The bank-sovereign nexus across borders

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This paper in a nutshell

An empirical study of the transmission of risk from banks to sovereigns, following news arrival about bank risk:

> ➤ October 26, 2014: ECB's release of the Comprehensive Assessment (CA) of the 130 most significant banks in the euro area.

> ➤ Negative news for bank equity in stressed countries (ES, GR, IE, IT, PT).

> ➤ Uncovered discrepancy between ECB supervision and supervision by National Central Banks (NCBs)

Analysis of the impact of this negative shock on bank-sovereign nexus:

Within-country:

> ➤ Stressed: nexus is non-existing (IT) or weak (ES, GR, IE, PT) ← sovereigns already in distress, cannot provide further guarantees to banks

> ➤ Non-stressed: nexus is present ← sovereigns "on the hook" for stressed banks

Across borders:

> ➤ Bank risk from stressed countries transmitted to non-stressed sovereigns.

Methodology :

> ➤ Time and cross-sectional difference approach around the CA release

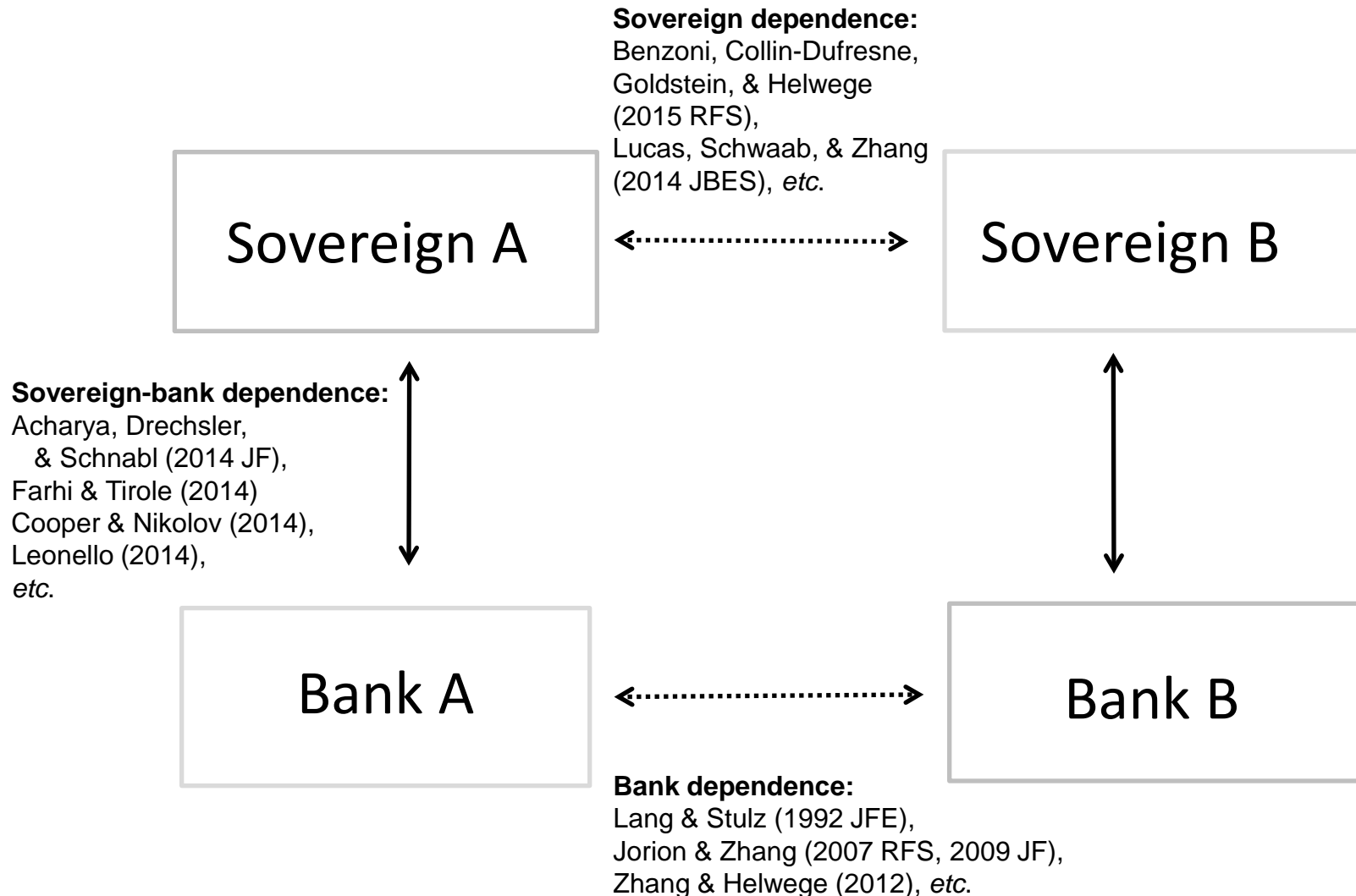> ➤ In addition, consider a time-varying parameter model to study the medium term.

Motivation

➢ Euro area is financially integrated.

➢ Explicit guarantees across borders: e.g., the ESM funds, or the OMT program.

➢ Implicit guarantees across borders: strong political will to do "whatever it takes" to prevent the break up of the monetary union.

