Discussion of "Violating the law of one price: the role of non-conventional monetary policy"

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Summary

- Basis (YTM of the USD-denominated and EUR-denominated bonds) is high and persistent.

$$Basis_{i,j,t} = AskYTM_{m,j,t}^{USD->EUR} - BidYTM_{n,j,t}^{EUR}$$

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- What is the role of ECB's non-conventional monetary policy in affecting bond yields during the financial and euro area sovereign debt crises?
  - Fixed-rate full allotment (USD-bonds eligible as collateral).
  - **Haircut policy.**
  - Long-term refinancing operations (LTRO).

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- Non-conventional MP affected the basis through the haircut channel
  - Basis is sensitive to changes in the ECB haircuts applied on USD-bonds.
  - Haircut difference by CCPs and ECB affect the basis.
  - Basis widens when funding conditions are tight.

Market frictions for basis

- Liquidity and fungability – collateral value, liquidity, fungability
- Funding risk – Each arbitrageur has contemporaneous access to both USD and EUR.
- Market segmentation – Both bond markets are accessible by the arbitrageur at the same time.
- Default risk – Variation in bankruptcy laws.

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- MAIN MESSAGE.

CIRP with margin

- Covered interest rate parity (CIRP)

$$\frac{X(t)}{F(t,T)}(1+R^a(t,T))-(1+R^b(t,T))=0$$

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- CIRP with default risk – Buraschi, Menguturk, and Sener (2014)

$$\left[\frac{X(t)}{F(t,T)}(1+R^a(t,T))-(1+R^b(t,T))\right]+\left[\frac{X(t)}{F(t,T)}S^a(t,T)-S^b(t,T)\right]=0$$

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- CIRP with margin – This paper

$$\left[\frac{X(t)}{F(t,T)}(1+R^a(t,T))-(1+R^b(t,T))\right]+$$
$$\left[\frac{X(t)}{F(t,T)}\psi(t)^{\$}m^a(t)-\psi^{EUR}(t)m^b(t)\right]=0$$

What happened?

- **Pre-crisis**
  - Banks had large USD positions and relied heavily on wholesale funding (U.S. financial institutions, e.g. money market mutual funds).

    "Between 2000 and mid-2007 European banks ***net long US dollar positions*** *grew to around* ***USD 800 billion****, being funded in euro. This created significant exchange rate risk and considerable dependence on the foreign exchange swap market" (ECB, 2009).*

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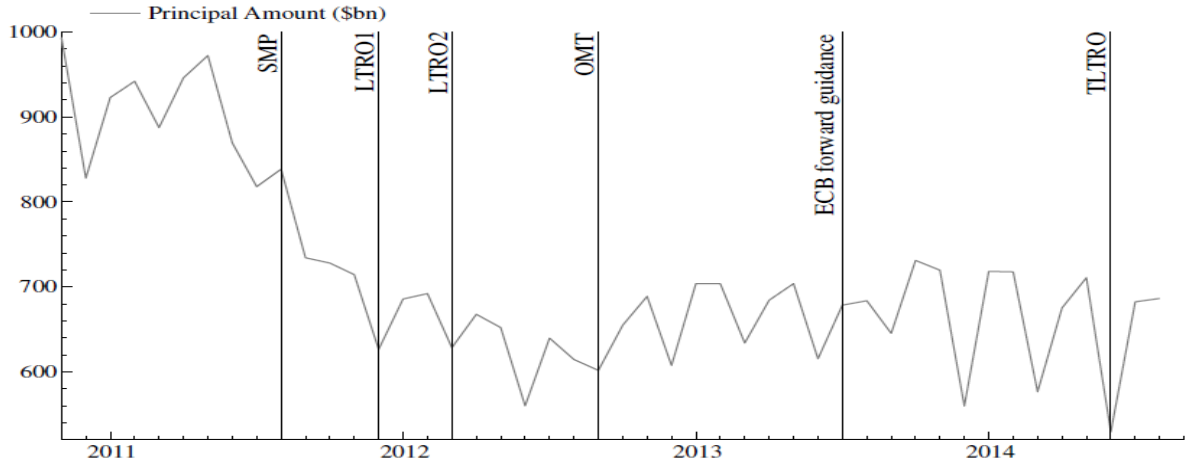
- **Financial Crisis – post-Lehman**
  - General increase in counterparty risk and the capital repatriation by the U.S. financial institutions reduced the supply of USD in the interbank market.
  - ECB provided liquidity in foreign currencies, particularly USD, through swap lines with the Federal Reserve.

