Violating the Law of One Price: The Role of Non-Conventional Monetary Policy

Unconventional Monetary Policies: A Small Open Economy Perspective

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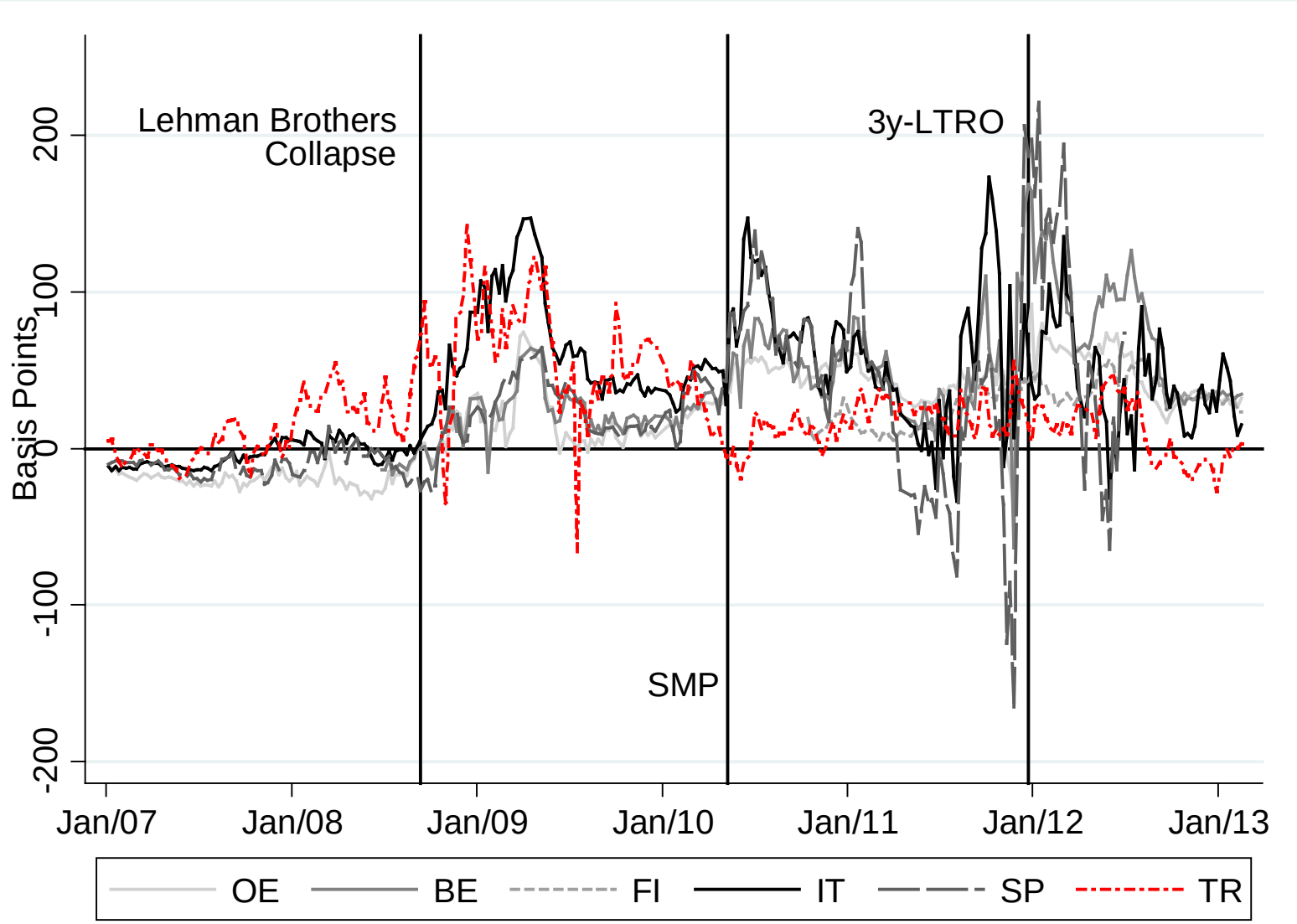
Introduction

- October 2008 - February 2013 USD-denominated bonds were *cheaper* on average than comparable EUR-denominated bonds issued by the same euro zone country
  - Countries - Austria, Belgium, Finland, Italy, and Spain
  - Pairs of bonds - For each USD-denominated bond we find a comparable bond denominated in Euro

$$Basis_{i,j,t} = YTM_{m,j,t}^{USD \rightarrow EUR} - YTM_{n,j,t}^{EUR}$$

    - $YTM_{m,j.t}^{USD \rightarrow EUR}$ yield-to-maturity of synthetic (from USD to EUR) bond m issued by country j
    - $YTM_{n,j,t}^{EUR}$ yield-to-maturity of EUR-denominated bond n issued by country j

