Central Bank Interventions, Demand for Collateral, and Sovereign Borrowing Costs

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RESEARCH QUESTION

- Collateralized lending to banks $\overset{?}{\rightarrow}$ sovereign yields
- Our laboratory: Portugal during the Dec11 ECB liquidity injections (3Y-LTROs)
  - Largest liquidity injection ever made: $>$ €1 tn
  - Peripheral country with high sovereign credit risk
  - Unique dataset from Banco de Portugal

THIS PAPER

1. Banks purchased Portuguese govt debt after the 3Y-LTRO announcement, *before* the allotment
   - Pledge them at the ECB, collateral trade
   - Purchased mostly short-term bonds
2. Equilibrium effects
   - Sovereign yield curve steepens
   - Strategic behavior: debt agency takes advantage of the steepening to resume issuance of ST bonds
3. Main result: vLTRO boosted demand for public debt
   - Short-Term: 12 to 17 percentage points of amount issued.
   - Long-Term: 1.3 to 2.1 percentage points

LITERATURE REVIEW

1. Linkages between sovereign and financial sector
   - Broner et al. (2010), Acharya et al. (forthcoming), Farhi and Tirole (2014), Beltratti and Stulz (2015), Brutti and Saure (2013), Drechsler et al. (forthcoming), Bo and Ivashina (2014), Crosignani (2014), Uhlig (2013), Gennaioli et al. (2012), Gennaioli et al. (2014)
2. Transmission of monetary policy trough banks
   - Kashyap and Stein (2000), Chodorow-Reich (2014), Andrade et al. (2014), Drechsler et al. (2014), Jimenez et al. (2014), Trebesch and Zettelmeyer (2014)
3. Management of sovereign debt maturity
   - Bai et al. (2015), Broner et al. (2013), Arellano and Ramanarayanan (2012)
4. Fiscal and monetary policy coordination during the financial crisis
   - Greenwood et al. (2014), Greenwood et al. (2015)

OUTLINE

1. The 3Y-LTRO
   - Two stylized facts
2. Simple theoretical framework to
   - Rationalize these two facts
   - Yield three additional empirical implications
3. Empirical tests
   - Alternative explanations

EMPIRICAL SETTING

ECB REGULAR OPEN MARKET OPERATIONS

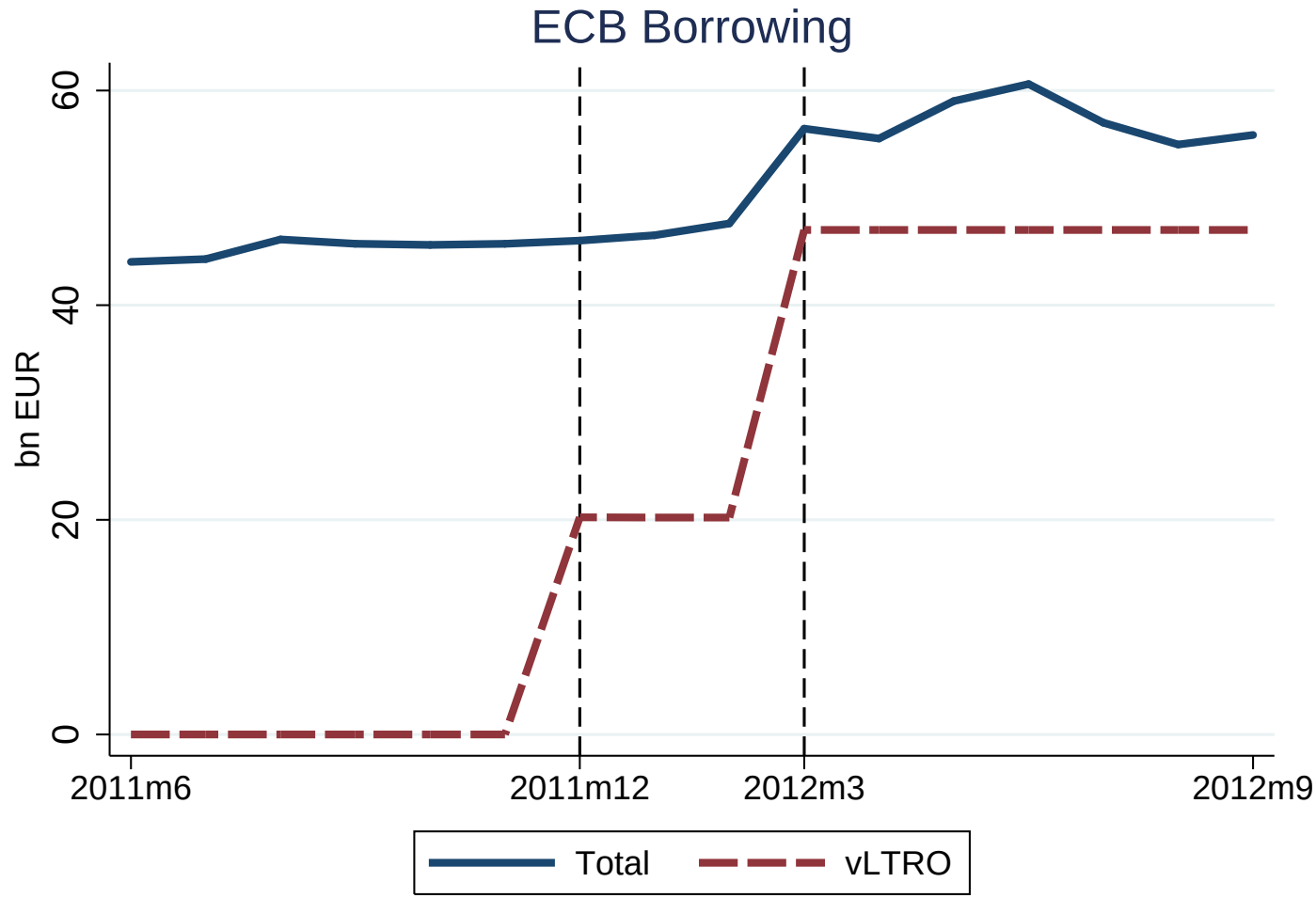
- OMO conducted through repurchase agreements
  - Cash loans in exchange for collateral (w./ haircut)
  - Contrast with US-style market-based operations

- Regular open market operations
  - MROs: one-week maturity
    $\approx$ 75% overall liquidity provided
  - LTROs: three-month maturity
    occasionally extended during the crisis up to one-year

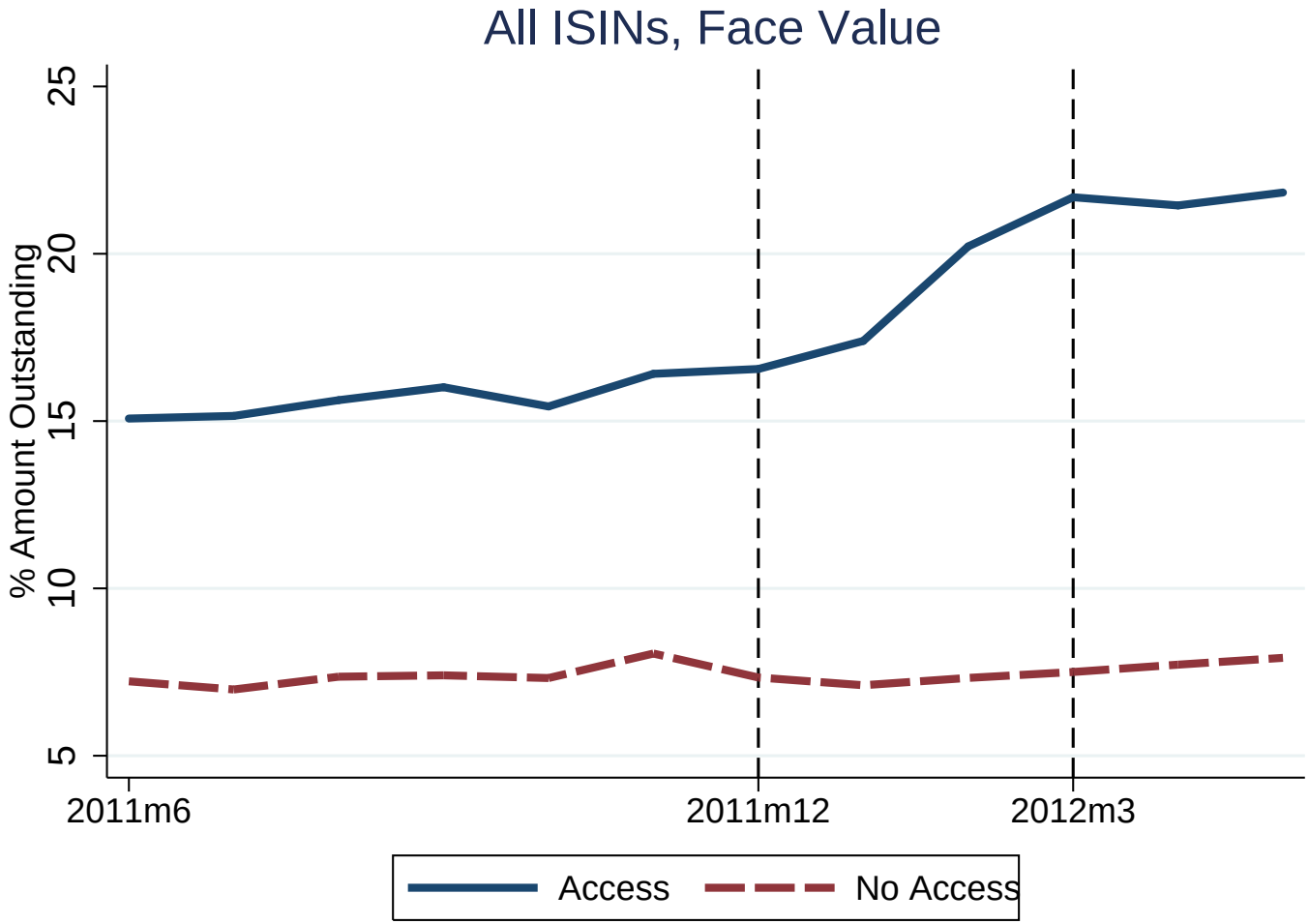
The 3-Year Long Term Refinancing Operation (vLTRO)