What happened?

- **Euro area sovereign debt crisis**

Figure 1: **Money Market Funds investments at European banks**
The graphs show the principal amounts of unsecured (Panel A) vs. secured funding (Panel B) invested at GIIPS, Eurozone non-GIIPS, and non Eurozone banks ($bn). Vertical bars indicate ECB interventions: SMP (08/2011), LTRO 1 (12/2011), LTRO 2 (03/2012), OMT (09/2012), ECB forward guidance (07/2013), TLTRO (06/2014).

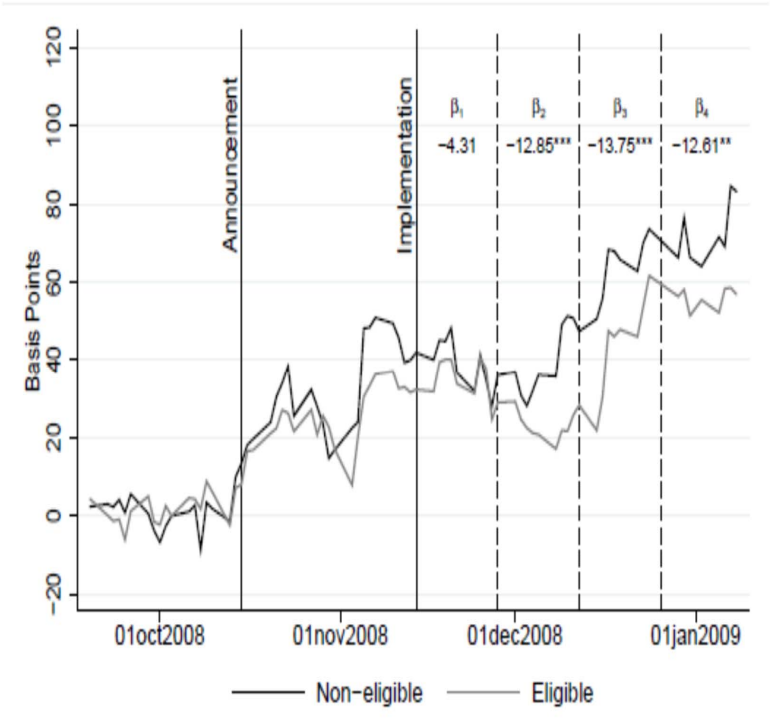
(a) MMF investments ($bn) - All securities

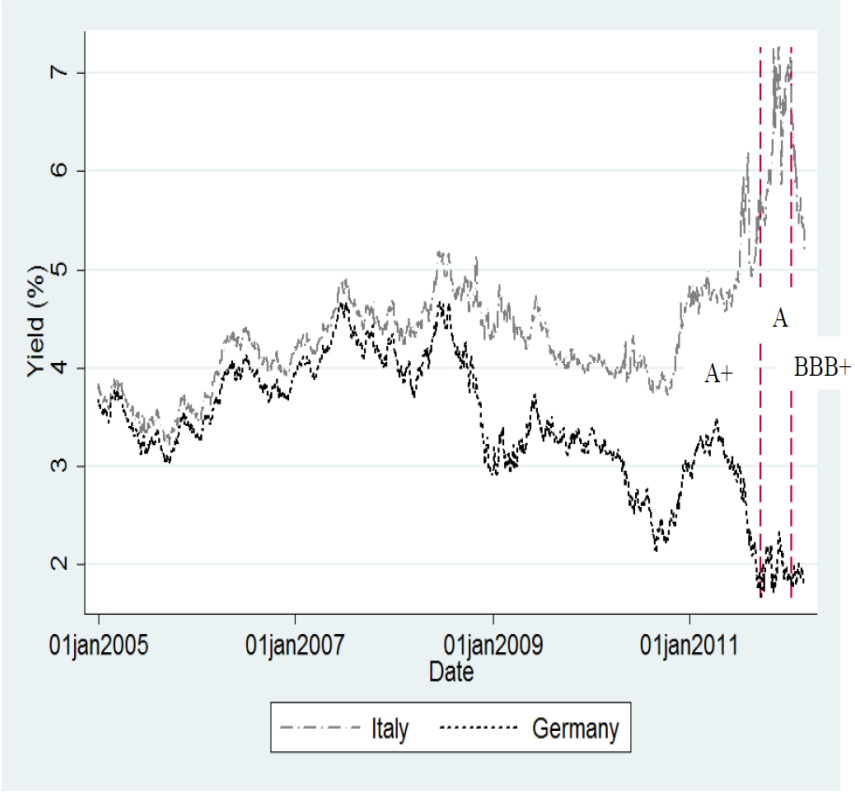


US MMF reduced funding owing to concerns about the creditworthiness of the banks, leading to USD shortages.