Introduction



Results Overview

- Limited empirical evidence on the impact of CB lending facility on asset prices
  - Ashcraft et al. (2011) & Campbell et al. (2011)
- We stress the role of CB Collateral Policy and Liquidity Facilities
  - Changes in ECB haircuts affect prices (lasting impact)
  - ECB lending factors
    - CCPs vs ECB haircuts
    - Liquidity withdrawn by strongly-constrained banks
    - Collateral pledged by strongly-constrained banks

  significantly add to the explanation of our basis and of cross-sectional country differences

Basis & Theory

- Garleanu & Pedersen (GP2011) propose the *marginal* CAPM

$$E(r^i) = r_f + \beta^i \text{x}\, covariace\ risk\ premium + m^i \text{x}\, \psi$$

  - where m^i refers to the haircut and ψ is the shadow cost of capital
- Different haircuts imply different prices (when borrowing constraints bind)
- Basis: gap between the return of securities with identical cash-flows but different haircuts $m^i \neq m^{i'}$

$$\underbrace{E(r^i) - E(r^{i'})}_{Basis} = \psi \text{ x } (m^i - m^{i'})$$

- In this setup we should expect greater deviations when:
  - borrowing constraints are binding
  - haircuts are greater

Data

- **Bond pairs**
  - 19 pair-bonds belonging to Italy (9), Spain (4), Austria (2), Belgium (2), Finland (2)
  - Daily bid and ask prices (Bloomberg BGN)
- **Bond factors:** lending activity, governing laws, additional clauses (Dealogic)
- **Market factors:** Quanto CDS, Euribor-Eurepo, XCS
- **ECB data**: Liquidity withdrawn from ECB (bank level), collateral pledged (bond/bank level) and ECB haircuts
- **Private repo haircuts** (BME and CC&G)

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Do ECB haircuts affect market prices?

- Changes in the collateral policy
  - 14 Nov 2008 - 31 Dec. 2010: temporary expansion of the collateral (announcement on 15 Oct 2008)
    - ECB admits bonds in USD
    - If USD-denominated bond is eligible, it is subject to an additional haircut (mark-down)
  - ECB publishes the list of eligible assets on 14 Nov 2008
- Our sample: 6 out of 19 pairs became eligible

Do ECB haircuts affect market prices?