- Very attractive 3-Year loans for banks
- Little time between announcement and first allotment

FACT 1: POSITIVE *Net* UPTAKE ONLY AT LTRO2



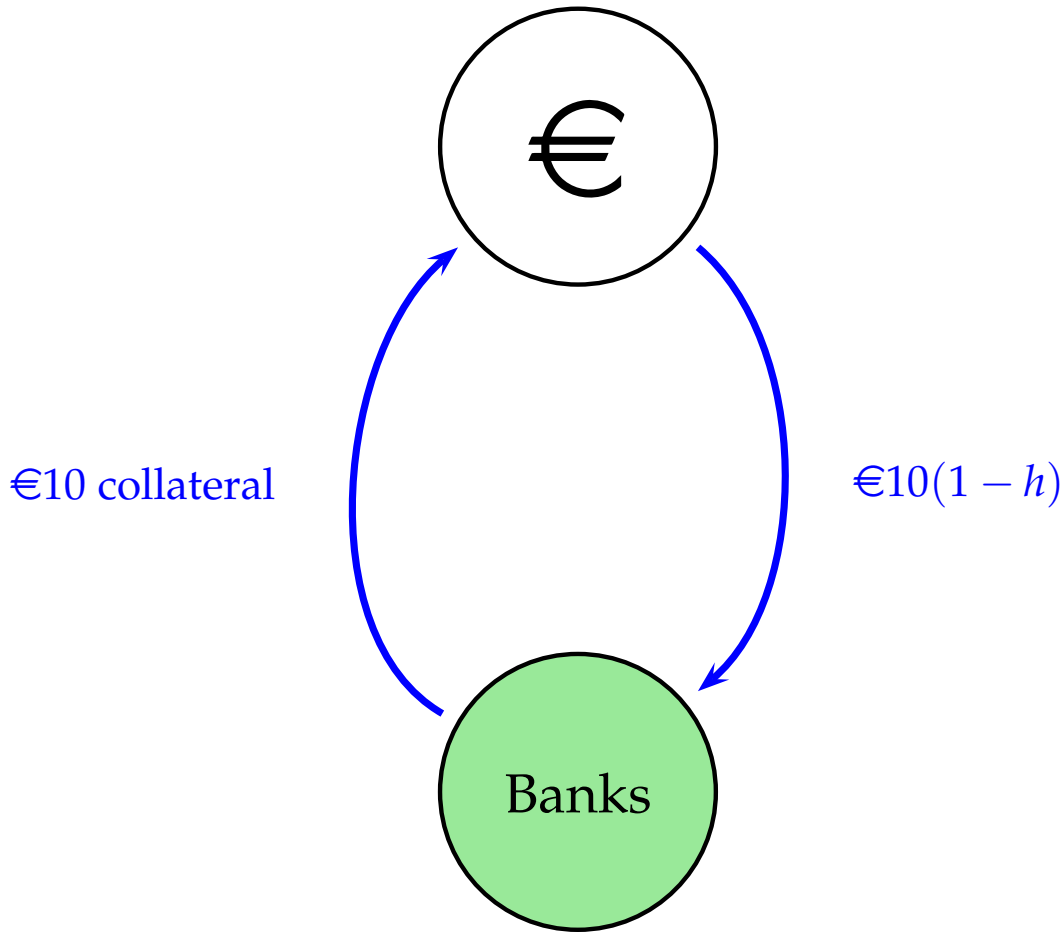
FACT 2: GOVT BOND HOLDINGS ↑ *Between* LTROS



The Collateral Trade

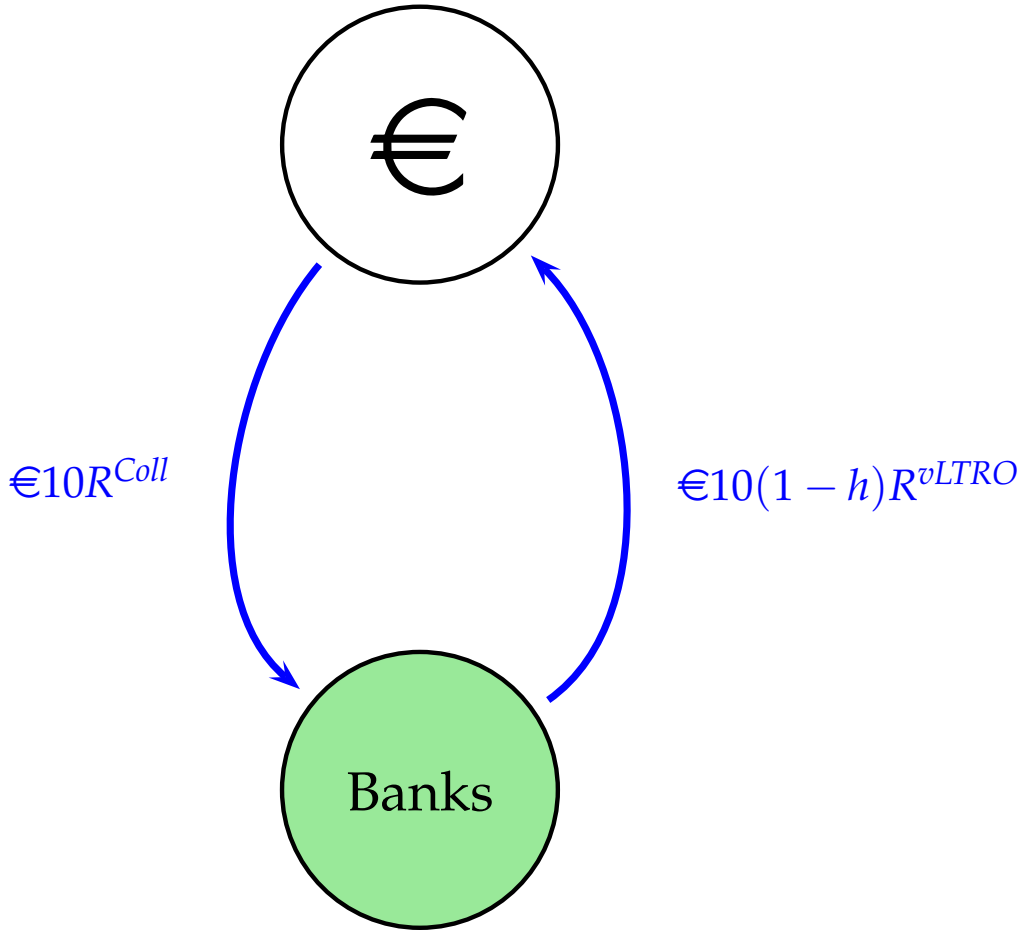
THE "COLLATERAL TRADE"