Joint role played by rising funding costs and higher margins deterred arbitrageurs from exploiting mispricing.

Margin OR ...



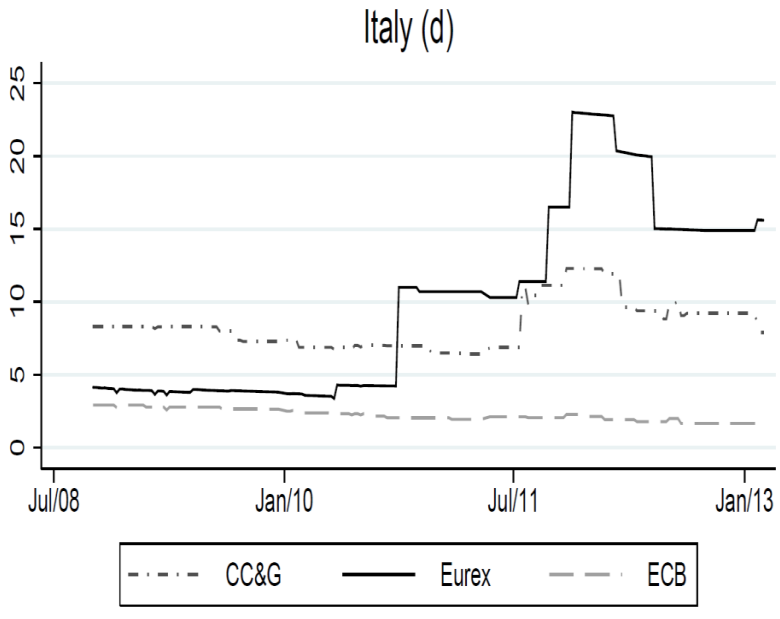


- Bonds included in the first implementation (14 November 2008 [Sept 2008 - Jan 2009])
  - *Eligible*: 1 Belgium, 1 Spain, 2 Austria
  - *Non-Eligible*: 1 Spain, 6 Italy

Haircut spread

$$Basis_{i,j,t} = \alpha + \delta_j + \beta_1 \times \text{Bond Factors} + \beta_2 \times \text{Market Factors} + \beta_3 \times \text{Monetary Policy Factors} + \varepsilon_{i,j,t}$$

	Italy & Spain		
	(1) Financial Crisis	(2) Sovereign Debt Crisis	(3) Post Sovereign Debt Crisis
Panel A - Eligibility			
Eligibility Window$_t$	1.769	24.628***	-5.056
Eligible Pair$_{i,j}$	13.166	54.164***	
Eligibility Window$_t$xEligible Pair$_{i,j}$	13.756	-36.615**	
R^2	0.315	0.110	0.275
Panel B - Haircuts (CC&G, BME)			
CCP -ECB Haircut$_{i,j,t}$	0.008	6.136***	4.888*
	[0.048]	[58.906]	[25.662]
R^2	0.311	0.115	0.283
Panel C - Haircuts (Eurex)			
Eurex -ECB Haircut$_{i,j,t}$	-0.024	1.216*	2.189
	[-0.029]	[21.360]	[10.120]
R^2	0.311	0.094	0.279
Panel D - Liquidity			
Liquidity$_t$	0.908***	1.803***	1.036
	[9.681]	[16.522]	[10.701]
R^2	0.321	0.109	0.276
Panel E - Collateral			
Collateral$_{j,t}$	-2.341***	4.987***	6.150***
	[-8.109]	[37.449]	[15.116]
R^2	0.318	0.111	0.293
Num. Obs.	711	797	275
Bond Factors	YES	YES	YES
Market Factors	YES	YES	YES
Country FE	YES	YES	YES



- Increase in CCP haircuts of the EUR-denominated bonds is associated with an increase in the basis?

