

Central Bank Liquidity Shocks

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3rd ChaMP Workstream 1 Workshop,
Banca d'Italia, June 21, 2024

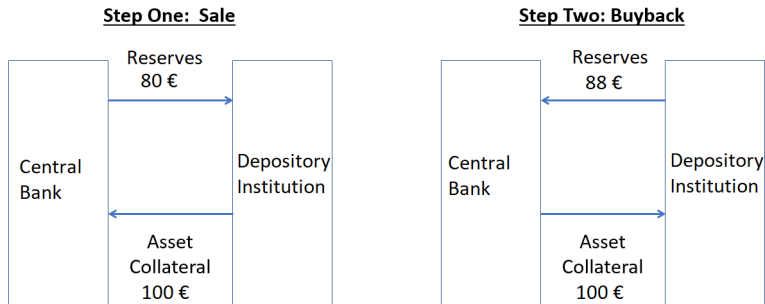
The views expressed in this presentation and in the related paper are those of the authors and do not necessarily reflect the views of the Bank of Italy, the European Central Bank or the Eurosystem.

Motivation

- **Liquidity provision** is a classic function of a central bank to:
 - alleviating liquidity squeezes in the banking sector
 - Central Banks operate according to the **separation principle**
 - monetary policy stance: primary goal of inflation & employment stabilization
 - central bank liquidity: address financial stability
 - Effects on **each other goals** via e.g. general equilibrium effects
 - Both policies operate via the banking sector
- ⇒ **How do shocks to the provision of central bank liquidity transmit to the macroeconomy?**

Central Bank Refinancing Operations

Repurchase Agreement or “Repo”



Repo Rate: 8% Haircut: 20%

Figure: Repurchase Agreement. (Ex. ECB's MRO, FED's Temporary OMOs)

- REPO rate = Monetary Policy Rate
- Haircut = Another policy lever?

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 - **Negative effects** on **Excess Liquidity**, **Systemic Risk Indicators**, **Money Market Dispersion Index**.
 - **Effects** on Excess Liquidity and Yield Curve \neq **Conv. Monetary Policy Shock**.

Contribution to the literature

Large VAR literature on identification of policy rate shocks

e.g. Bernanke (1992); Christiano et al. (1996); Coibion (2012); Gertler and Karadi (2015); Antolin-Diaz and Rubio-Ramirez (2018),...

⇒ Focus on Central Bank Liquidity Shocks.

LOLR policies and its effects: Drechsler et al. (2017), Rochet and Vives (2004), Freixas et al. (2010), Stein (2012), Pelizzon et al. (2020), Carpinelli and Crossignani (2021), Jasova et al. (2021), Altavilla et al. (2022); Jasova et al. (2024),...

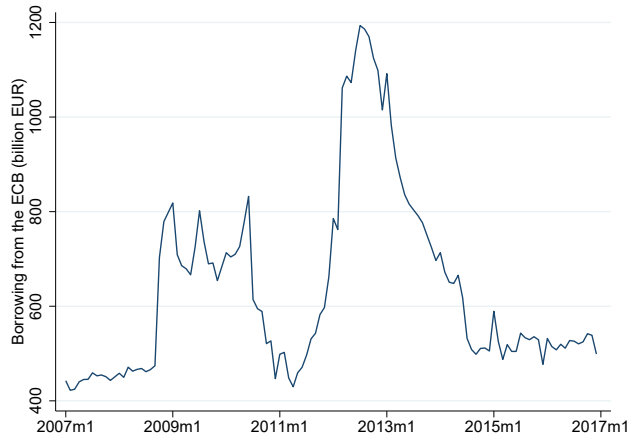
⇒ New evidence on the macroeconomic effects of LOLR

Impact of unconventional monetary policy using VAR models

e.g. Debortoli et al. (2020); Gambetti and Musso (2020); Andrade and Ferroni (2021); Altavilla, Rostagno, Schmaker (2023),...