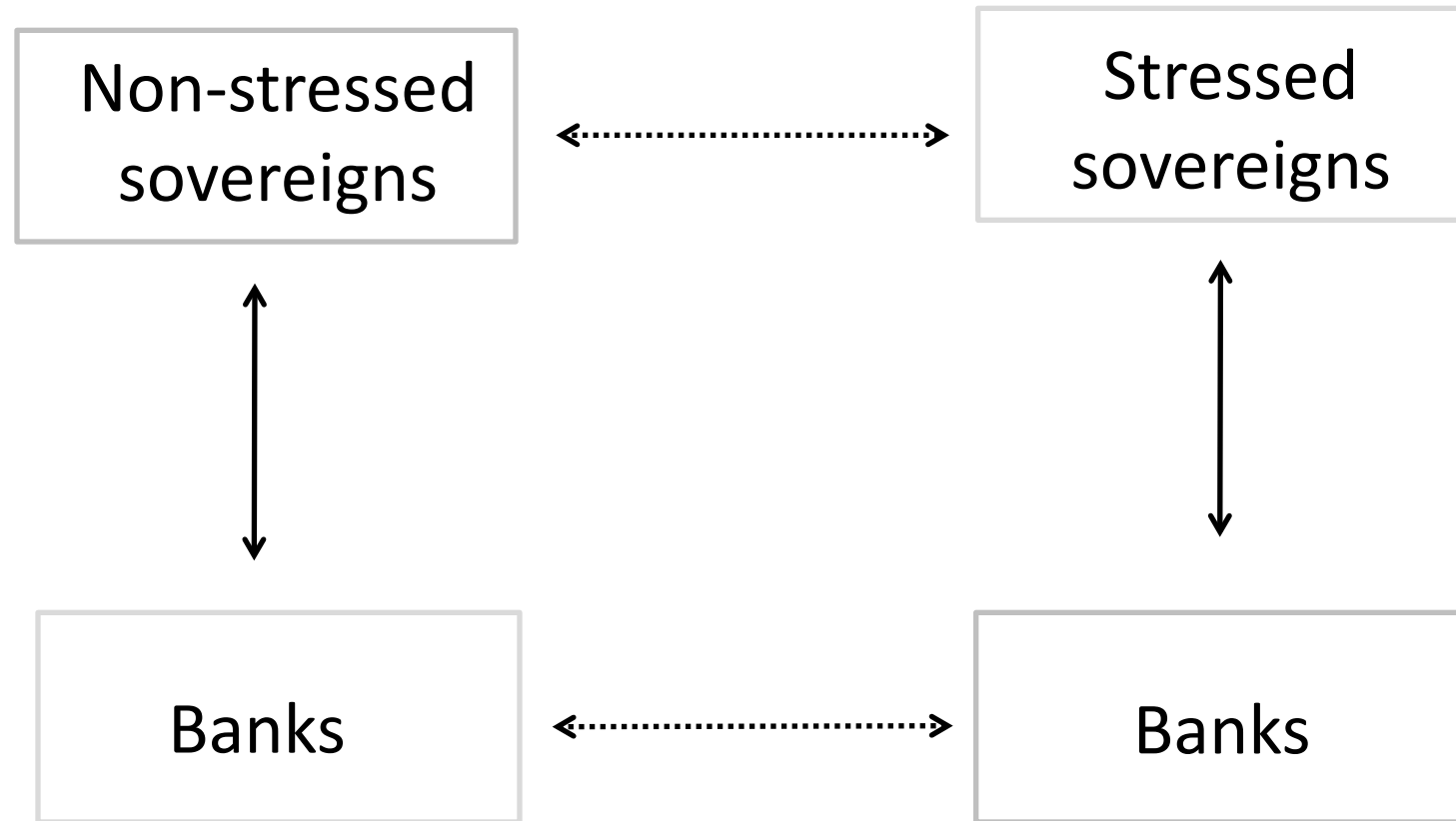Our contribution: Quantifying the risk transfers from banks to sovereigns within and across borders.
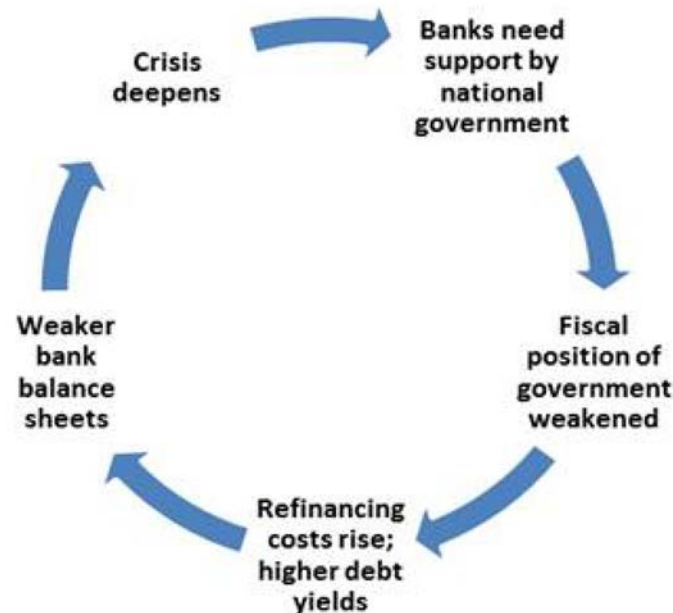
Source: EC (2012) document motivating the European Banking Union legislation, addressing the "doom loop", "deadly embrace", or "vicious circle"; see also Acharya, Drechsler & Schnabl (2014).

