

## External Appendix

Bank to sovereign risk spillovers across borders:  
Evidence from the ECB's Comprehensive Assessment

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## **Appendix A: Data summary statistics**

Table A.1 reports descriptive statistics for our bank and sovereign CDS spread and bank equity data, distinguishing the Pre-CA, Soft Info, and Post-CA periods. The pre-announcement period ranges from September 29 to October 10, the Soft Info period ranges from October 13 to 24, and the Post-CA ranges from October 27 to November 04; see Section 2 of the main text.

Table A.2 complements Figure 3 in the main text by reporting sovereign CDS spreads for selected euro area and European Union countries.

Table A.1: Descriptive statistics

Summary statistics for bank CDS spreads, sovereign CDS spreads, and bank equity data. CDS spreads are in levels and basis points. The cumulative equity returns are computed as the log difference between the levels at the beginning and the end of the respective period. For each group we report the mean, standard deviation, the 5th and 95th percentiles, and the total number of observations. Within each panel, we distinguish between five non-stressed countries, four stressed countries (GIPS; Greece, Ireland, Portugal, Spain), and Italy.

	Pre-CA					Soft Info					Post-CA				
	Mean	5p	95p	Std Dev	N	Mean	5p	95p	Std Dev	N	Mean	5p	95p	Std Dev	N
<b>Bank CDS</b>															
Non-stressed	104.50	48.31	188.26	54.86	270	108.93	52.33	205.31	55.13	265	104.73	52.45	207.40	54.56	260
GIPS	228.80	72.69	390.30	112.25	150	253.99	79.00	469.95	130.67	150	251.30	77.36	489.31	147.17	150
IT	139.70	79.72	238.59	55.71	70	159.09	84.20	273.84	67.42	70	138.38	81.66	250.06	54.62	70
All	147.58	54.03	388.49	94.82	490	161.03	55.81	425.89	108.29	485	155.44	54.22	470.03	114.42	480
<b>Sovereign CDS</b>															
Non-stressed	30.69	18.28	45.99	11.65	50	35.58	19.32	57.31	15.08	50	36.15	19.48	56.69	15.48	50
GIPS	208.38	52.38	539.50	193.15	40	259.25	58.36	730.49	251.84	40	281.97	61.78	757.71	276.97	40
IT	112.33	109.88	117.80	2.22	10	134.93	115.26	146.91	10.37	10	139.21	133.37	142.86	3.03	10
All	109.93	18.38	531.11	147.83	100	134.98	20.03	713.18	190.62	100	144.78	19.94	747.17	209.54	100
<b>Equity</b>															
Non-stressed	-6.5%	-11.2%	-1.4%	3.1%	14	4.9%	-0.2%	10.8%	3.1%	11	-1.2%	-8.4%	2.5%	3.7%	11
GIPS	-7.1%	-19.1%	-0.2%	5.1%	14	3.1%	-12.6%	13.2%	5.9%	14	-10.1%	-19.5%	3.0%	6.4%	14
IT	-3.2%	-8.0%	2.0%	3.4%	11	4.2%	-0.80%	11.07%	3.36%	11	-7.74%	-16.29%	2.97%	5.71%	11
All	-5.7%	-12.7%	1.7%	4.3%	36	4.0%	-1.5%	11.1%	4.4%	36	-6.6%	-18.5%	3.0%	6.6%	36

Table A.2: Sovereign CDS spreads

Sovereign CDS spreads in basis points for selected euro area and E.U. non-euro area countries, comparing Pre-CA and Post-CA time averages.

Country	Level Pre-CA	Level Post-CA	Change (bps)	Change (%)
<b>Non-stressed</b>				
AT	24.3	27.5	3.2	13.4%
BE	44.8	55.0	10.3	22.9%
DE	18.6	20.1	1.6	8.6%
FI	26.1	28.1	1.9	7.3%
FR	44.4	54.2	9.8	22.1%
NL	21.4	23.8	2.4	11.2%
<b>Average</b>	<b>29.9</b>	<b>34.8</b>	<b>4.9</b>	<b>16.3%</b>
<b>Stressed</b>				
ES	78.2	105.8	27.5	35.2%
GR	529.6	746.1	216.5	40.9%
IE	53.5	63.5	9.9	18.6%
IT	112.3	139.2	26.9	23.9%
PT	172.2	212.6	40.4	23.5%
<b>Average</b>	<b>189.2</b>	<b>253.4</b>	<b>64.3</b>	<b>34.0%</b>
<b>Non-Euro area</b>				
DK	23.2	24.4	1.2	5.1%
PL	68.0	64.9	-3.0	-4.5%
SE	13.4	15.1	1.6	12.0%
UK	19.1	19.4	0.3	1.7%
<b>Average</b>	<b>30.9</b>	<b>31.0</b>	<b>0.0</b>	<b>0.1%</b>

## Appendix B: Plots of CDS spreads

Figure B.1 presents weighted averages of CDS spreads (in levels) for banks and sovereigns in the euro area. The figure distinguishes non-stressed countries, stressed countries without Italy, and Italy. The sample ranges from September 29, 2014 to November 7, 2014. Figure B.2 presents corresponding plots based on unweighted averages. Both are similar. Therefore, our interpretation of group outcomes don't appear to be sensitive to within-country-group weighting issues.