⇒ Central Bank Liquidity

ECB Liquidity Provision



Institutional Details: Haircut Gap

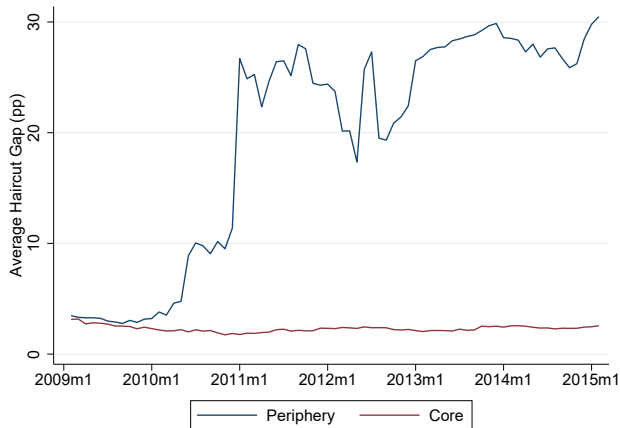
- We use the **haircut gap** as a measure the CB liquidity policy, i.e. difference in haircuts applied by the private market and ECB on bonds in repo market.

$$\text{HaircutGap}_{s,t} = \text{private market haircut}_{s,t} - \text{ECB haircut}_{s,t}$$

security s in month t .

- micro-level data on ECB and private repo markets: 300+ EA banks; 20,000+ bonds

Average haircut gap for securities issued in core and periphery



Prior to GFC: haircuts applied by the ECB similar to private market haircuts on repo loans.

Afterwards: ECB haircuts significantly below that of the private repo markets.

Shock Identification

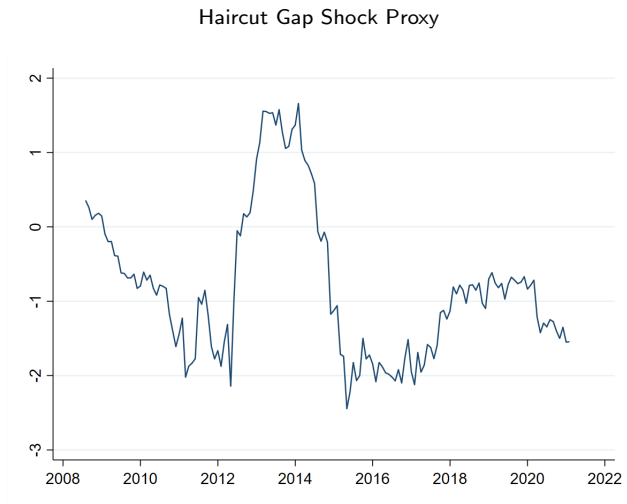
In order to identify exogenous central bank liquidity shocks we use the following regression:

$$\text{HaircutGap}_{security, bank, t} = \alpha_{country / bank, t} + \varepsilon_{security, bank, t}$$

The procedure is designed to absorb all the aggregate, country and bank specific variation over time.

$$\text{Liquidity Shock}_t = \sum_{security, bank} \varepsilon_{security, bank, t} \frac{\text{Amount Pledged}_{security, bank, t}}{\text{Total Amount Pledged}}$$

Shock Identification: Informative Variable



Shock Identification: Proxy Narrative Sign Restrictions

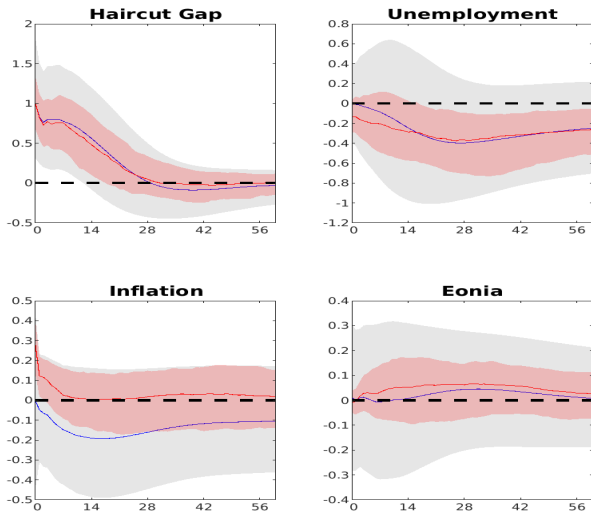
- 1 **Assumption:** use proxy as an "Informative Variable":
 - **Mostly** exogenous to other shocks.
 - **Mainly varying** due to our central bank liquidity shock.
- 2 **Hybrid VAR** (e.g. Coibion (2012)).
- 3 **Refine** by adding **Narrative Sign restrictions** (see Antolín-Díaz and Rubio-Ramírez (2018)):
 - **January 2011** - First downgrade of Greek Government Bonds by rating agency to High Yield Bond level
 - We impose the shock positively impact our informative variable on that date and explains most of its variation
 - **December 2011** - Date of announcement of the 3 year vLTRO
 - We impose the shock positively impacts our informative variable
 - **Robustness: June 2014** - Date of announcement of the first TLTRO
 - We impose the shock positively impacts our informative variable

