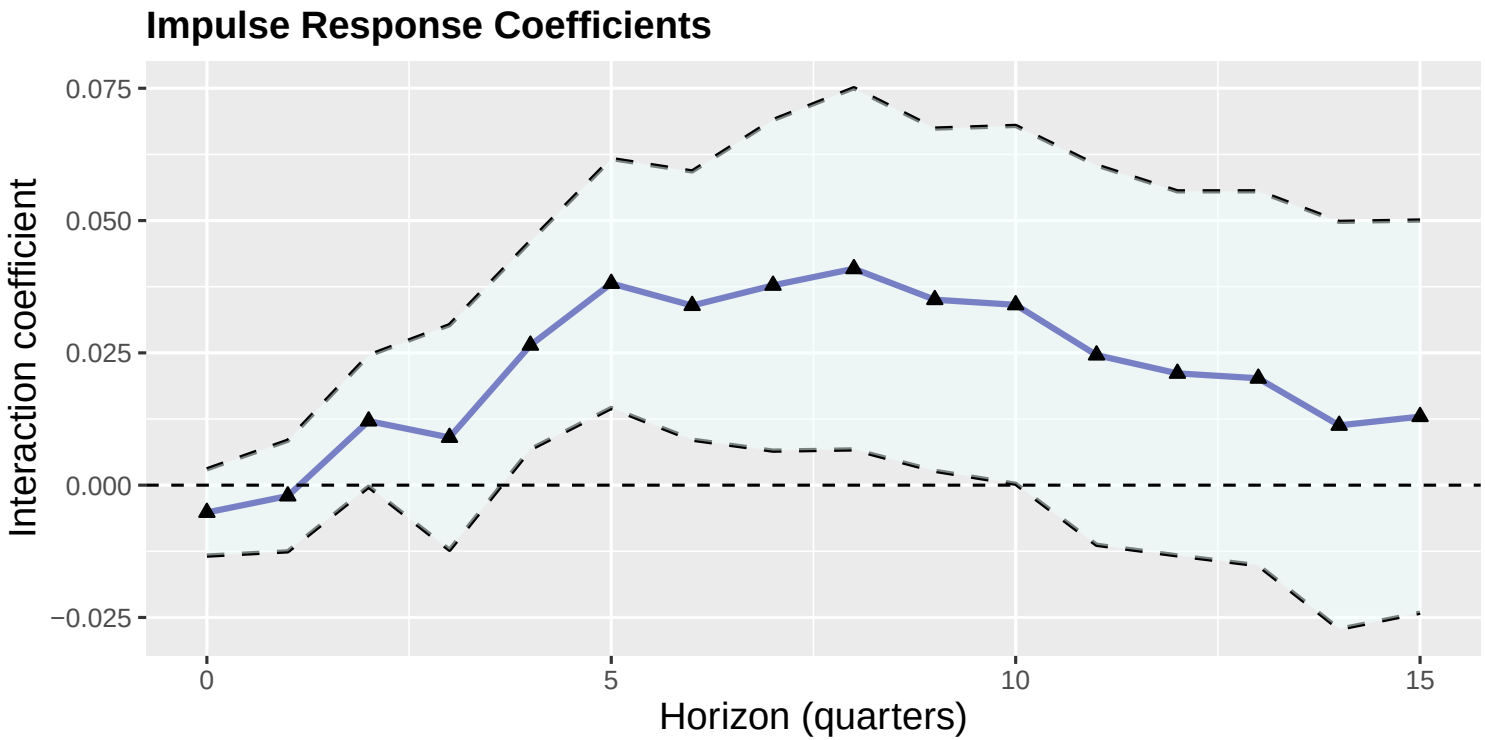

Figure 14: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (widerPRC)