t=0: bank with €10 of available collateral borrows from ECB



THE "COLLATERAL TRADE"

t=1: bank repays ECB loans and gets collateral back

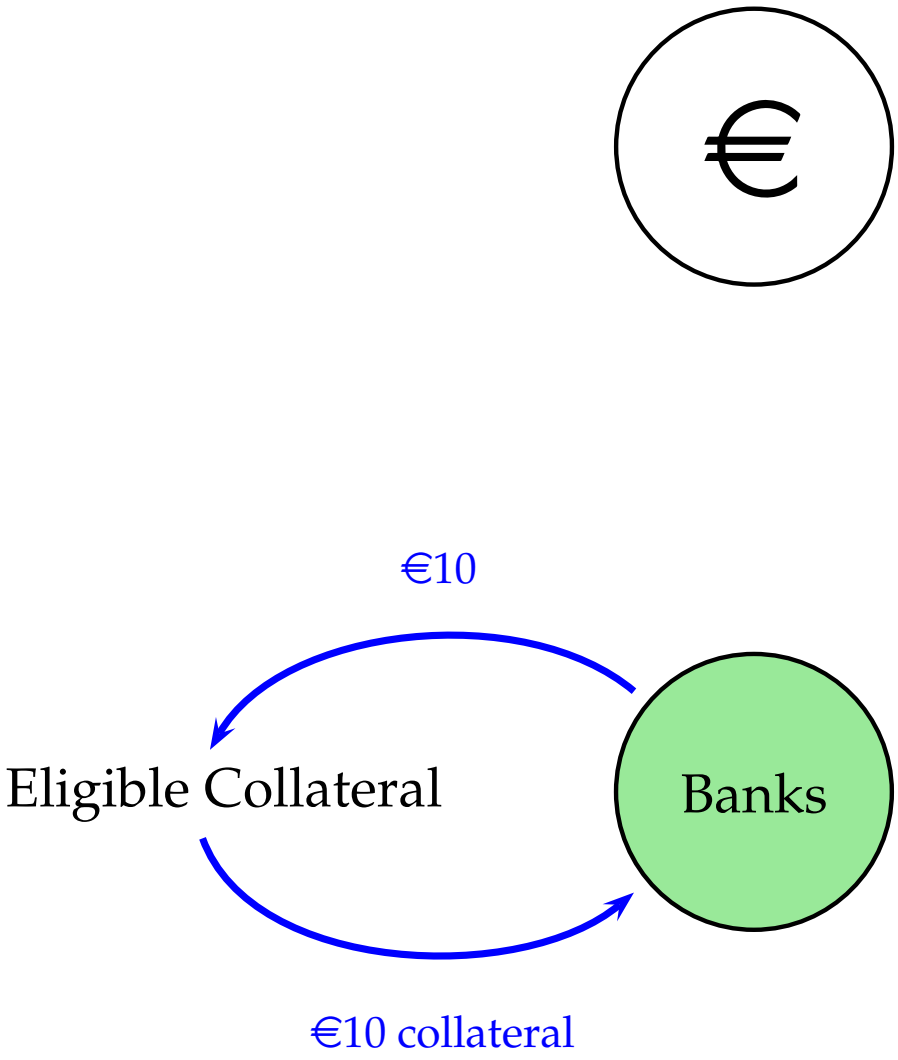


Profit if $R^{Coll} > (1-h)R^{vLTRO}$
$5\% > (.95)1\%$

Also cash $(1-h)$€10 available between $t=0$ and $t=1$

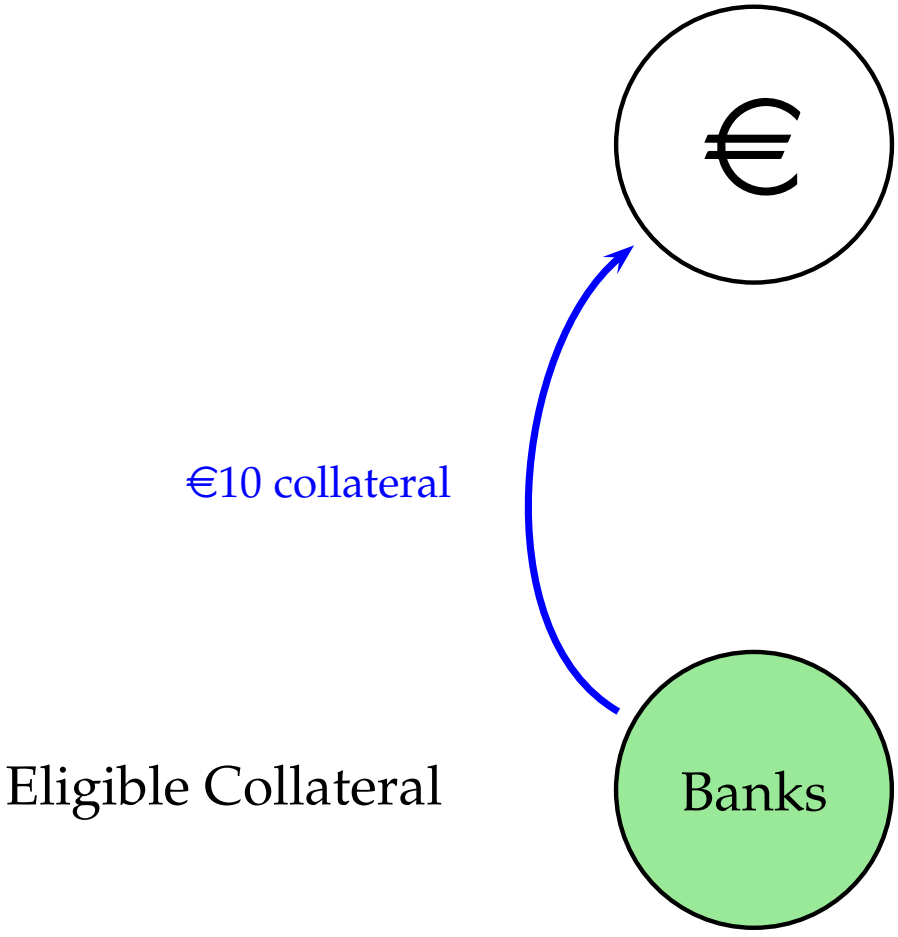
THE "COLLATERAL TRADE"

t=0: bank with **no** available collateral gets it in the secondary market



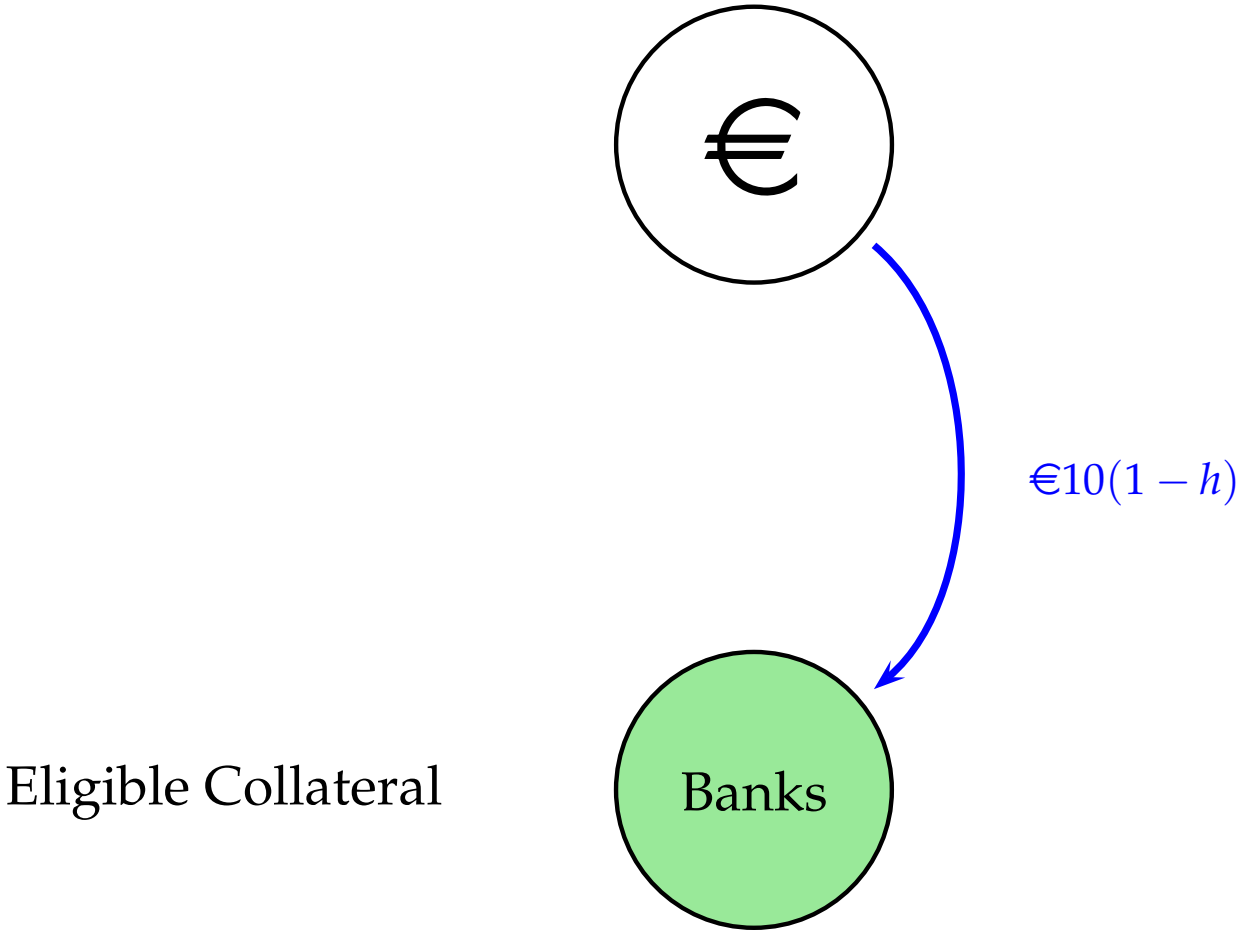
THE "COLLATERAL TRADE"