Literature on sovereign-bank nexus

Sovereign dependence:
Benzoni, Collin-Dufresne, Goldstein, & Helwege (2015 RFS),
Lucas, Schwaab, & Zhang (2014 JBES), *etc.*

Sovereign A ◄·····································► Sovereign B

Sovereign-bank dependence:
Acharya, Drechsler,
  & Schnabl (2014 JF),
Farhi & Tirole (2014)
Cooper & Nikolov (2014),
Leonello (2014),
etc.

Bank A ◄·····································► Bank B

Bank dependence:
Lang & Stulz (1992 JFE),
Jorion & Zhang (2007 RFS, 2009 JF),
Zhang & Helwege (2012), *etc.*

The bank sovereign nexus *within and across* stressed and non-stressed countries.

Non-stressed sovereigns		Stressed sovereigns
↕		↕
Banks		Banks
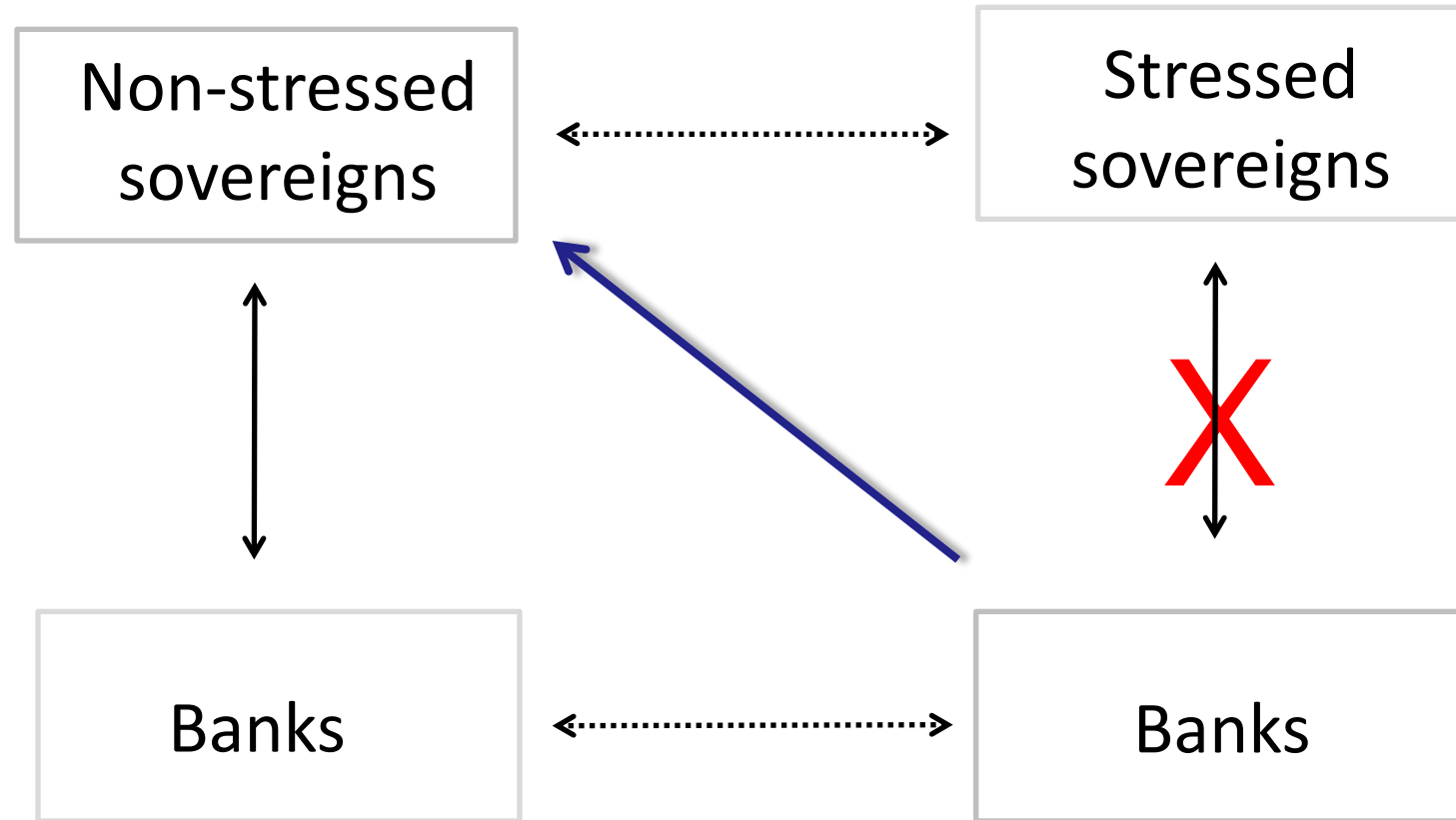
The bank sovereign nexus *within and across* stressed and non-stressed countries.

The CA release on October 26, 2014: **unanticipated** adverse news arrival about bank risk in stressed countries. The ECB signalled what type of supervisor it is going to be (difference to the NCBs) → identification of risk transfer from banks to sovereigns.