Appendix

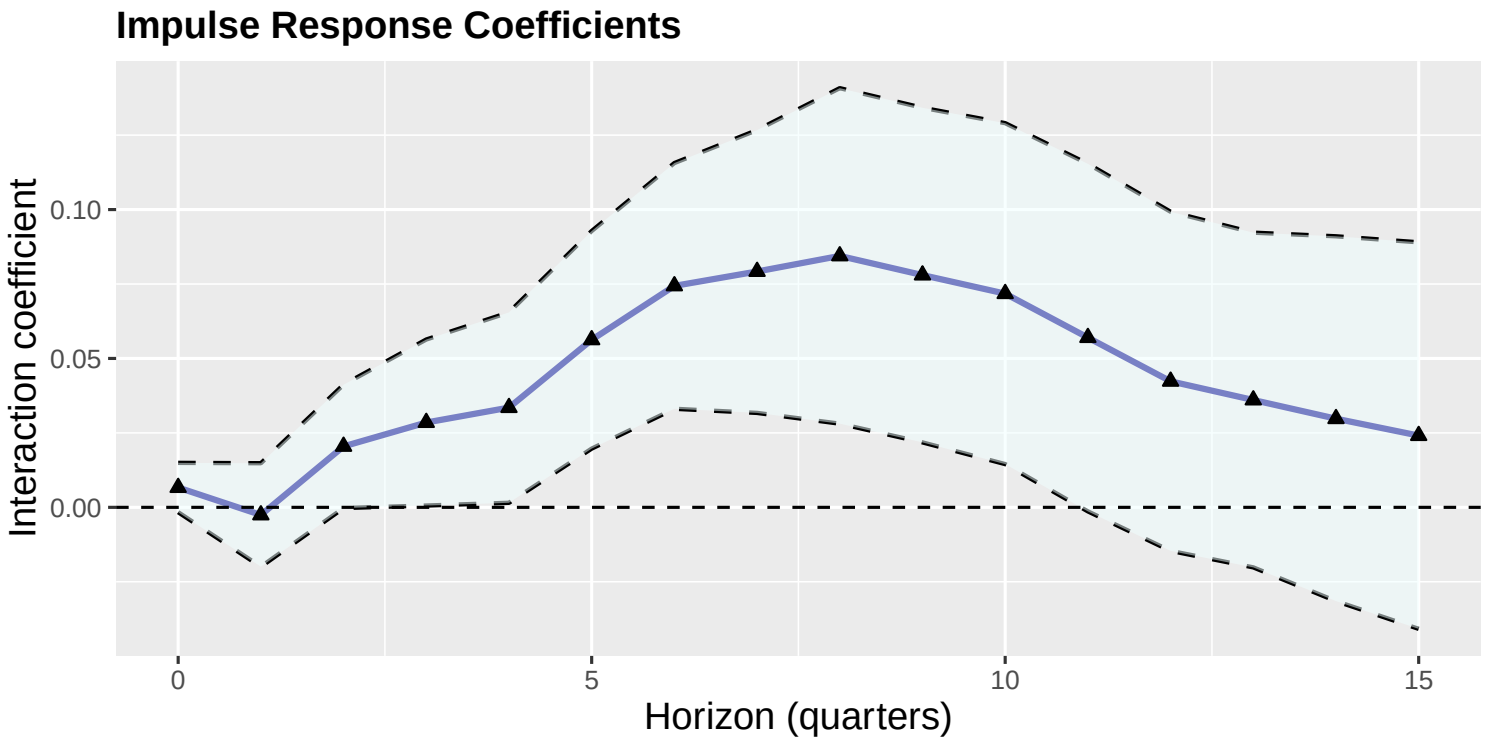

Figure 15: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (OISPRCnom)