t=0: bank then pledges collateral at ECB



THE "COLLATERAL TRADE"

t=0: bank gets ECB funds



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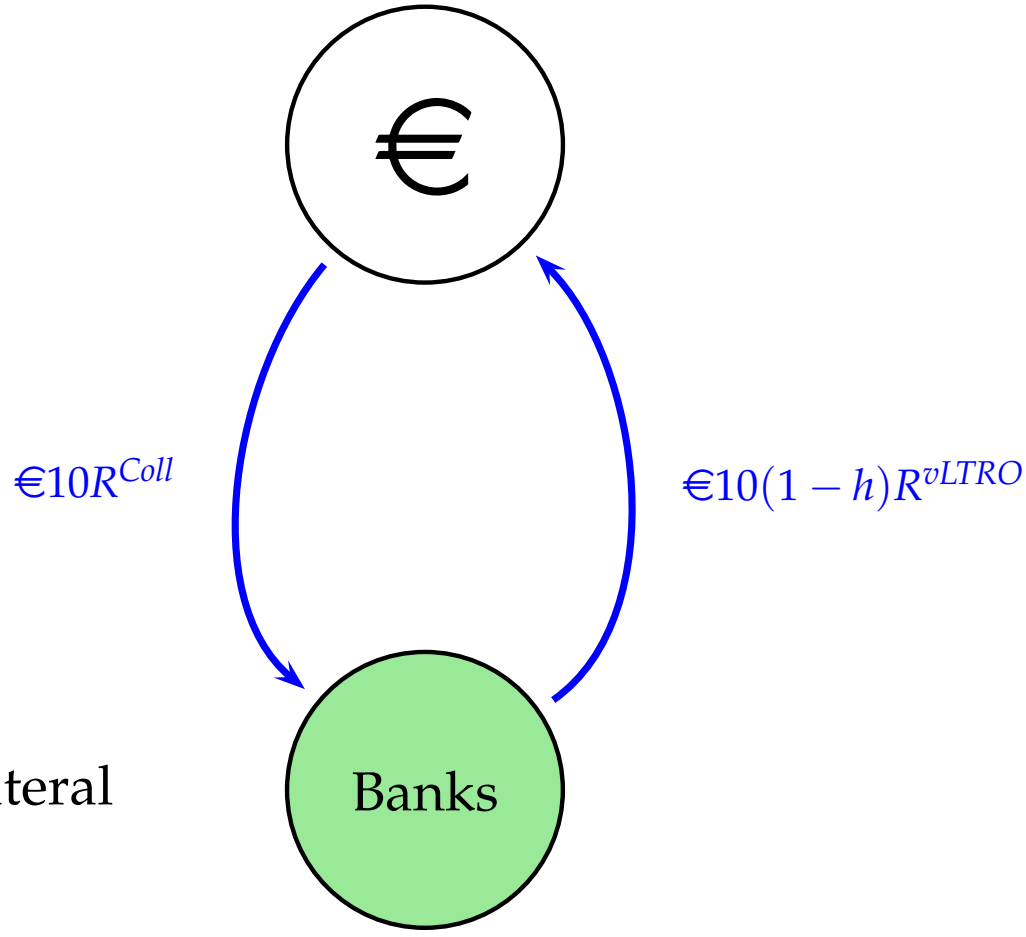
ST Vs. LT Collateral



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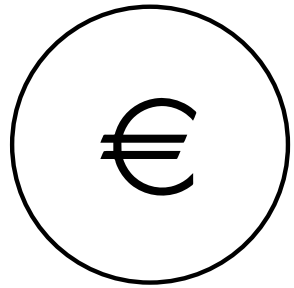