Illustrative example for a pair

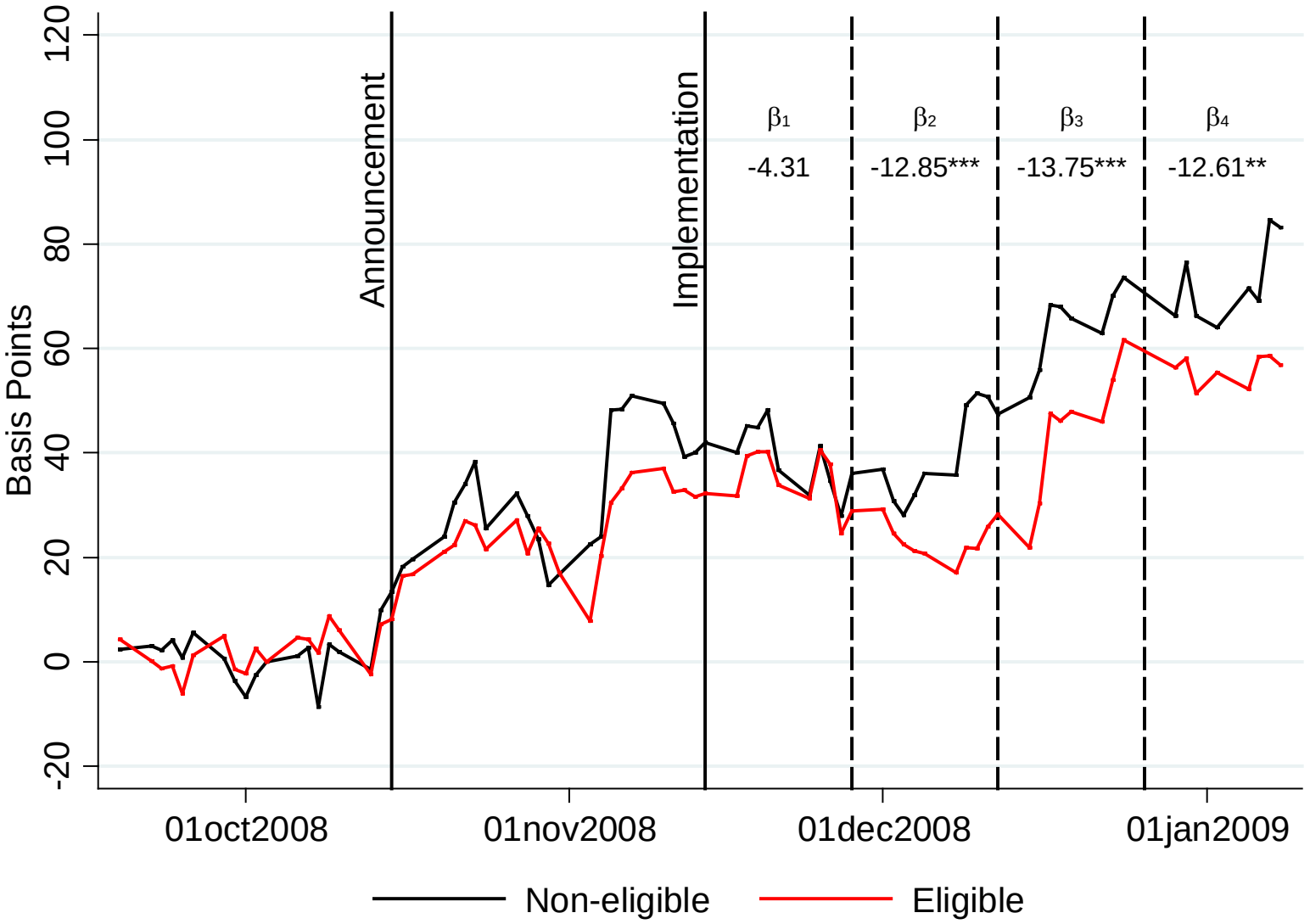
- EUR denominated bond is subject to a 3% haircut
  - $€100x(1-3\%) = €97$
- Eligible USD-denominated bond is subject to an additional 8% haircut
  - $€100x(1-3\%)x(1-8\%) = €89.24$
  - Overall haircut of 10.76%
- No Eligible USD-denominated bond: 100% haircut

Do ECB haircuts affect market prices?

- Theoretical background (GP2011)
  - A reduction in the haircut of an asset lowers its yield
- Objective
  - Test whether the changes in the ECB haircuts explains the changes basis
- Methodology: Diff-in-Diff
  - Test for the effect of the change in the eligibility criteria over a window of 8 weeks (56 days) before and after the intervention date

$$Basis_{i,j,t} = \alpha + \delta_{i,j} + \gamma_{i,j} Eligible_{i,j} + \sum_{k=1}^{4} \eta_k After_k + \sum_{k=1}^{4} \beta_k After_k \text{x} Eligible_{i,j} + \varepsilon_{i,j,t}$$

Do ECB haircuts affect market prices?



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Does the ECB drive the basis via ECB liquidity facilities?

- Theoretical Background (GP2011)
  - Greater deviations from the LoOP when
    - Limited ability of banks to borrow against their securities due to funding constraints
    - ECB haircuts lower than market
- Objective
  - Test whether the basis increases as liquidity facilities provided to constrained banks increase
- Methodology – Panel regression analysis

$$Basis_{i,j,t} = \alpha + \delta_j + \sum_{k=1}^{K} \gamma_k \, BF_{k,t} + \sum_{l=1}^{L} \zeta_l \, MF_{l,t} + \beta MP_t + \varepsilon_{i,j,t}$$

  - Control variables based on LA: BF & MF

Does the ECB drive the basis via ECB liquidity facilities?