Appendix

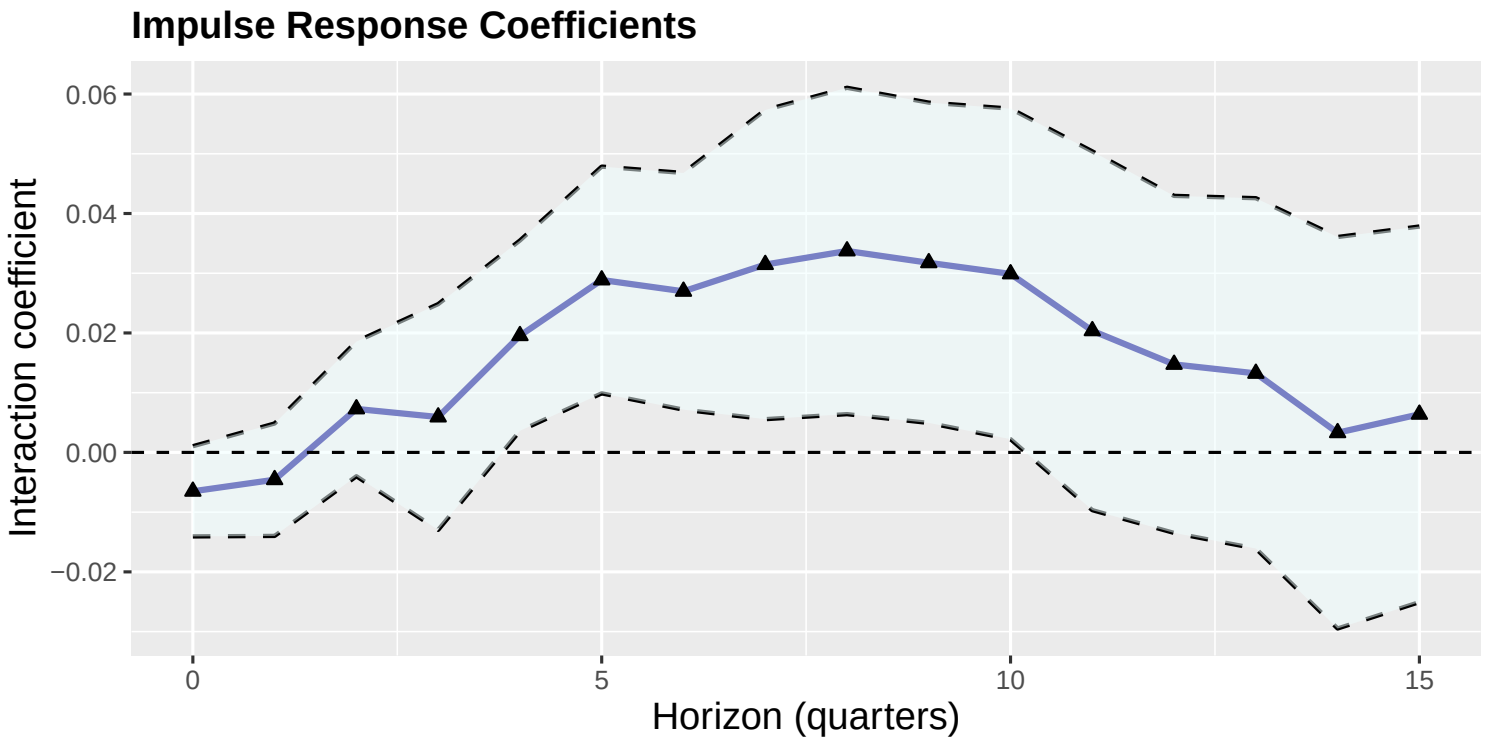

Figure 16: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (with Bond Ratings)