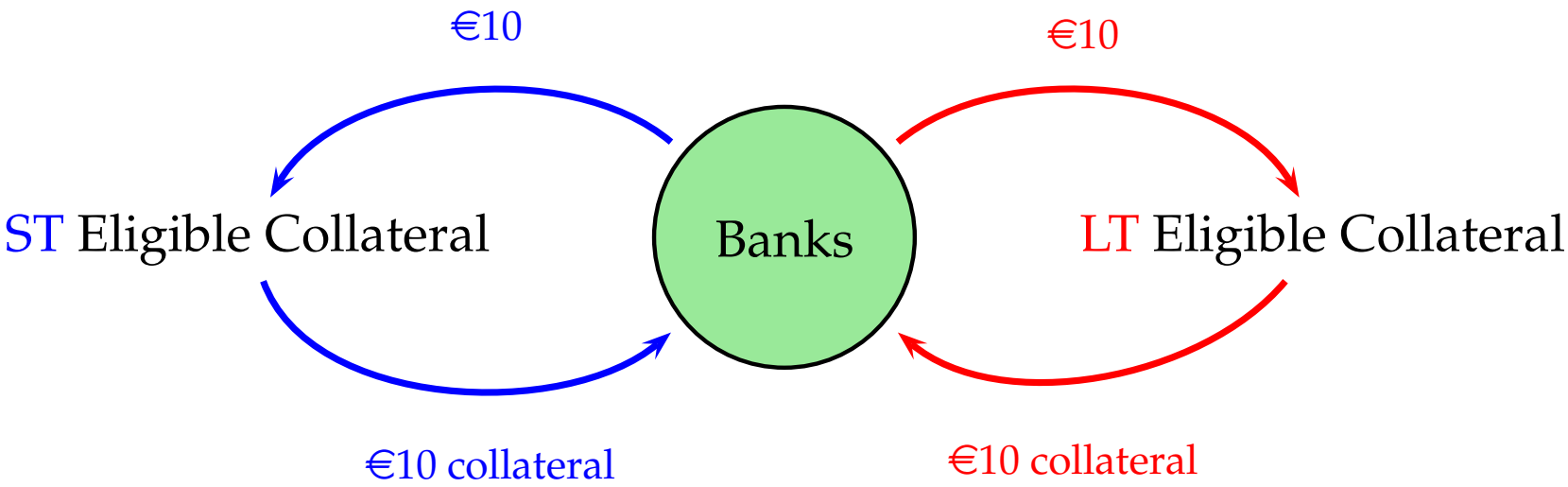

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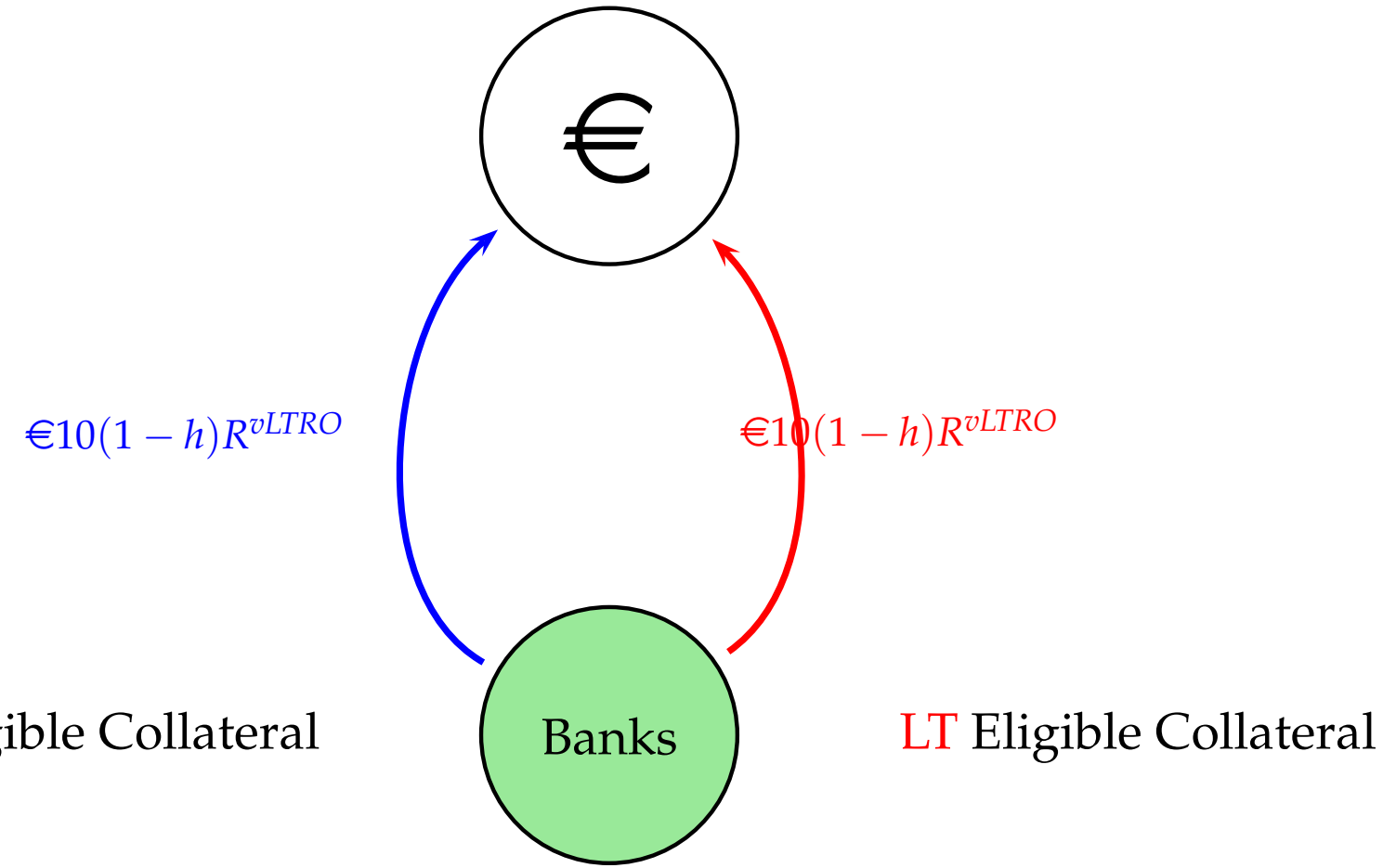

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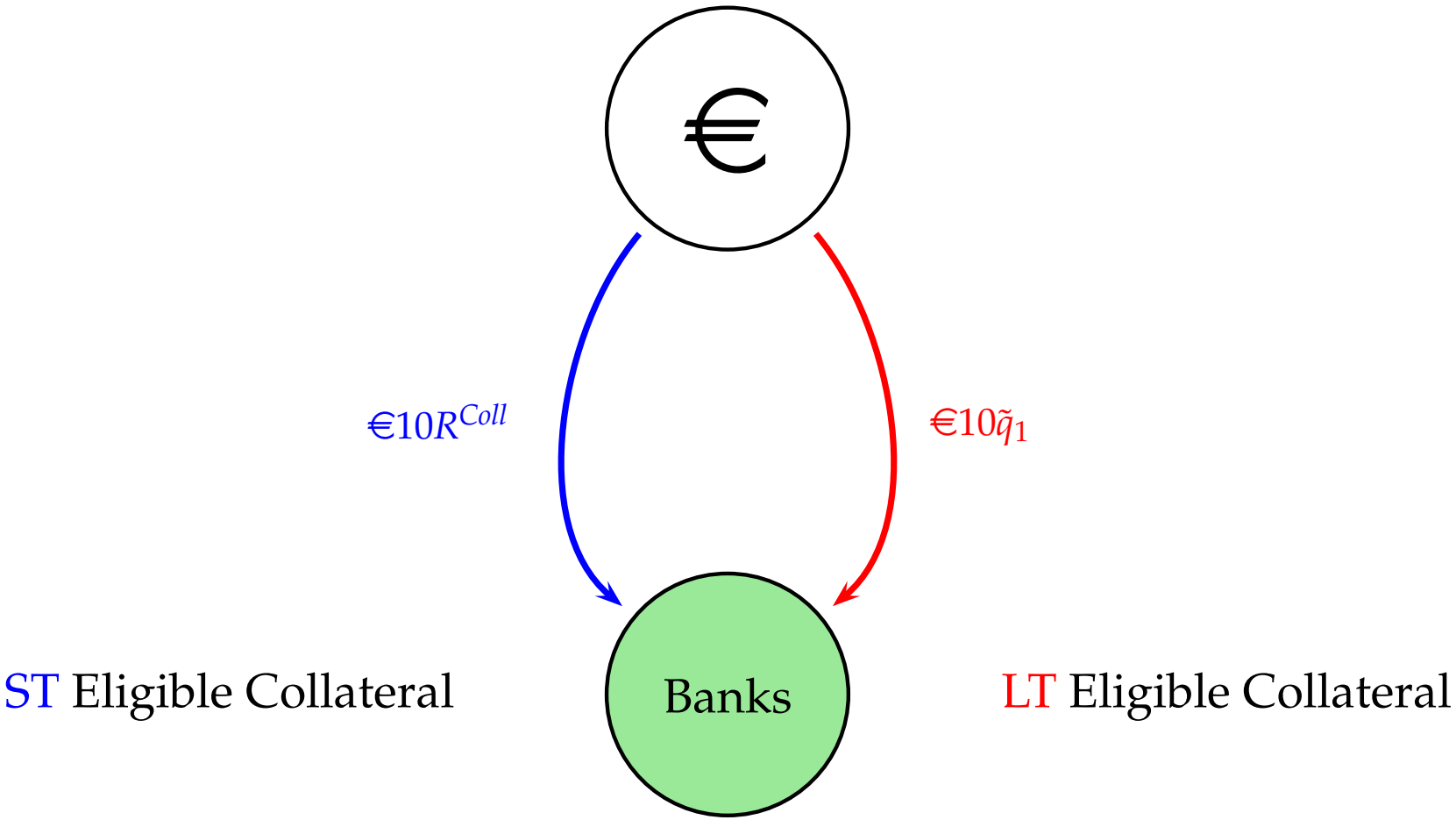


LT securities associated with a refinancing risk at $t = 1$

ANECDOTAL EVIDENCE

Banco Carregosa Annual Report, 2012:

It [the bank] *invested essentially in short-term deposits with other financial institutions and in Portuguese public debt, in most cases, with maturities up to 2015. Stable financial sources were used with the Clients' 2 to 3 year term deposits and transforming the short-term financing with the ECB into 3 years (...)*

Three Empirical Implications

1. Banks tapping 3y-LTRO prefer ST bonds
   - Collateral trade, liquidity risk management
   - Intensive margin
2. Yield curve steepens
3. Debt Agency reacts?
   - More issuance during the intra-allotment period
   - Public debt is financed with ST bonds