The CA design:

> A financial health check of 130 banks in the euro area, involving a backward-looking asset quality review and a forward-looking stress test.

> Covered € 22 trn of financial assets, representing 82% of total banking assets in the euro area.

> Carried out by the ECB together with 26 national supervisors, involving approximately 6000 people between November 2013 and October 2014.

Results were released on the ECB's website on Sunday, **October 26, 2014**; preceded by two weeks of intense media coverage.

Main outcome: 25 banks failed or near-failed, 20 of which were located in stressed countries.

Identification: Three periods

1. **Pre-CA** period before October 10
    - ➤ Sample: Sep 29 to Oct 10.
    - ➤ No media discussion of CA.

2. **Soft Info** period between October 13 to October 24
    - ➤ Significant media attention.
    - ➤ Rumours, see timeline next slide.
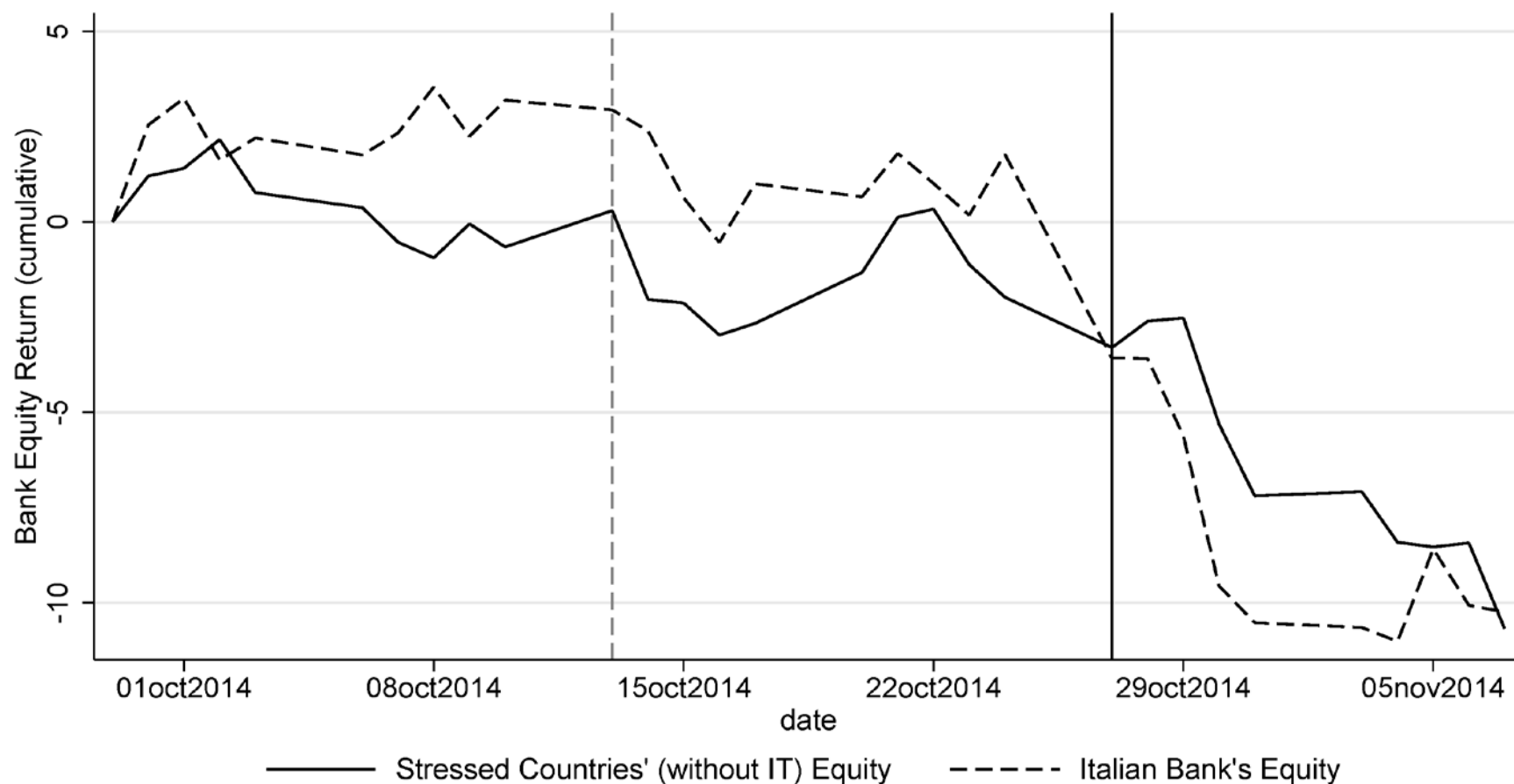   - ➤ Second week of confidential "supervisory dialogue meetings".

3. **Post-CA** period after October 26
    - ➤ Sample: Sep 27 to Nov 07.
    - ➤ Hard information publicly available.

Identification: The CA Timeline

10 October:
ECB announces CA results to be published on 26 October 2014

13 October:
Communications between ECB and NCB over CA results get started

22 October:
ECB press release: "Until that time [October 26] **any media reports** on the outcome of the tests are by their nature **highly speculative**."