Appendix

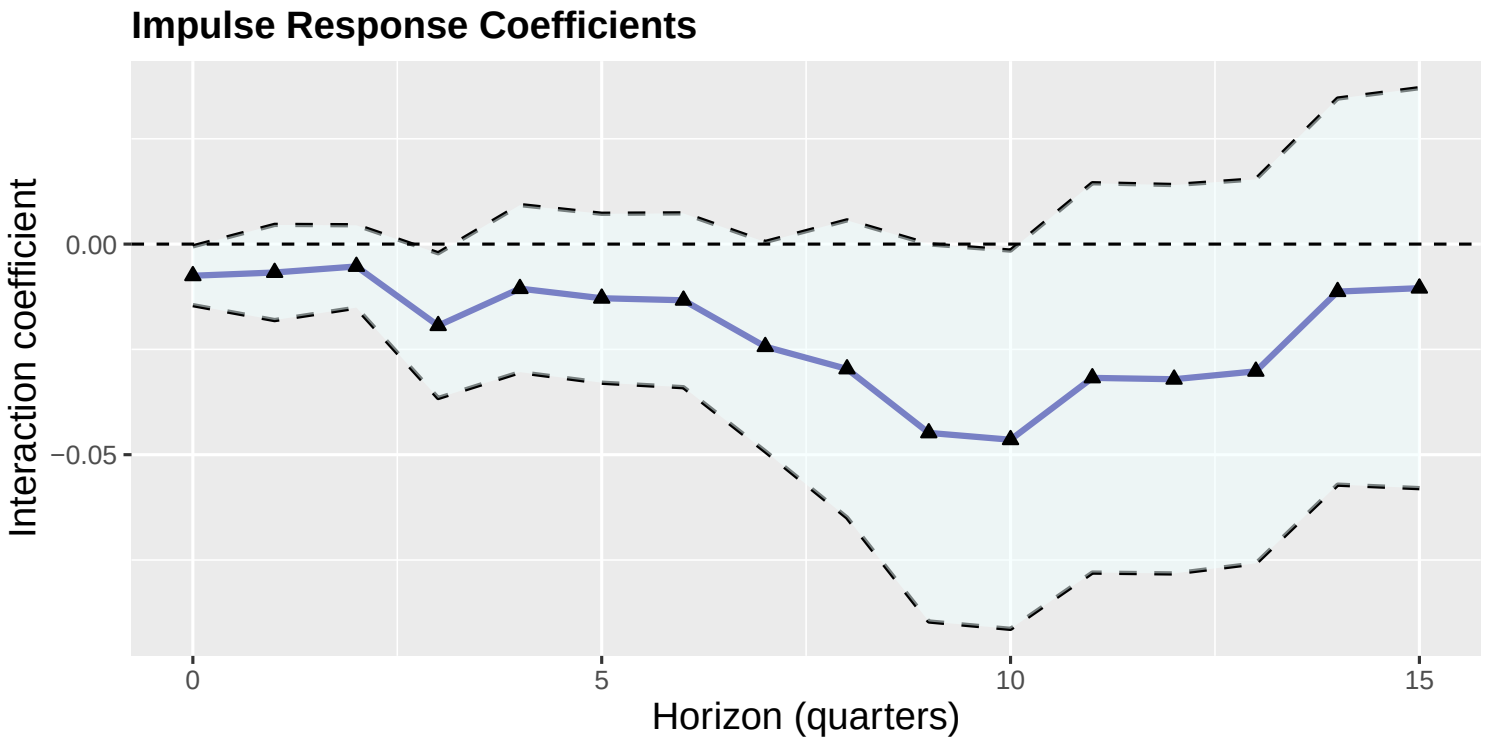

Figure 17: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (with OB_{it}^2)

Appendix

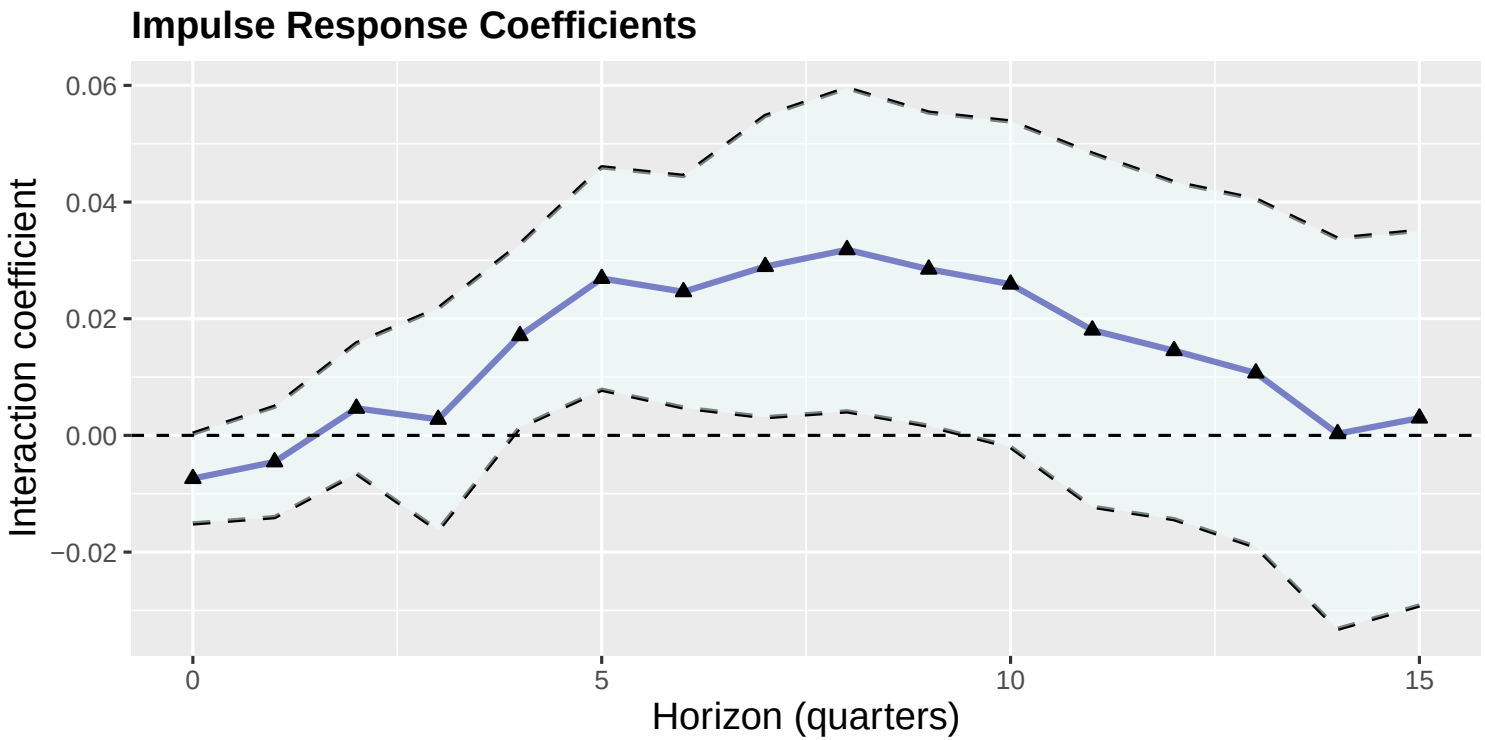

Figure 18: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (with Tobin's q)