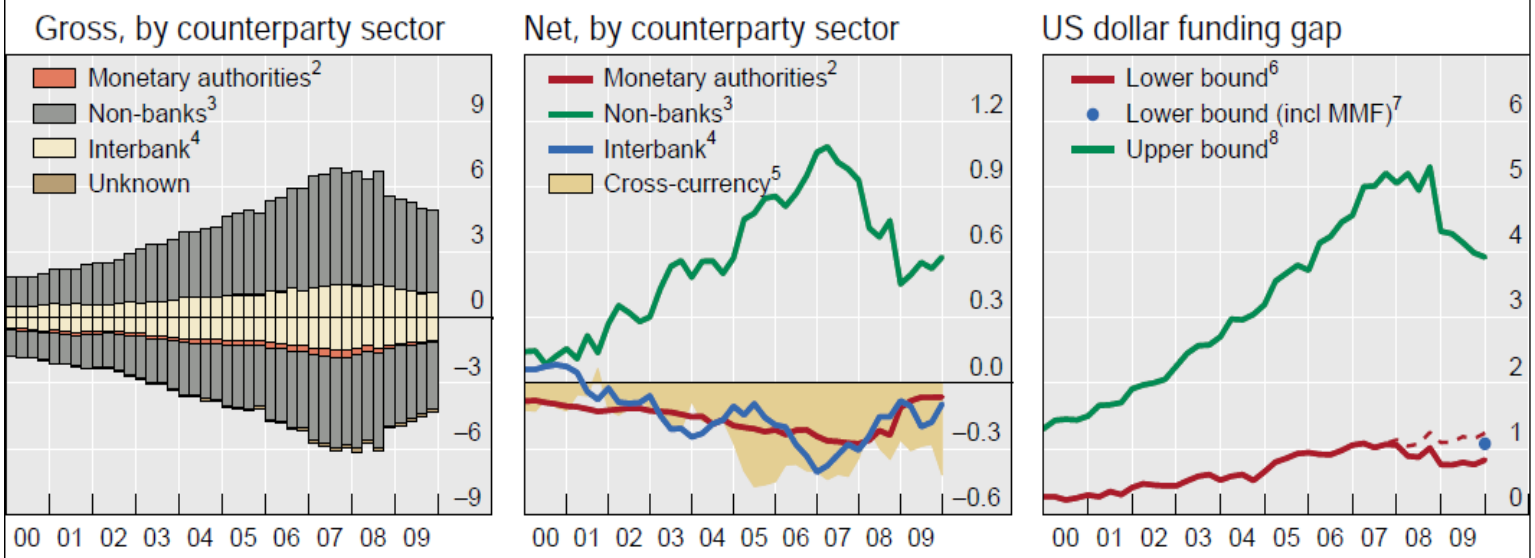
Policy Implications

- Policy implications for preventing security mispricing during crisis periods?
- *"Our results are consistent with a weakening of market discipline of short-term debt during the sovereign debt crisis...repeatedly lowering its collateral standard, the ECB was effectively providing assistance to banks that likely had solvency issues. In other words, the interventions by the ECB facilitated forbearance by national regulators rather than curtailing these incentives."* Acharya, Pierret, Steffen (2015)

Dollar Funding Gap

Long-USD European banks' on-balance sheet USD positions[1]

In trillions of US dollars



[1] Estimates are constructed by aggregating the worldwide on-balance sheet cross-border and local positions reported by internationally active banks headquartered in Germany, the Netherlands, Switzerland and the United Kingdom. [2] Positions vis-à-vis official monetary authorities. Excludes liabilities to Japanese monetary authorities placed in banks located in Japan. [3] International positions vis-à-vis non-banks plus local positions vis-à-vis US residents (all sectors) booked by banks' offices in the United States. No sectoral breakdown is available for these positions. [4] Estimated net interbank lending to other (unaffiliated) banks. [5] Implied cross-currency funding (ie FX swaps), which equates US dollar assets and liabilities. [6] The dashed red line is the estimate after adding back in writedowns of assets (based on Bloomberg data). [7] Lower bound estimate plus estimated US dollar liabilities to money market funds (based on JPMorgan data). [8] Same as the lower bound estimate, but all liabilities to non-banks are assumed to be short-term.

Sources: Bloomberg; JPMorgan; BIS consolidated statistics (immediate borrower basis); BIS locational statistics by nationality. Graph 2

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