23 October:
Bloomberg News reports that Italian MPS and Carige, jointly with Irish Permanet TBS, had failed the stress test, whereas Deutsche Bank had not

26 October:
CA results are released to the public by the ECB

13-21 October:
Media spread information on potential outcomes of the CA – mainly reports of investment banks

22 October:
First leak by Spanish press-agency EFE
.

24 October:
Bloomberg News reports that exactly 25 banks had failed the stress test. Other leaks from National press anticipate the reaction of stressed banks to the stress tests

time

Cumulative equity returns relative to non-stressed countries

Worst performing bank equity

Bank Name	Country	Equity Surprise	CDS Change	Beta	CA Outcome
Banca Monte dei Paschi di Siena SpA	IT	-38.60%	3.79%	-0.34	F
Banca Carige SpA	IT	-35.23%			F
Permanent TSB plc	IE	-15.30%	-1.44%	0.02	F
Alpha Bank SA	GR	-13.33%	20.98%	-0.23	P
Banco Comercial Português SA	PT	-12.22%	6.89%	-0.52	F
National Bank of Greece SA	GR	-12.13%	20.98%	-0.08	NF
Eurobank Ergasias SA	GR	-10.90%	20.96%	-0.11	NF
Piraeus Bank SA	GR	-8.59%	11.33%	-0.02	NP
Deutsche Bank AG	DE	-8.21%	10.67%	-1.43	P
Liberbank SA	ES	-8.18%			NP
Banca Popolare Di Milano Scarl	IT	-7.14%	-4.03%	-0.25	F
Banco Santander SA	ES	-7.03%	6.85%	-1.56	P
UniCredit SpA	IT	-6.77%	4.78%	-1.17	P
Unione Di Banche Italiane Scpa	IT	-6.33%	2.24%	-0.34	P
Banco Bilbao Vizcaya Argentaria SA	ES	-5.62%	6.78%	-1.93	P
Banca Popolare di Sondrio Scpa	IT	-4.77%			NP

Note: Deutsche Bank reported a loss of approx 1 bn EUR (3 bn provisions) in litigation expenses on 29 Oct 2014.

Best performing bank equity

BNP Paribas	FR	-2.96%	7.66%	-1.42	P
Bankinter SA	ES	-2.83%	-9.85%	-0.02	P
Intesa Sanpaolo SpA	IT	-1.93%	0.09%	-1.13	P
KBC Group NV	BE	-1.05%	5.59%	-0.35	P
Banco BPI SA	PT	-0.77%	14.78%	-0.05	P
Groupe Crédit Agricole	FR	-0.19%	8.16%	-0.78	P
Raiffeisen Zentralbank AG	AT	0.61%	-11.67%	-0.61	P
Banco Popolare SC	IT	0.73%	-13.13%	-0.52	NP
IKB Deutsche Industriebank AG	DE	0.76%	-7.28%	0.05	P
ING Bank NV	NL	0.88%	-3.58%	-0.69	P
Aareal Bank AG	DE	1.62%			P
The Governor and Company of the Bank of Ireland	IE	2.09%	-4.68%	-0.03	P
Mediobanca - Banca di Credito Finanziario SpA	IT	2.80%	4.50%	-1.43	P
Commerzbank AG	DE	5.93%	-2.39%	-0.90	P
Erste Group Bank AG	AT	10.07%	-13.95%	-0.69	P

Bank-sovereign nexus

Bank-sovereign nexus: positive association bw a country's bank and sovereign risks

Expected impact of adverse news about bank risk following the CA:

➢Higher bank risk → bank equity prices ↓ & bank CDS spreads ↑

➢Since local sovereigns on the hook to guarantee liabilities of local banks → sovereign risk ↑ (measured by sovereign CDS spreads)

$$\Delta \text{cds}_{j,t}^{s} = \alpha_0 + \alpha_1 \times P_t \times \Delta \text{cds}_{i,j,t}^{b} \times S_j + \alpha_2 \times P_t \times \Delta \text{cds}_{i,j,t}^{b}$$
$$+ \alpha_3 \times P_t \times S_j + \alpha_4 \times \Delta \text{cds}_{i,j,t}^{b} \times S_j$$
$$+ \alpha_5 \times \Delta \text{cds}_{i,j,t}^{b} + \delta_i + \gamma_t + \varepsilon_{i,j,t},$$