Appendix

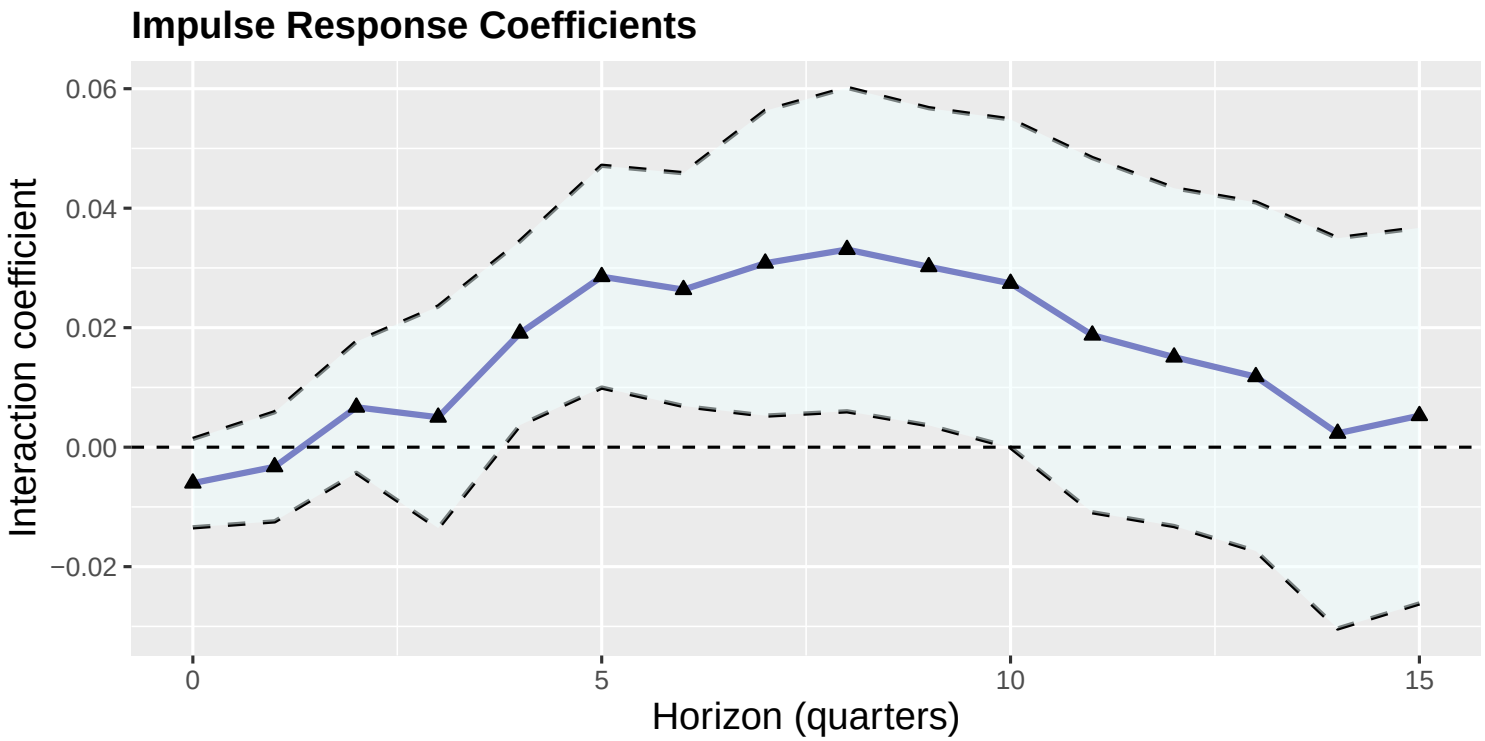

Figure 19: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (with Sector-Specific Effects)