- Proxies of ECB liquidity facilities (MP)
  - CCP vs. ECB haircuts (Pair Specific)
  - Liquidity Measure (Aggregate)
    1. Collateral coverage ratio

$$CCR = \frac{Total\ Borrowing\ with\ the\ ECB}{Total\ Post - Haircut\ Market\ Value\ of\ Collateral}$$

    2. Sort banks into three groups based on the pctl of the CCR distribution
    3. Banks that have a CCR higher than the 66th pctl are identified as strongly-constrained
    4. Liquidity drawn by this group
  - Collateral measure (Country Specific)
    - Share of total collateral in the sovereign country j debt pledged to the ECB by the strongly-constrained banks

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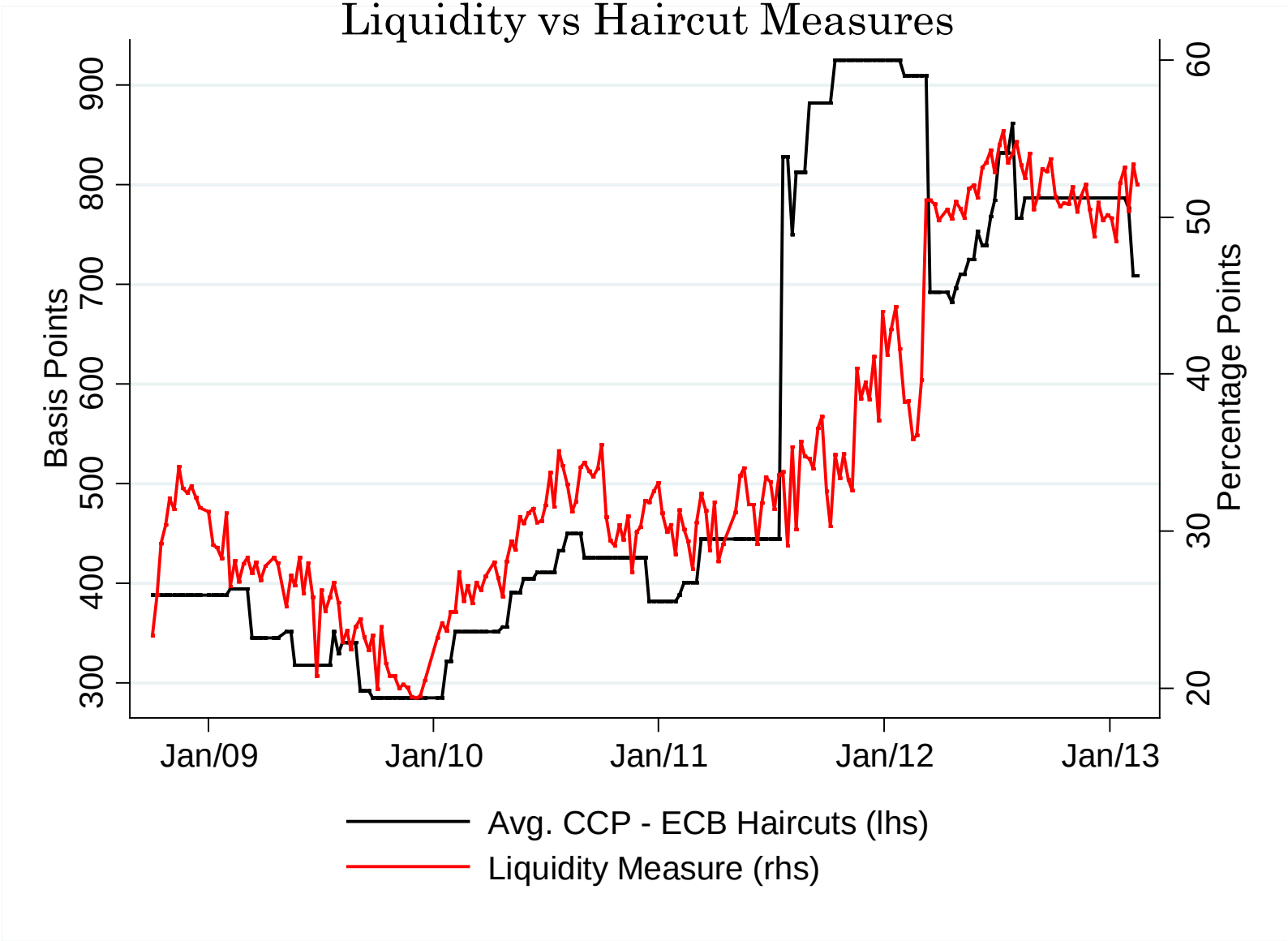