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔLog(Sovereign CDS)	Pre-CA	Pre-CA	Soft Info	Soft Info	Post-CA	Post-CA	Diff-Diff (4)-(2)	Diff-Diff (6)-(2)
Stressed x Post x ΔLog(Bank CDS)							0.184 (0.148)	-0.397*** (0.113)
Stressed x ΔLog(Bank CDS)	-0.009 (0.064)	0.112 (0.074)	0.129 (0.165)	0.289** (0.132)	-0.524*** (0.137)	-0.290** (0.113)	0.099 (0.069)	0.108 (0.080)
Post x ΔLog(Bank CDS)							-0.159 (0.119)	0.339*** (0.108)
Stressed x Post							0.001 (0.005)	-0.001 (0.004)
ΔLog(Bank CDS)	0.063 (0.059)	-0.050 (0.070)	0.315*** (0.120)	-0.211** (0.103)	0.593*** (0.129)	0.289*** (0.111)	-0.038 (0.064)	-0.049 (0.075)
Stressed Country FE	0.003 (0.003)		0.002 (0.005)		0.002 (0.004)			
Observations	441	441	485	485	480	480	926	921
R-squared	0.0100	0.2163	0.0941	0.4433	0.0923	0.5489	0.4165	0.4361
-	-	-	-	-	-	-	-	-
Bank FE	NO	YES	NO	YES	NO	YES	YES	YES
daily Time FE	NO	YES	NO	YES	NO	YES	YES	YES
-	-	-	-	-	-	-	-	-
Bootstrapped SE	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Dependent Variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔLog(Sovereign CDS)	Pre-CA	Pre-CA	Soft Info	Soft Info	Post-CA	Post-CA	Diff-Diff (4)-(2)	Diff-Diff (6)-(2)
Italy x Post x ΔLog(Bank CDS)							0.105	-0.343***
							(0.167)	(0.104)
Stressed (other) x Post x ΔLog(Bank CDS)							0.570***	-0.198*
							(0.116)	(0.114)
Post x ΔLog(Bank CDS)							-0.202*	0.267**
							(0.119)	(0.108)
Italy FE x Post							0.008	-0.000
							(0.008)	(0.004)
Stressed (no IT) x Post							-0.004	-0.001
							(0.005)	(0.005)
ΔLog(Bank CDS)	0.063	-0.050	0.315***	-0.183	0.593***	0.292***	0.032	0.027
	(0.057)	(0.070)	(0.111)	(0.117)	(0.119)	(0.094)	(0.032)	(0.026)
Italy x ΔLog(Bank CDS)	-0.002	0.128*	-0.131	0.116	-0.582***	-0.340***		
	(0.071)	(0.073)	(0.183)	(0.173)	(0.131)	(0.095)		
Stressed (no IT) x ΔLog(Bank CDS)	-0.015	0.092	0.570***	0.565***	-0.428***	-0.204**		
	(0.085)	(0.085)	(0.161)	(0.126)	(0.153)	(0.102)		
Italy FE	-0.002		0.005		-0.002			
	(0.003)		(0.007)		(0.004)			
Stressed (no IT) FE	0.006*		-0.001		0.005			
	(0.003)		(0.006)		(0.005)			
Observations	441	441	485	485	480	480	926	921
R-squared	0.0163	0.2167	0.1363	0.4594	0.0963	0.5510	0.4308	0.4365
-	-	-	-	-	-	-	-	-
Bank FE	NO	YES	NO	YES	NO	YES	YES	YES
daily Time FE	NO	YES	NO	YES	NO	YES	YES	YES
-	-	-	-	-	-	-	-	-
Bootstrapped SE	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Interpretation of within-country results

Usually, the bank-sovereign nexus is understood to be within country.

However, this mechanism does not seem to be at work in the euro area:
  - other institutions than the local sovereign can guarantee banks (non-stressed sovereigns, ESM …)

→ Who actually bears bank risk in stressed countries?

→ Do we see bank sovereign nexus *across* borders?

$$\Delta \text{cds}_{j,t}^{s,ns} = \alpha_0 + \alpha_1 \times P_t \times \Delta \text{equity}_t^{b,st} + \alpha_2 \times \Delta \text{equity}_t^{b,st}$$

$$+ \quad \alpha_3 \times \Delta \text{cds}_{i,j,t}^b + \kappa' X_{(i),j,t} + \delta_i + \gamma_{t,week} + \varepsilon_{i,j,t},$$

VARIABLES	(1) Pre-CA	(3) Pre-CA	(4) Soft Info	(6) Soft Info	(7) Post-CA	(9) Post-CA	(10) Diff-Diff (6)-(3)	(11) Diff-Diff (9)-(3)
ΔLog Stressed Equity x Post							0.590	-0.472**
							(0.379)	(0.227)
ΔLog(Stressed Equity)	-0.087	-0.161	0.444*	0.681**	-0.478***	-0.564***	-0.243	-0.185
	(0.160)	(0.170)	(0.257)	(0.345)	(0.142)	(0.178)	(0.218)	(0.170)
ΔLog(Bank CDS)	0.028	0.020	0.364***	0.379***	0.562***	0.566***	0.199***	0.275***
	(0.072)	(0.081)	(0.082)	(0.073)	(0.105)	(0.129)	(0.048)	(0.068)
ΔLog(VIX (US))		-0.074***		0.114***		-0.073	0.010	-0.102***
		(0.019)		(0.044)		(0.083)	(0.036)	(0.023)
Observations	243	243	265	265	260	260	508	503
R-squared	0.0974	0.1878	0.1086	0.1464	0.2090	0.2289	0.1236	0.1593
-	-	-	-	-	-	-	-	-
Bank FE	NO	YES	NO	YES	NO	YES	YES	YES
Weekly Time FE	YES	YES	YES	YES	YES	YES	YES	YES
-	-	-	-	-	-	-	-	-
Bootstrapped SE	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Our analysis suggests that

- ➢stressed debt is guaranteed
- ➢guarantees made not solely by the local sovereign
- ➢→ decoupling of bank and sovereign CDS spreads

How would this be reflected in the level of risk?