Appendix

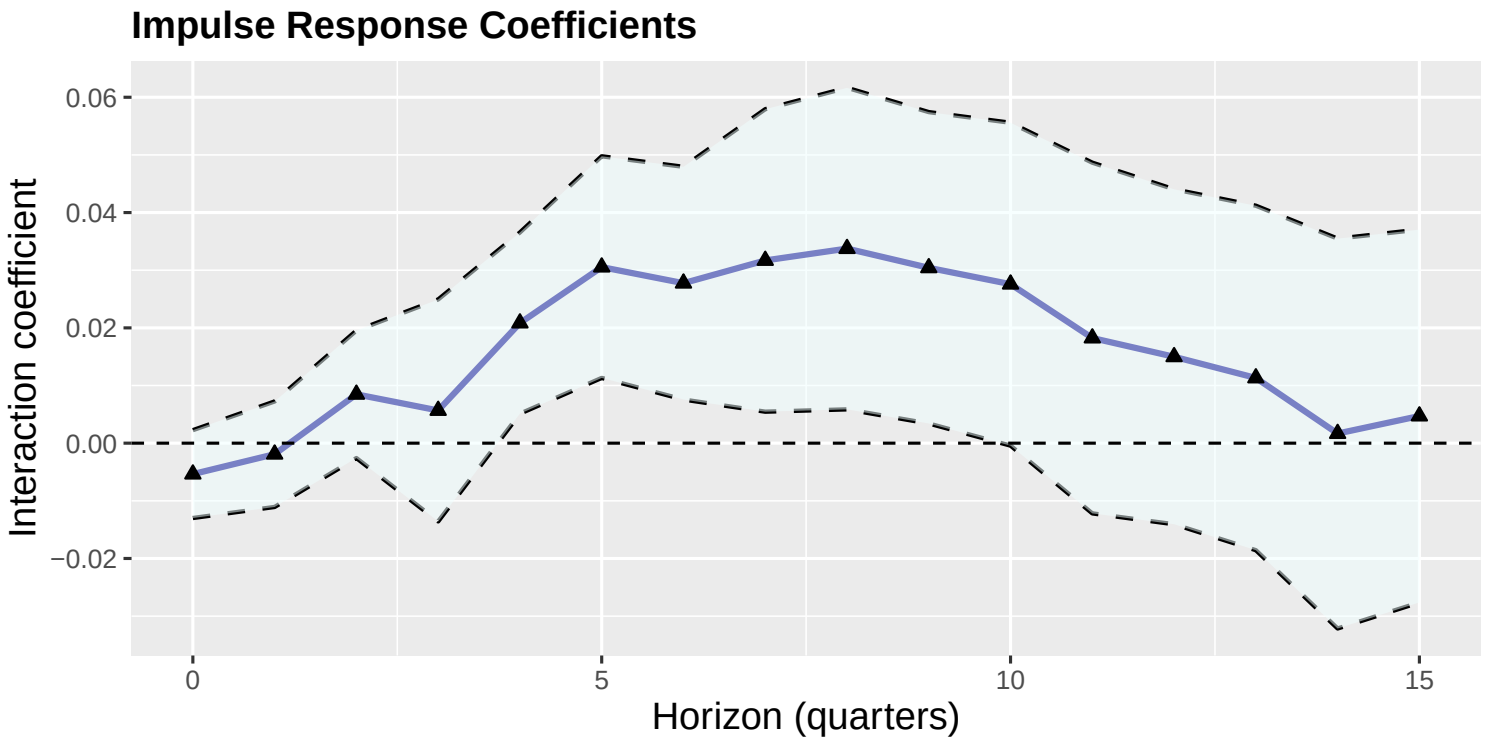

Figure 20: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (without Top 1% Issuers)