Empirical Findings

GRANULAR BANK- AND SECURITY- LEVEL DATASET

Two proprietary datasets from Banco de Portugal

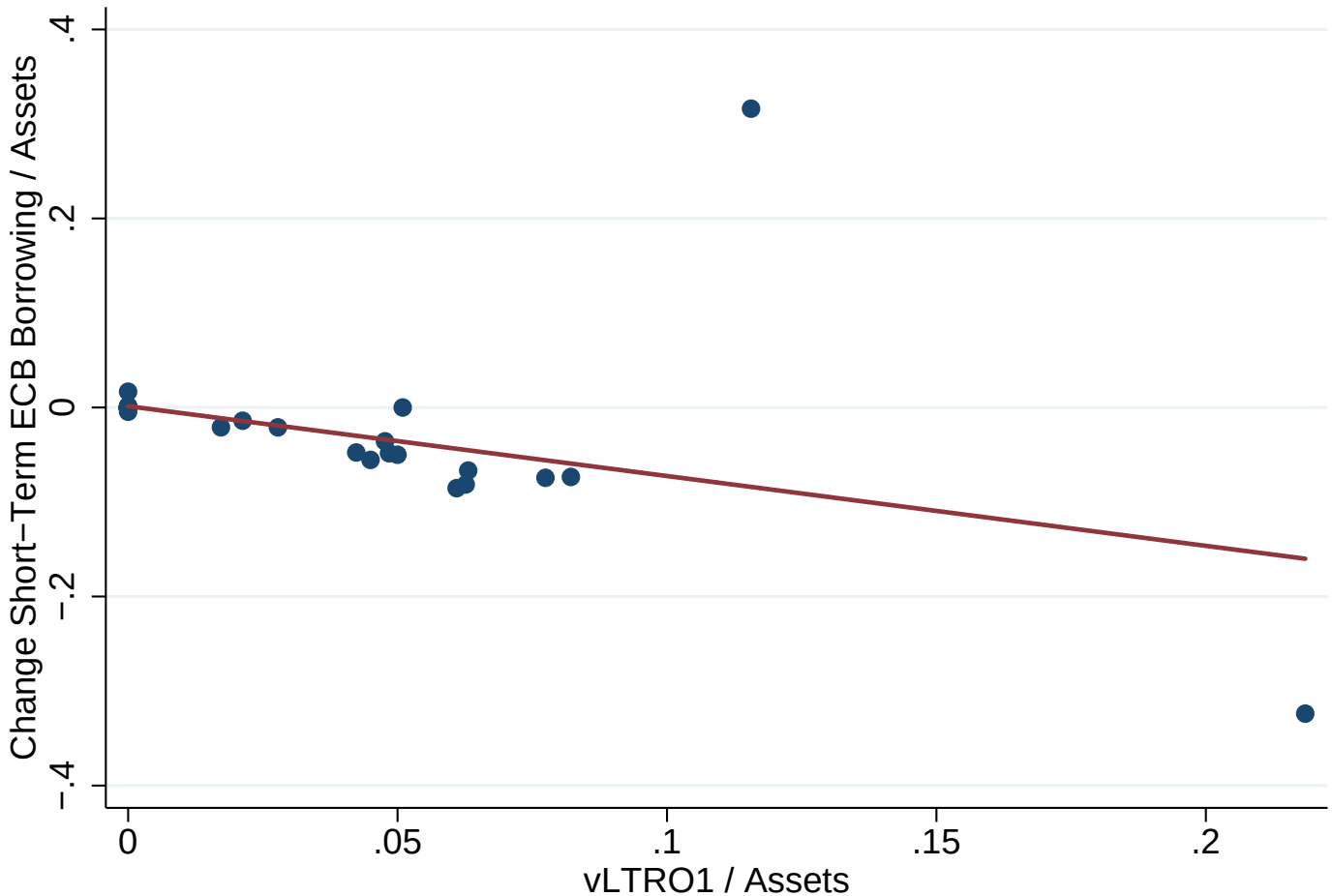
- Balance sheets for all reporting institutions (82 banks + 10 savings institutions + 13 money market funds)

- *Sistema integrado de estatsticas de títulos* (SIET)

  - Security-level data for all holdings of domestic govt debt by financial institutions (606 entities: banks, mutual funds, pension funds, ...)

    "holdings of PTPBTYGE0017 by BES in Oct07"

Linking the Two Stylized Facts: Fact 1



LINKING THE TWO STYLIZED FACTS: FACT 2

$$\Delta\text{Total ECB Borrowing}_i = \alpha + \beta_1 \Delta\text{Govt}_i^{PT} + \beta_2 X_i + \epsilon_i$$

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Bank i, cross-section

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- ΔGovt_i^{PT}: change in PT govt bond portfolio quantities (Dec11-Feb12)

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- X_i: Controls: other measures of collateral, price changes for PT govt bonds (Dec11-Feb12)

(all quantities divided by assets)

BANKS BUY GOVT BONDS TO PLEDGE THEM AS COLLATERAL AT LTRO2

$$\Delta\text{Total ECB Borrowing}_i = \alpha + \beta_1 \Delta\text{Govt}_i^{PT} + \beta_2 X_i + \epsilon_i$$

ΔGovt_i^{PT}	0.346***	0.235***
	(0.0641)	(0.0631)
Price controls	✓	✓
Other collateral	✓	✓
N	71	37
adj. R^2	0.911	0.706

GE Implications

#1 HIGH DEMAND FOR ST SECURITIES

$$\frac{\text{Hold}_{i,j,t}}{\text{Amount Outstanding}_{j,t}} = \beta \text{vLTRO}_t \times \text{Short-Term}_j \times \text{Access}_i + X_{i,j,t} + \epsilon_{i,j,t}$$

#1 High Demand for ST Securities

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Entity i, ISIN j, month t

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- vLTRO_t: time dummy equal to 1 after December 2011

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- Controls: double interactions, fixed effects

#1 HIGH DEMAND FOR ST SECURITIES

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	All Bonds	No Issuance After Dec2011
$\text{vLTRO}_t \times \text{Short}_j \times \text{Access}_i$	0.00220***	0.000181**
	(0.0000522)	(0.0000649)
$\text{vLTRO}_t \times \text{Short}_j$	-0.0000587	0.000160
	(0.000108)	(0.000139)
$\text{vLTRO}_t \times \text{Access}_i$	0.000293***	0.000293***
	(0.0000583)	(0.0000572)
$\text{Short}_j \times \text{Access}_i$	0.00353***	0.00353***
	(0.000390)	(0.000390)
Period FE	✓	✓
ISIN FE	✓	✓
Entity FE	✓	✓
N	259,272	242,589
adj. R^2	0.126	0.127

Sample: +- 4 months around announcement. SE clustered at investor sector levle.

#1 High Demand for ST Securities

Intensity should matter for the collateral trade.

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Intensity should matter for the collateral trade.

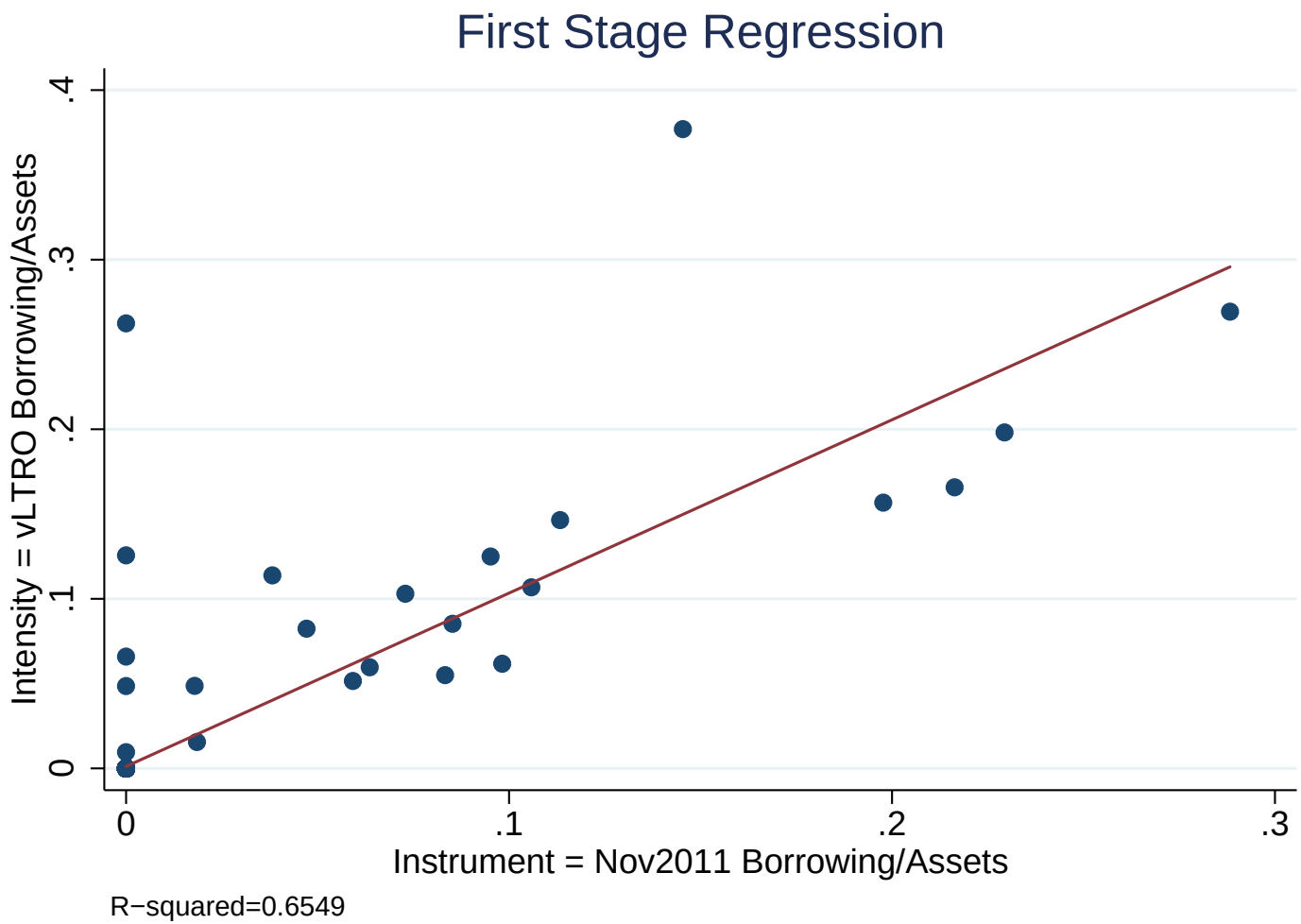
$$\frac{\text{Hold}_{i,j,t}}{\text{Amt Outst}_{j,t}} = \beta \times \text{vLTRO}_t \times \text{Short-Term}_j \times \text{Intensity}_i + X_{i,j,t} + \epsilon_{i,j,t}$$