- ➢ The overall level of risk within the Eurozone should go up.
- ➢ Stressed countries: bank equity prices ↓ and bank CDS spreads →
- ➢ Non-stressed countries: bank equity / CDS spreads don't change, but non-stressed sovereign CDS spreads ↑
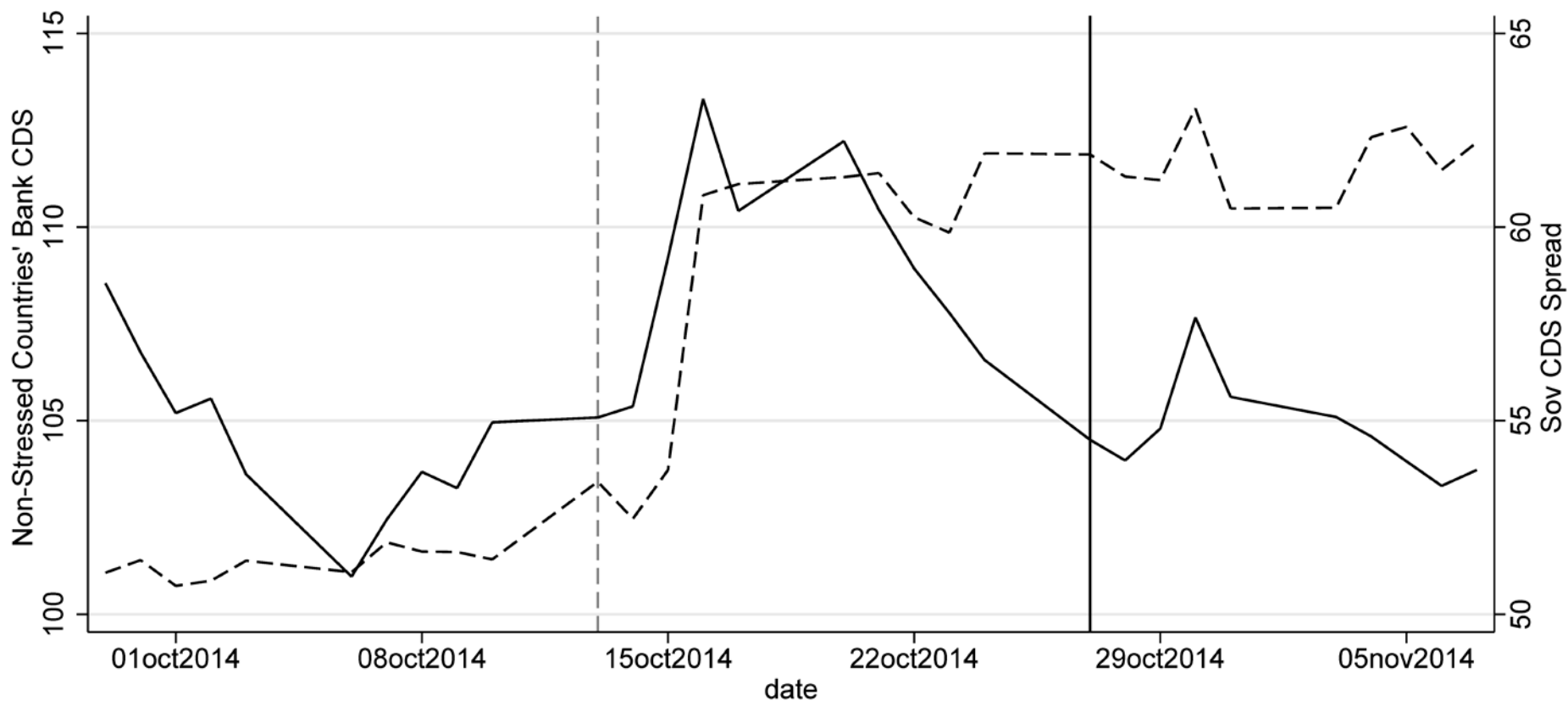
→ Do we see heightened *levels* of sovereign risk?