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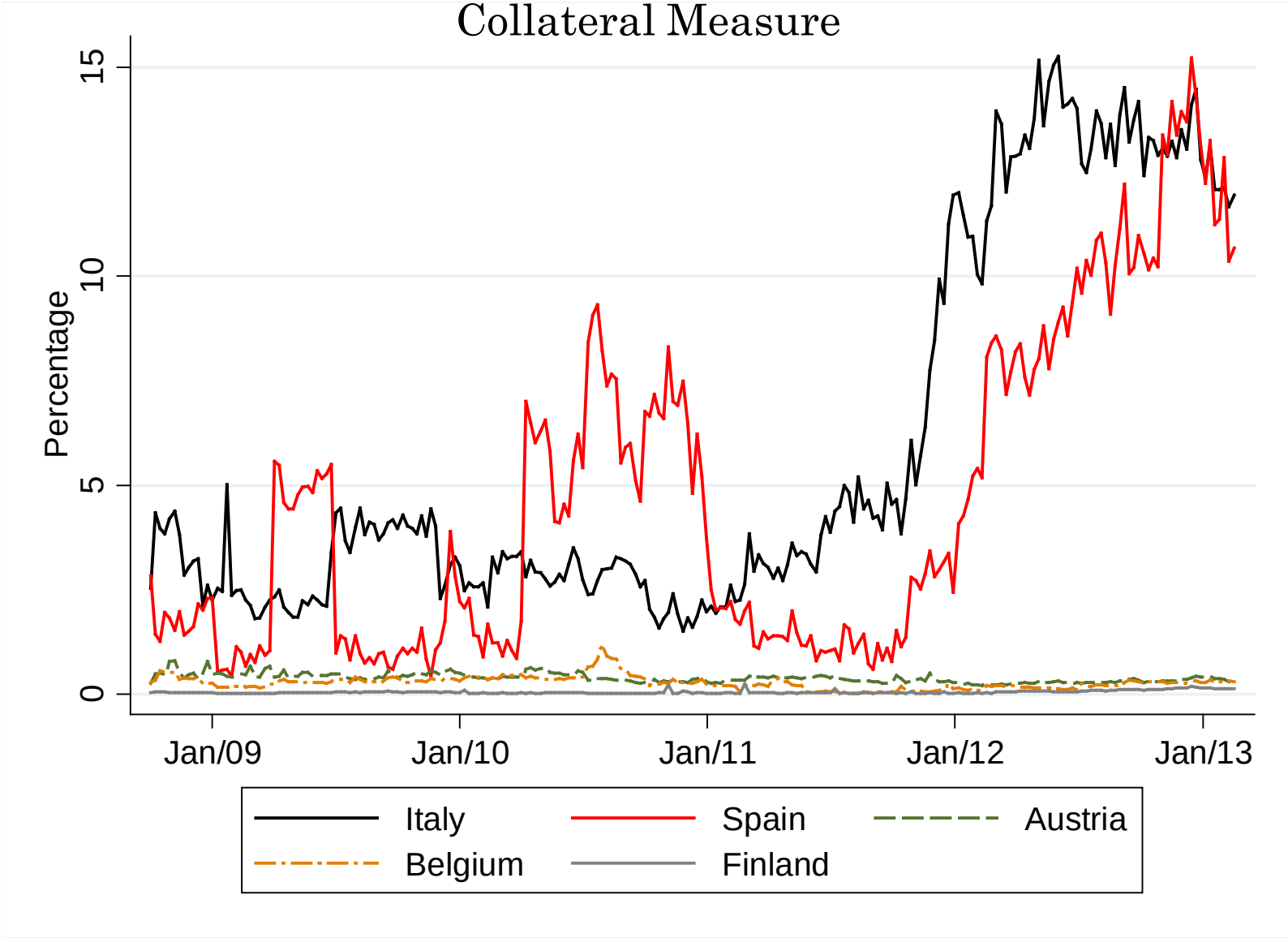


Does the ECB drive the basis via ECB liquidity facilities?

	(1)	(2)	(3)	(4)
	Italy&Spain		Austria&Belgium&Finland	
	Financial Crisis	Euro Area Sov. Debt Crisis	Financial Crisis	Euro Area Sov. Debt Crisis
Panel A - Differences in Haircuts (CC&G - BME)				
CCP - $ECB_{i,j,t}$	0.008	6.136***		
	[0.048]	[58.906]		
R-squared	0.331	0.115		
Panel B - Liquidity Measure				
$Liquidity_t$	0.908***	1.803***	1.224***	1.444***
	[9.681]	[16.522]	[13.47]	[14.916]
R-squared	0.321	0.109	0.188	0.089
Panel C - Collateral Measure				
$Collateral_{j,t}$	-2.341***	4.987***	-2.138	-12.156
	[-8.109]	[37.449]	[-0.576]	[-4.845]
R-squared	0.318	0.111	0.151	0.065
Observations	711	797	265	491
Bond&Market Factors	YES	YES	YES	YES
Country FE	YES	YES	YES	YES