Outline of Results

- NSR VAR: Baseline
- NSR VAR: Credit Spreads
- NSR VAR: Excess Liquidity, SRISK, Market Inefficiency
 - Robust with Hybrid VAR.
- Hybrid VAR: Compare Haircut vs MP Shock
 - Excess Liquidity
 - Zoom in on Yield Curve
- Further Results

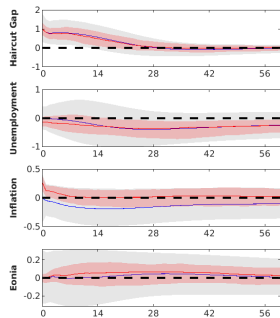
Haircut Gap Shock: Baseline

Haircut Gap Effects: Baseline Zoom-in



Haircut Gap Shock

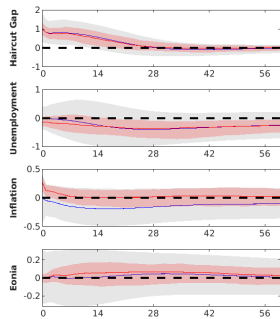
Haircut Gap Effects: Baseline and Credit Spreads



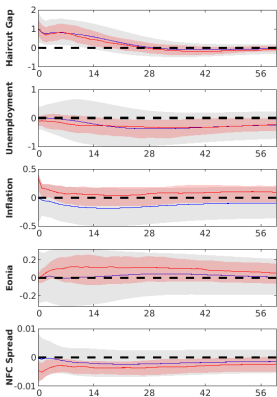
(a) Baseline

Haircut Gap Shock

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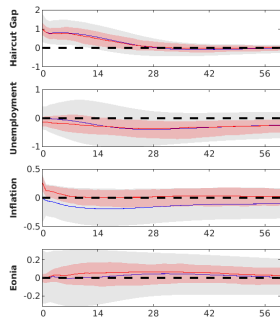
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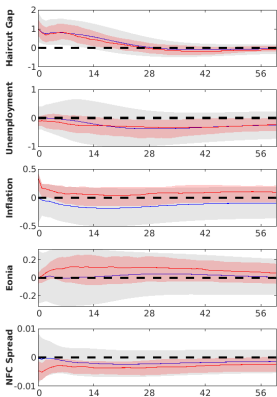
(b) NFC Credit Spread

Haircut Gap Shock

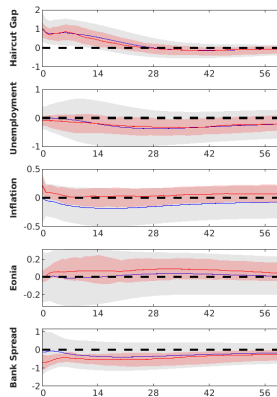
Haircut Gap Effects: Baseline and Credit Spreads



(a) Baseline



(b) NFC Credit Spread

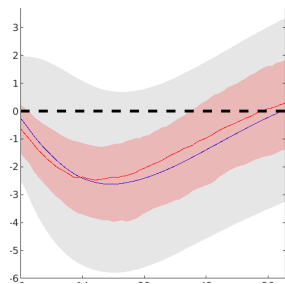


(c) Bank Credit Spread

Expansionary Effects on Unemployment and Credit Spreads.

Excess Liquidity, Systemic Financial Risk, Market Efficiency

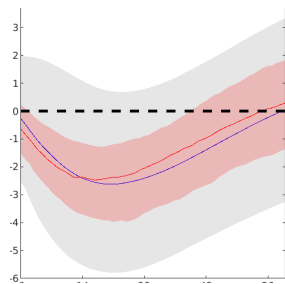
Haircut Gap Effects: Excess Liquidity, Systemic Risk, Market Efficiency