Italian sovereign risk increases while bank risk remains at the same level Post-CA, average bank risk is lower than sovereign risk
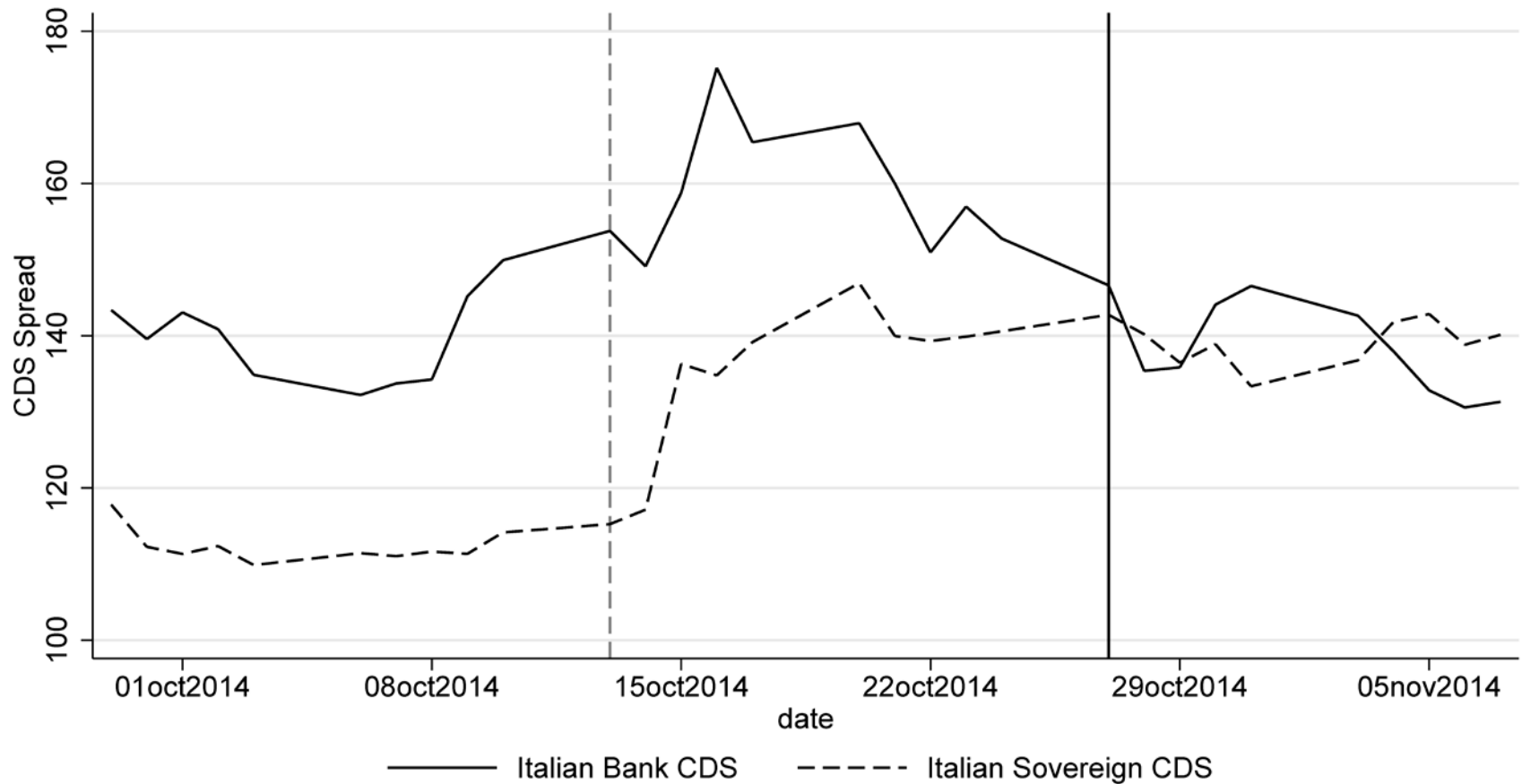
Non-stressed countries' risk increases while bank risk remains at the same level

Significance and policy implications

Economic significance:

➢A decrease in average bank market equity capitalization of 10% leads to an average increase in risk transmission from bank to sovereigns by 5%

Policy implications:

➢Risk transmission occurs through explicit and implicit public guarantees

➢To break the nexus, including cross-border: extend the European Bank Resolution Fund (BRF), facilitate more private sector risk-sharing

In sum

Adverse news about bank risk in stressed countries hit

Stressed countries : bank equity prices ↓ and yet bank CDS spreads don't change
- ➢perception that stressed debt are (partially) guaranteed
- ➢guarantees made not solely by the local sovereign
- ➢→ decoupling of bank and sovereign CDS spreads

Non-stressed countries: bank equity / CDS spreads don't change
- ➢but non-stressed sovereign CDS spreads ↑

→ Who pays for bank risk in stressed countries? This risk is **shared** in the euro area!

ADDITIONAL SLIDES

Data

CDS are traded for 49 banks: 27 in non-stressed countries and 22 in stressed countries.

Equity prices for 36 banks: 11 in non-stressed countries and 25 in stressed countries.

Distinguish 5 stressed countries – GR, IT, IE, PT and ES - and 5 non-stressed countries – AU, BE, FR, DE and NL.

Sample period: from 29 September 2014 (four weeks before the CA) to 7 November 2014 (two weeks after the CA).

Focus on CDS spreads:
  - Proxy for default risk of reference bond.
  - More comparable than bond spreads across countries and companies.
  - Liquid 5-year contracts, available daily.
  - CDS is related to the respective bond spread through arbitrage.

The medium-term perspective

Time-varying parameter panel model, cf. Ejsing & Lemke (2011 EL)
Weekly data from Jan 2009 to Nov 2014, adding a cross-country effect.

$$\Delta\text{cds}_{j,t}^{s,ns} = \gamma_t + \delta_i + \beta_t \Delta\text{cds}_{i,j,t}^{b,ns} + \kappa_t \Delta\text{equity}_t^{b,st} + \epsilon_{it},$$

$$\epsilon_t = (\epsilon_{1t}, \ldots, \epsilon_{Nt}) \sim \text{NID}\,(0, H_t)$$

$$H_t = \text{diag}\,(h_{1t}, \ldots, h_{Nt}), \quad \text{where} \quad h_{it} = \sigma_\epsilon^2 \cdot \text{CDS}_{i,t-1}^{s,ns} \geq 0,$$

$$\alpha_t = (\beta_t, \kappa_t)' = I \cdot \alpha_{t-1} + \eta_t; \qquad \eta_t \sim \text{NID}\,(0, Q)$$

$$\alpha_1 \sim \text{N}(0, \kappa I), \quad \text{with} \quad \kappa \to \infty$$

Allows us to investigate risk sensitivities over longer time periods than 3x2 weeks.

The medium-term perspective