Appendix

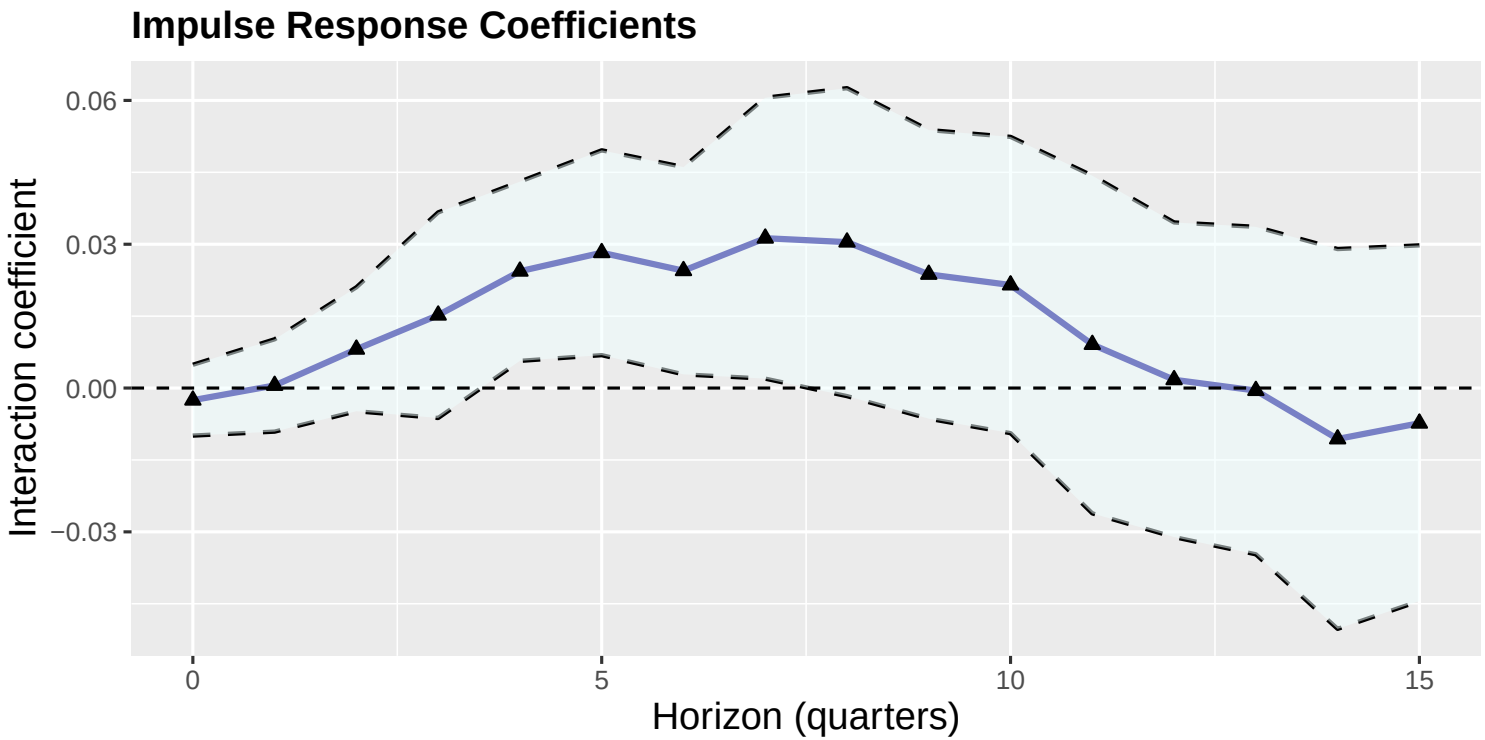

Figure 21: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Fixed Capital Expenditure (with OB_{it}^{3})