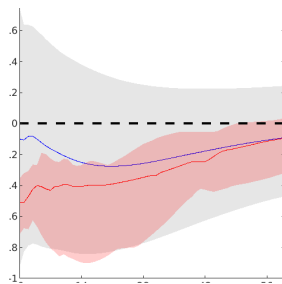
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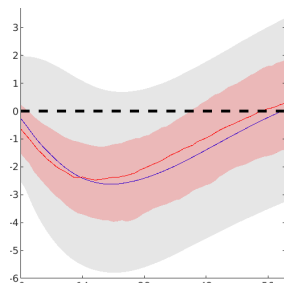
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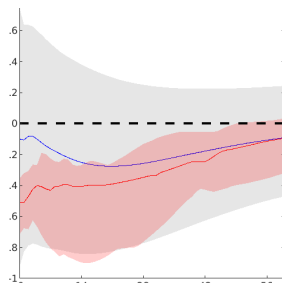
(b) Systemic Financial Risk

Excess Liquidity, Systemic Financial Risk, Market Efficiency

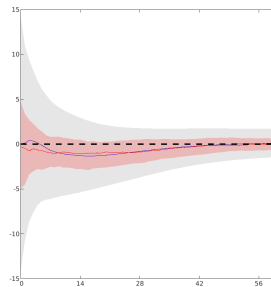
Haircut Gap Effects: Excess Liquidity, Systemic Risk, Market Efficiency



(a) Excess Liquidity



(b) Systemic Financial Risk



(c) Money Market Dispersion Index

Positive Haircut Subsidy \Rightarrow decrease in excess liquidity and SRISK Brownlees and Engle (2017). No impact on Market Inefficiency (Duffie and Krishnamurthy (2016)).

► Hybrid VAR: Excess Liquidity

► Hybrid VAR: SRISK

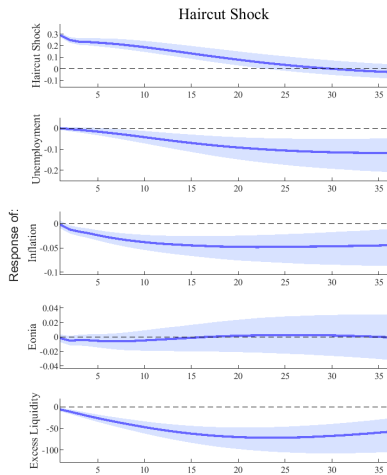
► Hybrid VAR: MM Disp Index

Haircut Gap vs MP Shocks. Hybrid VAR.

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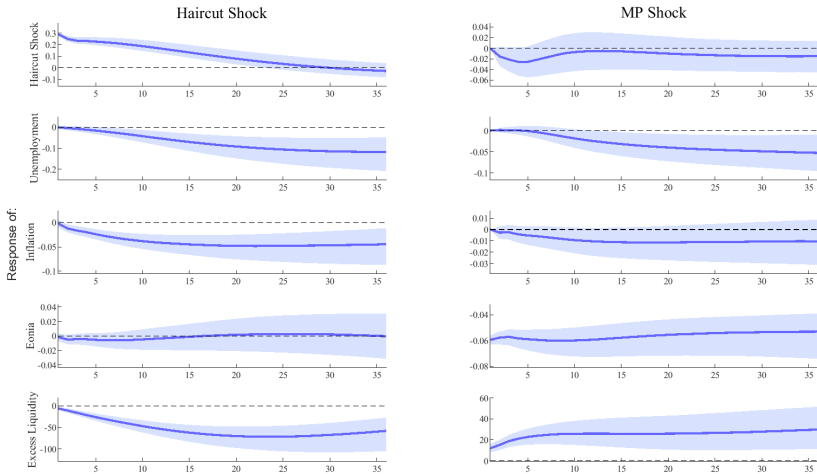
Haircut Gap VS MP Shock - Excess Liquidity. Hybrid VAR.

Baseline Specification + Excess Liquidity



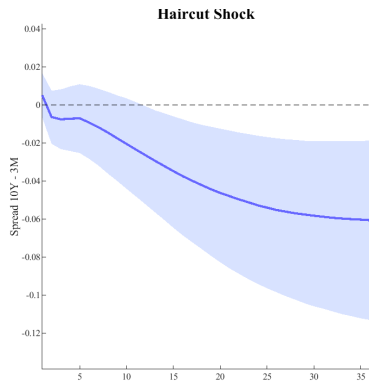
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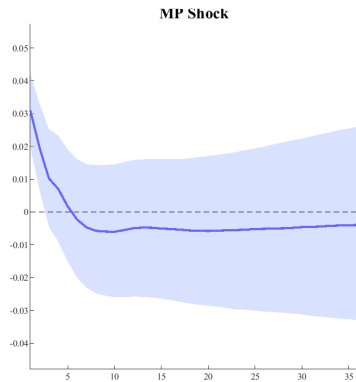
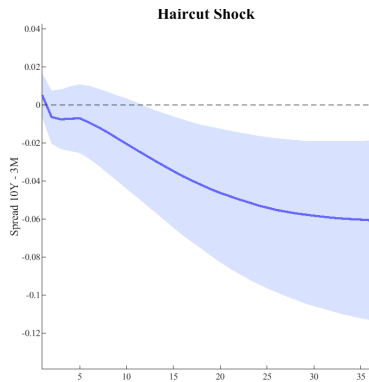
Haircut Gap VS MP Shock - Yield Curve