Coefficient x the 90^{th} -10^{th} pctl of the independent variable in brackets

Conclusion

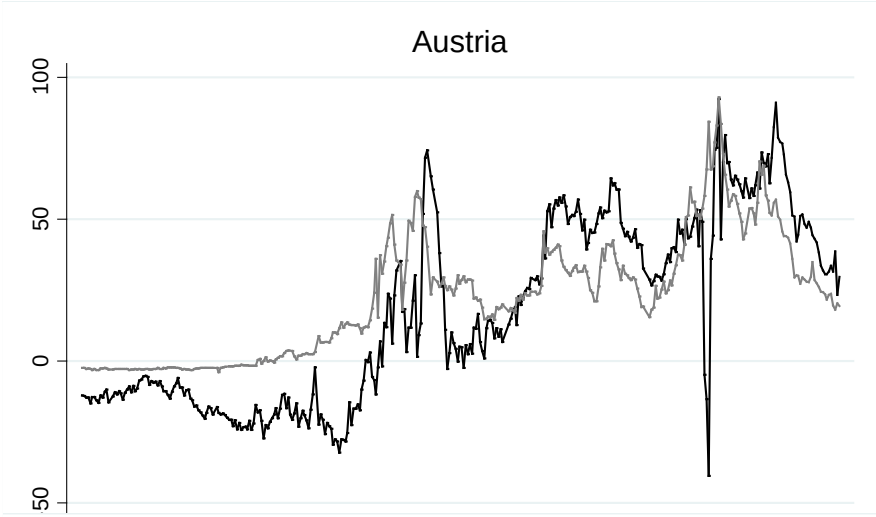
- We provide novel empirical results that firmly link the ECB non-conventional monetary policy to the basis
- These results are consistent with the theoretical framework of GP2011
  - The basis is sensitive to changes in the ECB haircuts policy
  - The increase in haircuts by CCP leads to a larger basis in periods when the ECB kept haircuts substantially lower and stable
  - The basis widens when strongly-constrained banks need central bank liquidity

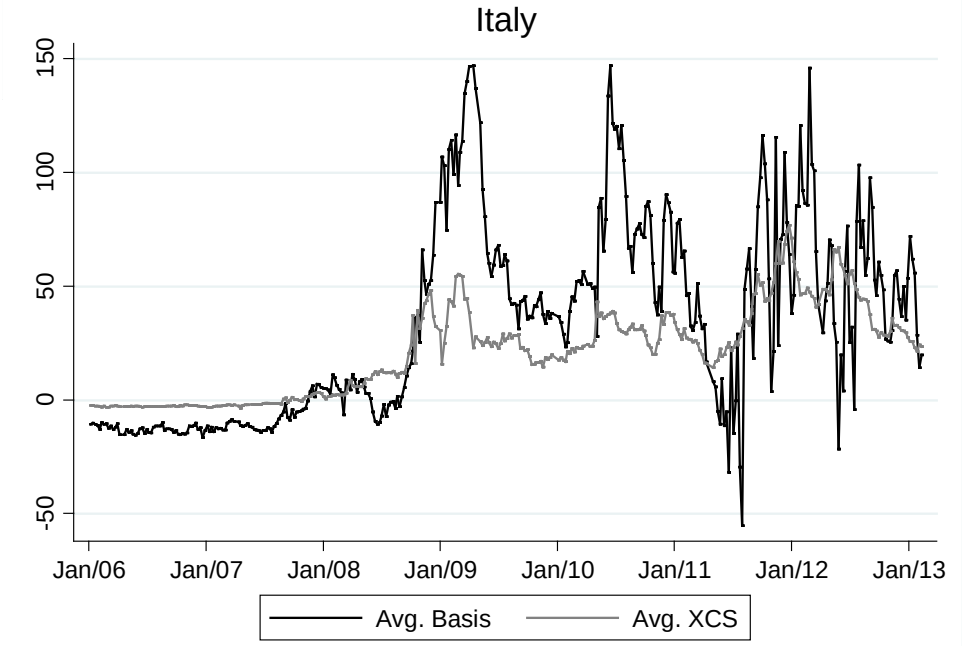
Thanks for your attention

Basis & LA

- What drives the basis?
- Is the basis mainly driven by the global scarcity of USD?

Basis & LA





- Is the basis mainly driven by the global scarcity of USD?
  - Yes/No
- We observe cross sectional differences across countries but the current swap spreads are common across countries