Appendix

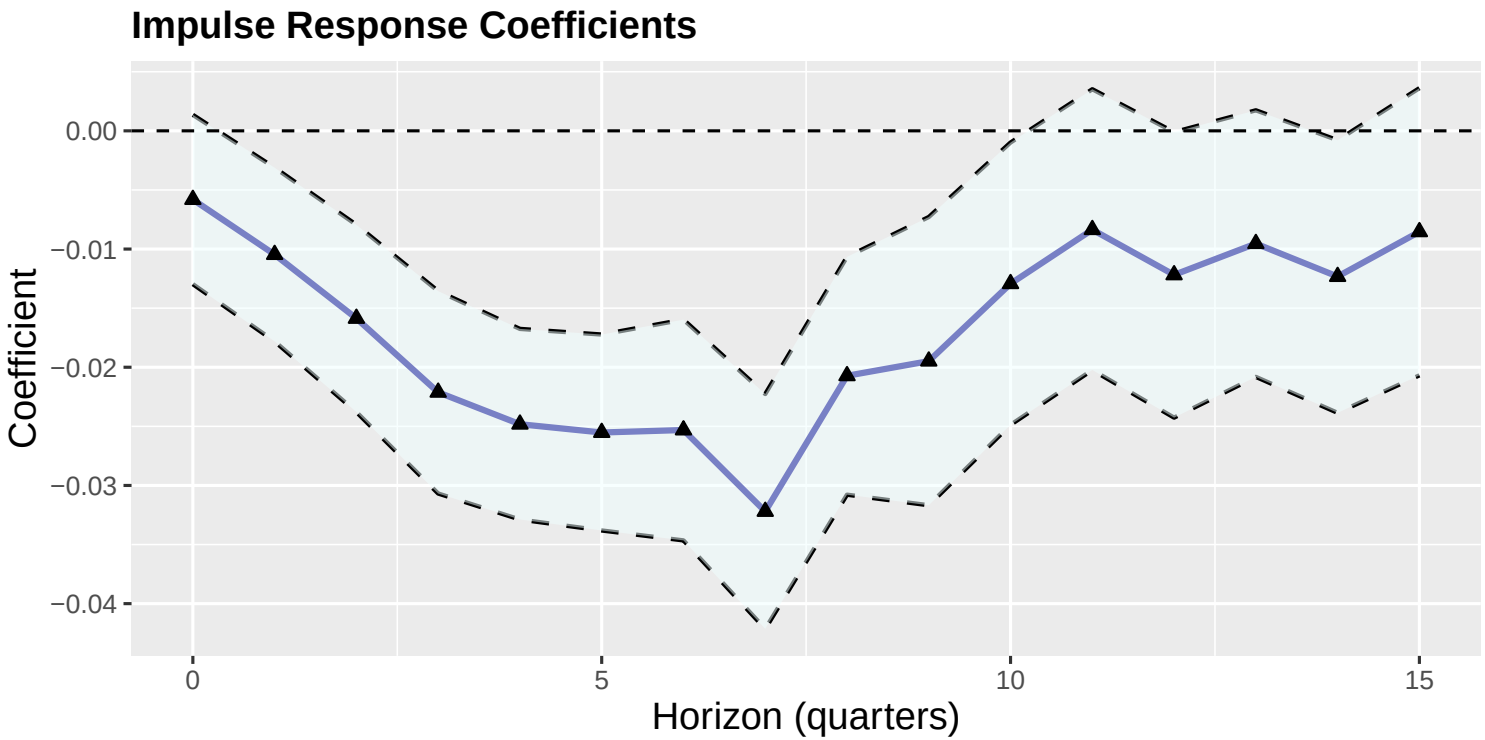

Figure 22: The Average Effect of Monetary Tightening Surprises on Firms' Inventory Investment

Appendix

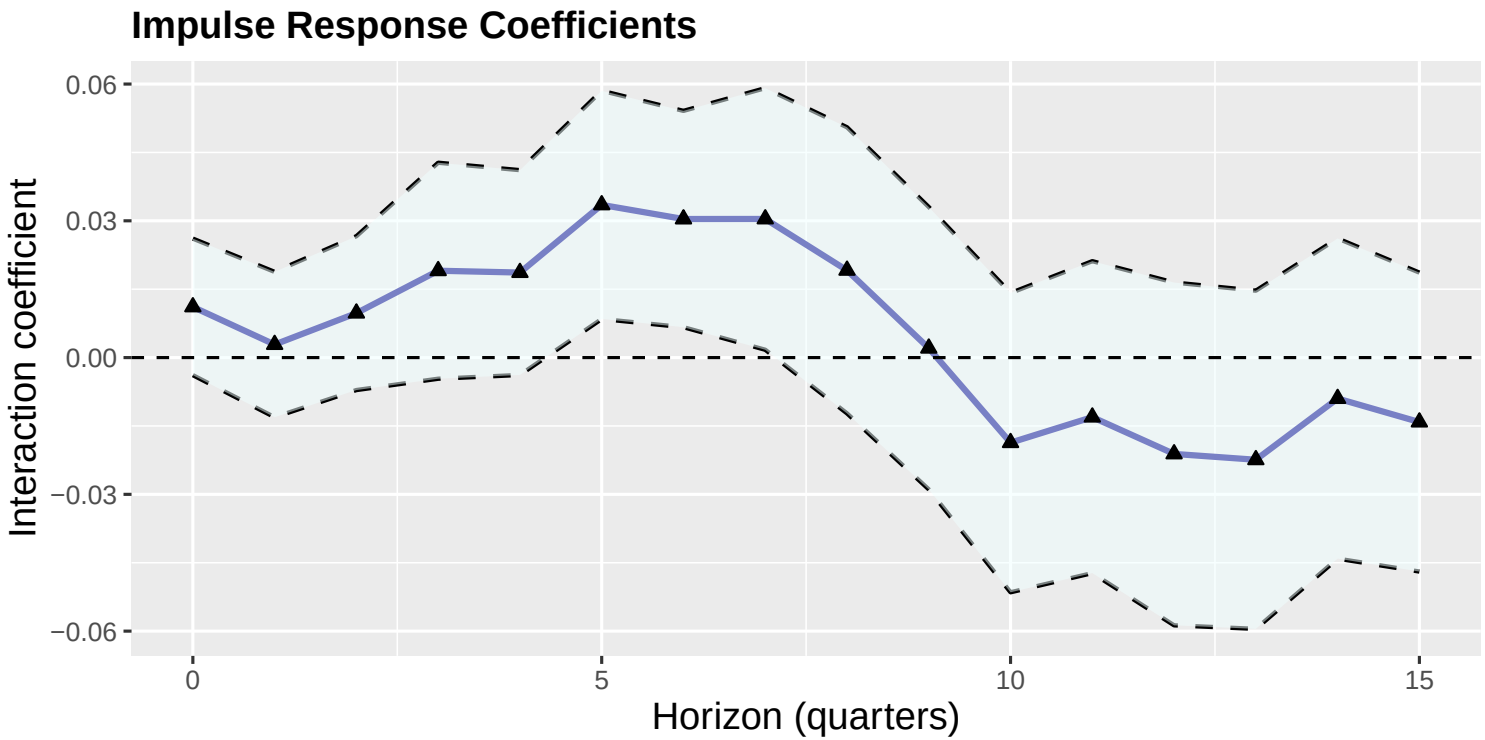

Figure 23: The Differential Impact of Monetary Tightening Surprises on Opportunistically Borrowing Firms' Inventory Investment