Baseline Specification + 10Y-3M Yield Curve Spread



Haircut Gap VS MP Shock - Yield Curve

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► Comparison with NSR

► Full VAR


More Results

Credit Spreads:


- a Bank & Corporate Credit Spreads:
 - Peripheral EA more responsive than Core EA. 

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Financial Stability Indicators:


- a CDS Spreads (Senior & Junior Tranches)
- b KMV Expected Default Probabilities (Corporate & Banks)
 - Respond positively and significantly to Haircut Shocks.
 - Junior CDS tranches and Corporate KMV PDs respond significantly more 

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Money Market Dispersion Index:

- Contractionary Haircut Shock **does not affect it.**
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Robustness - Bank Level Results:

- Run Bank Level Regressions of $\log(\text{Credit})$ on Haircut Shocks.
- Time, Bank and Country/Time FE. ▶
 - $\log(\text{NFC Credit})$ responds positively to Haircut shocks.
 - $\log(\text{HH Credit})$ responds positively and by more to Haircut shocks. ▶

Conclusion

- Haircut Gap Shocks are **an effective policy lever** for Central Banks:
 - Unemployment, Inflation.
 - Bank and Corporate Credit spreads.
- **Different from conventional policy rate shocks:**
 - Affects medium term of YC rather than short term.
 - Negative liquidity effects rather than positive.
 - No Money Market Dispersion.
- Stronger effects on Peripheral EA Countries.
- Positive effects on Risk Indicators.
- Positive effects on lending to HH and Firms.

THANKS!

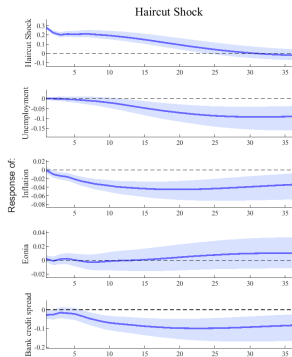
APPENDIX

References I

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Haircut Gap Shock

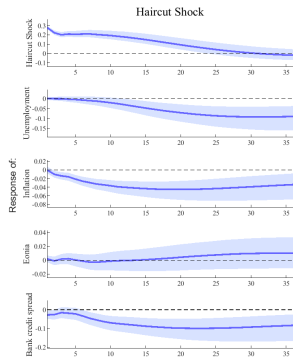
Haircut Gap Effects: Baseline and Credit Spreads



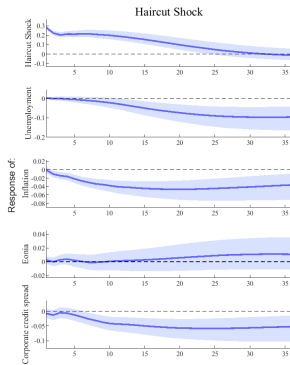
(a) Baseline

Haircut Gap Shock

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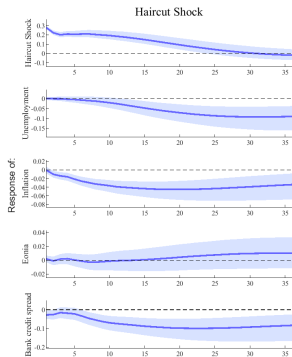
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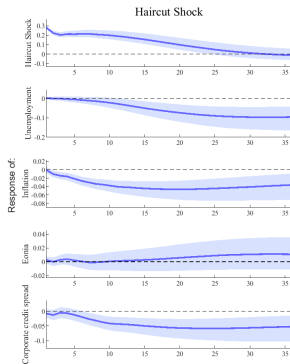
(b) NFC Credit Spread