where

$$\text{Intensity}_i = \frac{\text{vLTRO Borrowing}_i}{\text{Assets}_i}$$

- Intensity is endogenous
- Exploit the fact the vLTRO mostly rollover
- IV: ECB borrowing *before* beginning of the sample

VALIDITY


First Stage Regression
Intensity = vLTRO Borrowing/Assets
0
.1
.2
.3
.4
Instrument = Nov2011 Borrowing/Assets
0
.1
.2
.3
R−squared=0.6549

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	All Bonds	No Issuance After Dec2011
$\text{vLTRO}_t \times \text{Short}_j \times \text{Intensity}_i$	0.0370***	0.0140***
	(0.00122)	(0.000969)
$\text{vLTRO}_t \times \text{Short}_j$	0.0000295	0.000120
	(0.0000446)	(0.0000982)
$\text{vLTRO}_t \times \text{Intensity}_i$	-0.0240***	-0.00797***
	(0.000436)	(0.000110)
$\text{Short}_j \times \text{Intensity}_i$	0.0252***	0.0511***
	(0.00288)	(0.0000982)
Period FE	✓	✓
ISIN FE	✓	✓
Entity FE	✓	✓
N	259,272	242,589
adj. R^2	0.124	0.125

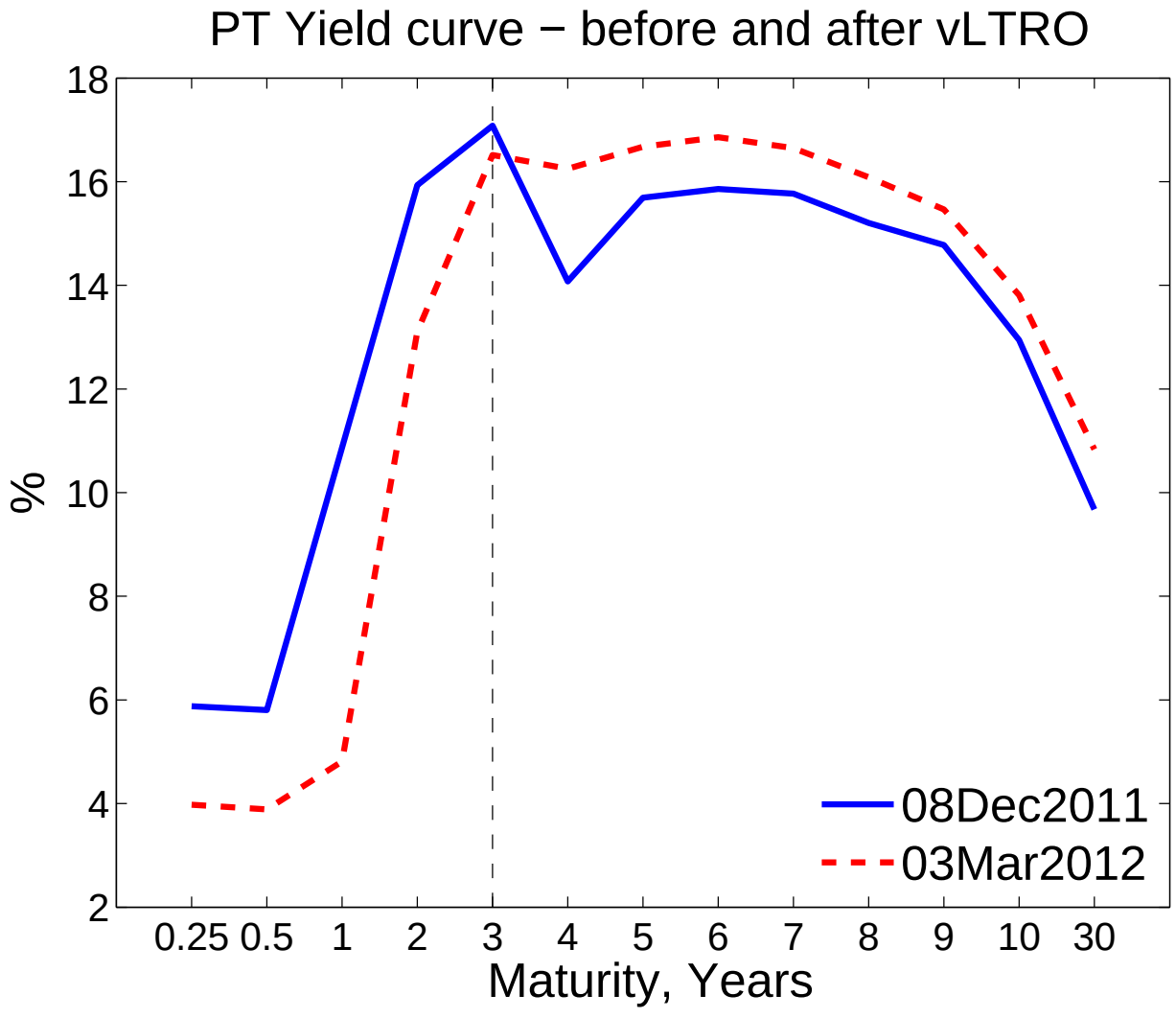
Sample: +- 6 months around announcement, June 2011 - May 2012. SE clustered at investor sector.

#1 HIGH DEMAND FOR ST SECURITIES

Who is engaging in this trade?