Haircut Gap Shock

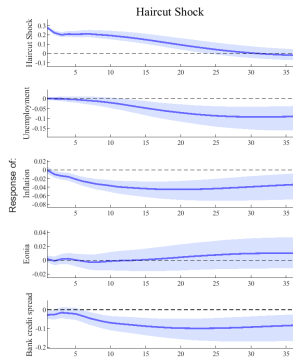
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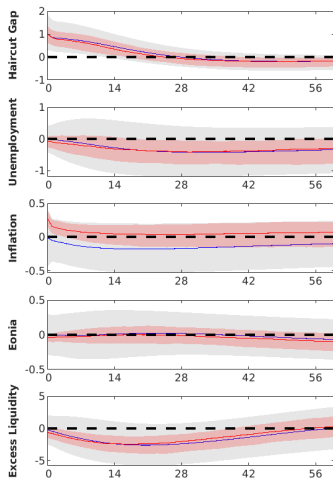


(c) Bank Credit Spread

Positive Effects on Unemployment and Credit Spreads.

Haircut Gap VS MP Shock - Excess Liquidity

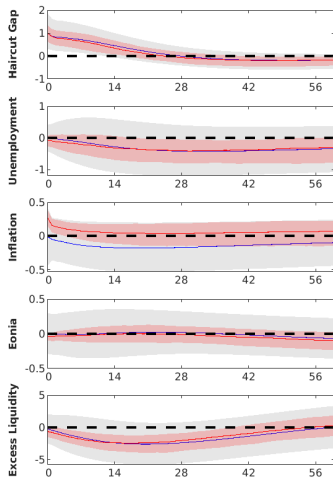
Baseline Specification + Excess Liquidity



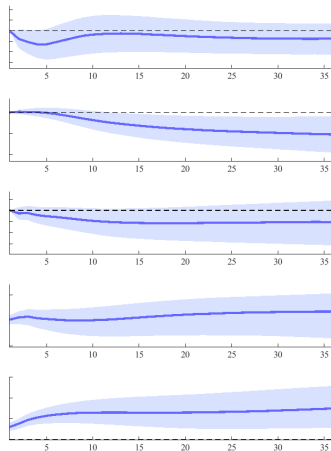
(a) Haircut Shock

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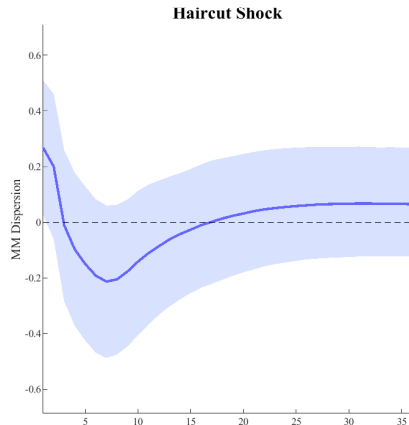
(a) Haircut Shock



(b) MP Shock

Money Market Dispersion Index

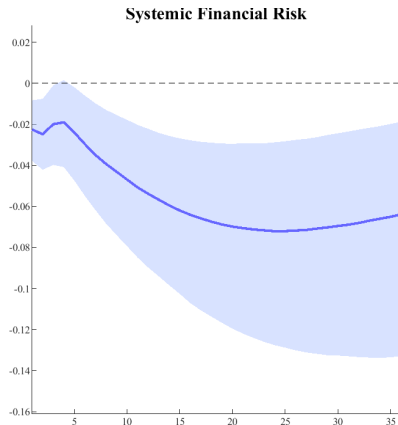
Money Market Dispersion Index (Duffie and Krishnamurthy (2016))



Index of rate dispersion in U.S. short-term money markets, the weighted mean absolute deviation of the cross-sectional distribution of overnight-equivalent rates, after adjusting for premia associated with credit risk and term structure.

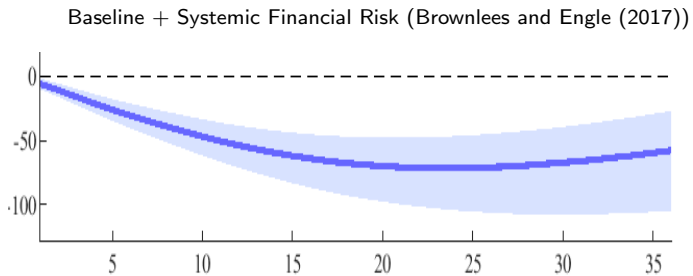
Financial Stability Indicators: Systemic Risk

Baseline + Systemic Financial Risk (Brownlees and Engle (2017))



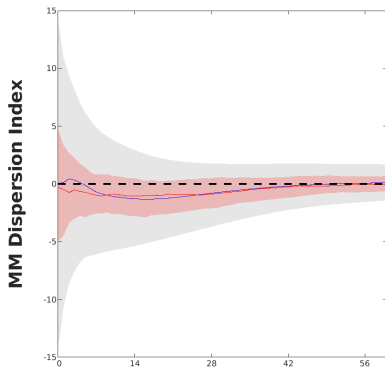
SRISK measures the conditional capital shortfall in case of a systemic event: $CS_{it} = k(A_{it}) - W_{it} = k(D_{it} + W_{it}) - W_{it}$, with k prudential capital, A assets, W equity, D debt, $SRISK_t = \sum_i \mathbb{E}_t(CS_{it+h} \mid Rm_{t+1:t+h} < C)$, Brownlees and Engle (2017).

Excess Liquidity

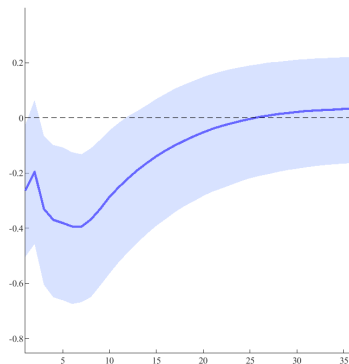


Haircut Gap VS MP Shock - Money Market Dispersion Index

Baseline + Money Market Dispersion index (Duffie and Krishnamurthy (2016))



(a) Haircut Shock

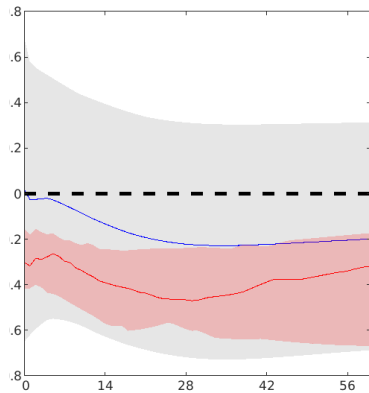


(b) MP Shock

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Haircut Gap VS MP Shock - Yield Curve

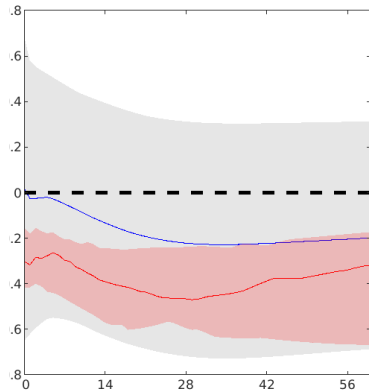
Baseline Specification + 10Y-3M Yield Curve Spread



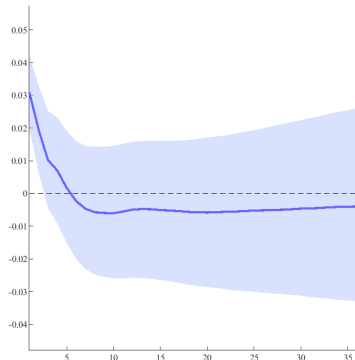
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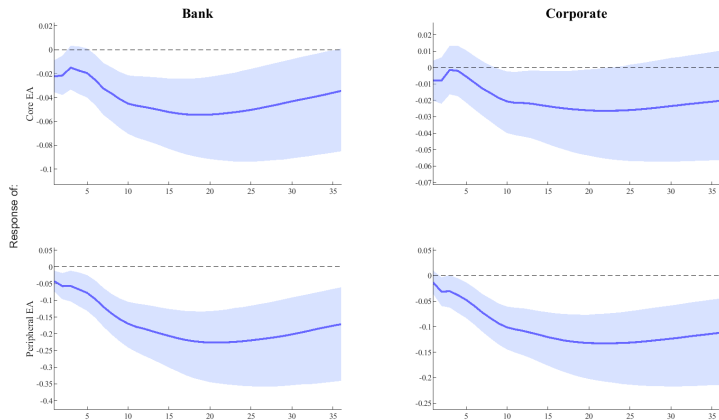
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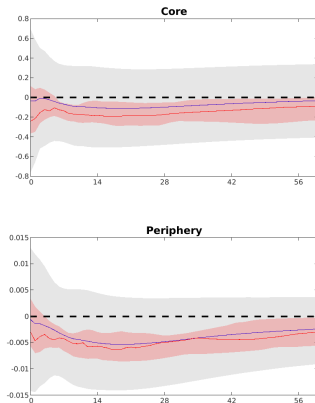
Credit Spreads Core VS Peripheral EA