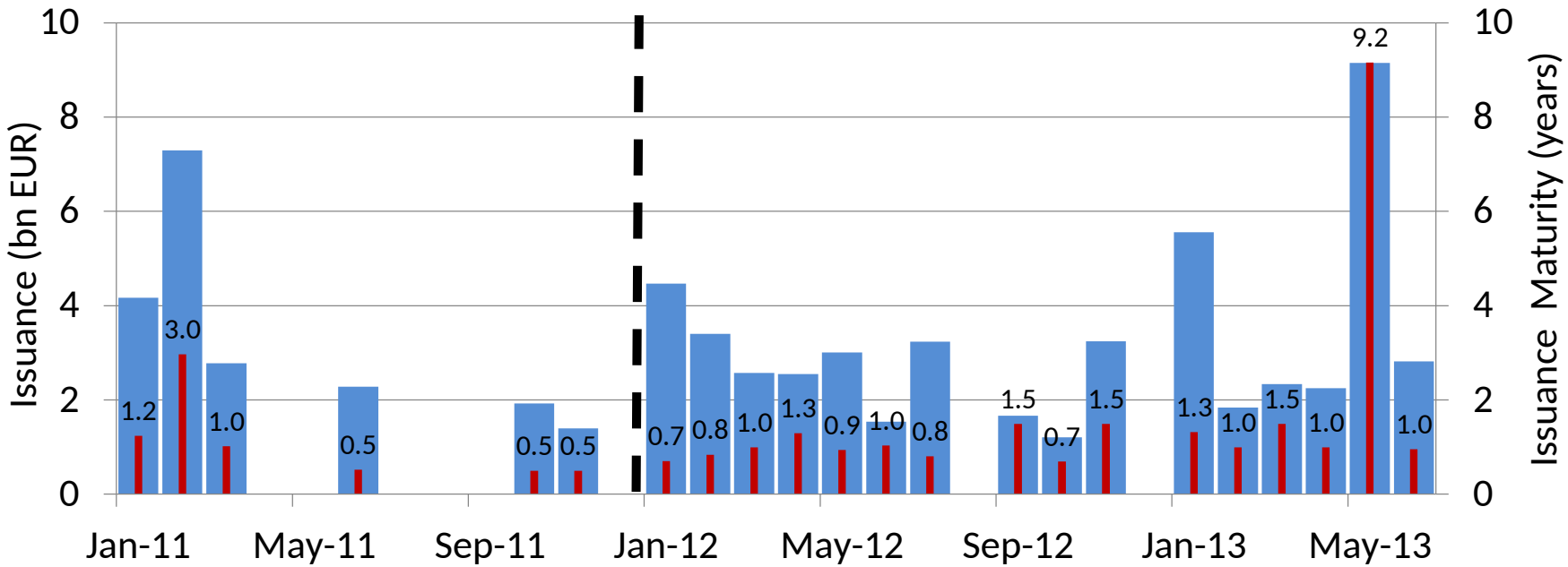
	Govt Debt. Purchases/Assets during Intra-Allotment	
November 2011 (% Assets)	Below Median	Above Median
Securities	17.5%	21.1%
Govt. Bonds	8.1%	4.5%
PT Govt. Bonds	7.8%	3.6%
IIGS Govt. Bonds	0.2%	0.8%
Lending	70.7%	67.5%
Securitized Liabs.	4.5%	6.5%
Deposits	84.7%	73.6%
Short-Term Funding	72.4%	59.5%
Average Assets (€ bn)	16.10	12.96
Leverage (Assets/Equity)	20.53	11.25

#2 YIELD CURVE STEEPENS



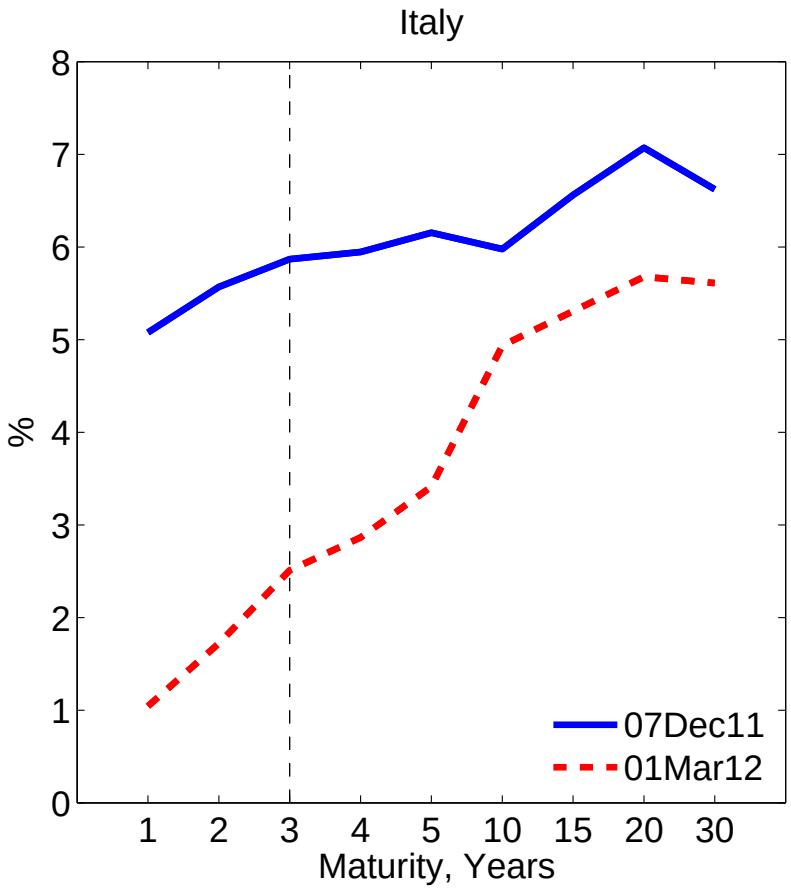
#3 GOVERNMENT DEBT AGENCY *seems* TO REACT

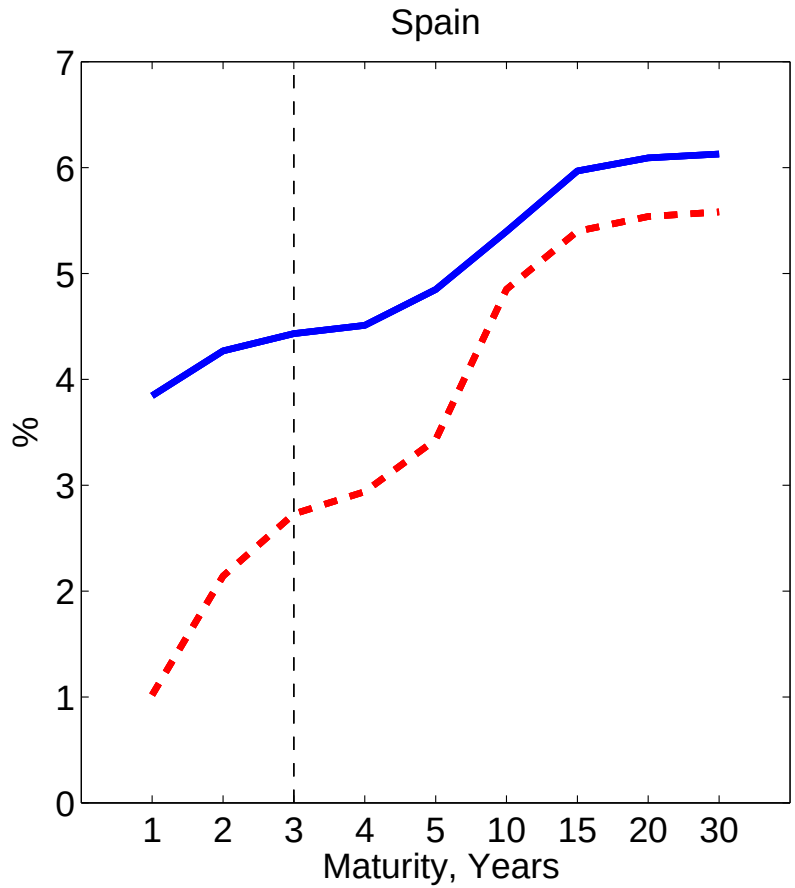
Debt Issuances: Quantity and Maturity



EXTERNAL VALIDITY

Italy and Spain





UNCONVENTIONAL MONETARY POLICY

Collateralized Lending vs. Quantitative Easing

- vLTRO
- QE

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  - relies on direct purchases of LT debt

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Collateralized Lending vs. Quantitative Easing

- vLTRO
  - relies on indirect purchases of ST debt
  - yield curve steepens
  - govt strategically reacts by shortening the maturity of public debt

- QE
  - relies on direct purchases of LT debt
  - yield curve flattens
  - govt strategically reacts by increasing the maturity of public debt

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Collateralized Lending vs. Quantitative Easing

- vLTRO
  - relies on indirect purchases of ST debt
  - yield curve steepens
  - govt strategically reacts by shortening the maturity of public debt
  - banks reduce maturity mismatch by increasing liability maturity (asset maturity also ↓)
- QE
  - relies on direct purchases of LT debt
  - yield curve flattens
  - govt strategically reacts by increasing the maturity of public debt
  - banks reduce maturity mismatch by decreasing asset maturity

Conclusion

- vLTRO boosted bank demand for domestic sovereign debt
- Liquidity risk channel generated preference for shorter-term bonds
- Implications for the management of
  - Yield curve
  - Maturity of sovereign debt
  - Bank risk-taking and financial stability
- Comparative analysis of unconventional monetary policies