Baseline + Credit Spreads (Gilchrist and Mojon (2018))

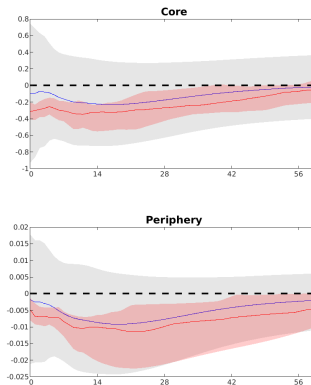


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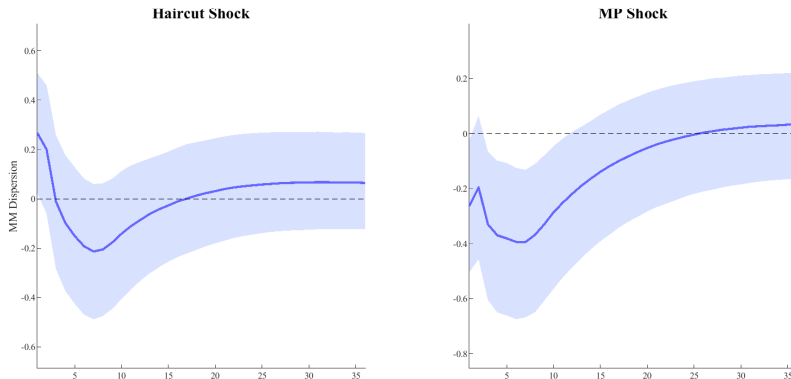
(a) Bank Credit Spreads



(b) Corporate Credit Spreads

Haircut Gap VS MP Shock - Money Market Dispersion Index

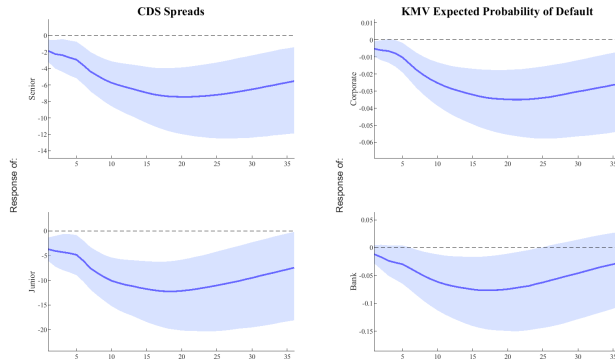
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Financial Stability Indicators

Baseline + Financial Stability Indicators



Markit CDS Indices covering 25 senior (CDS senior) and junior subordination (CDS subordinate) European banks measured in basis points. Expected Default Frequencies are defined as: $EDF = \mathbb{P}_t(V_t \leq D_t)$.

Bank-level Regressions - Methodology

- Merge bank-level haircut gaps with monthly unconsolidated bank balance sheet data.
- Explore effects on lending.

$$\log(\text{credit}_{b,t}) = \alpha_b + \alpha_{c,t} + \beta \text{HaircutGap}_{b,t-1} + \gamma X_{b,t} + \epsilon_{b,t}, \quad (1)$$

with:

$$\text{HaircutGap}_{b,t} = \frac{\sum_s (\text{HaircutGap}_{s,t} \times Q_{b,s,t=2008m8})}{\text{total assets}_{b,t-1}}, \quad (2)$$

Bank-level Regressions - Results

Table: LOLR lending Effects: credit to the private sector

	<i>log (NFC credit_{b,t})</i>		<i>log (HH credit_{b,t})</i>	
	(1)	(2)	(3)	(4)
HaircutGap _{b,t-1}	0.0250*** (0.00605)	0.0265*** (0.00850)	0.0358** (0.0178)	0.0508*** (0.0175)
Time FE	Yes	No	Yes	No
Bank FE	Yes	Yes	Yes	Yes
Country × Time FE	No	Yes	No	Yes
N	7,612	7,612	7,154	7,154
R ²	0.997	0.998	0.998	0.999

Notes: This table presents coefficients from the credit regressions, as described in equation (1). The reported coefficients are standardized. Standard errors are clustered at the bank and time level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$