Figure B.1: Weighted averages of bank CDS and sovereign CDS spreads

Weighted averages of CDS spreads for both banks and sovereigns in the euro area from September 29, 2014 to November 7, 2014. Weights are given by the respective levels of total government debt for sovereign CDS, and bank-specific total liabilities for bank CDS, on December 31, 2013. In each panel the dashed vertical line marks the start of the Soft Info period, while the solid vertical line marks the Monday close following the Sunday announcement of the CA results. The top panel plots average CDS spread levels for non-stressed countries' banks' CDS (solid line) and non-stressed countries' sovereign CDS (dashed line). The middle panel plots average CDS spread levels for stressed countries' banks' CDS (solid line), and stressed countries' (without Italy)' sovereign CDS (dashed line). The bottom panel reports Italian data.

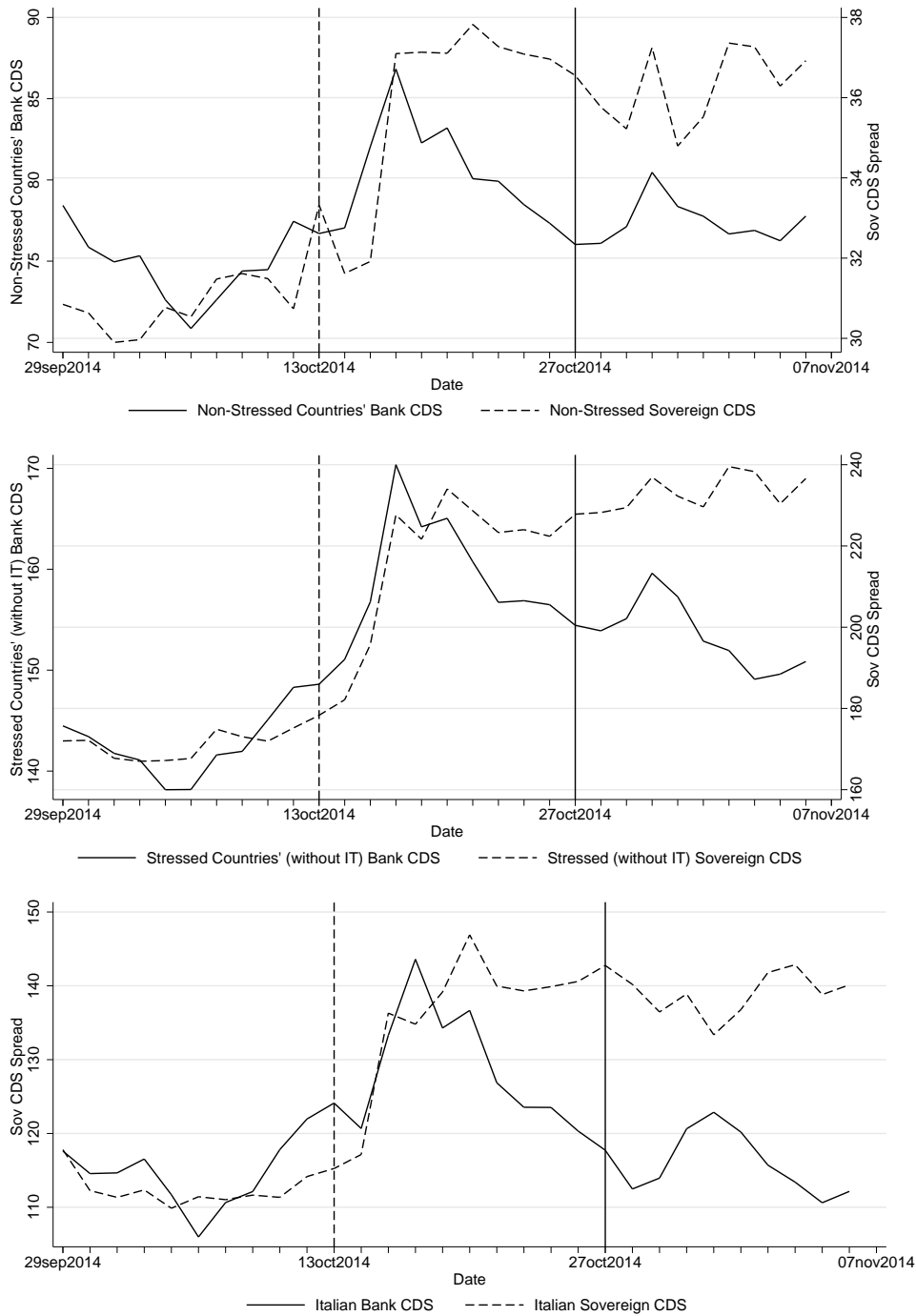
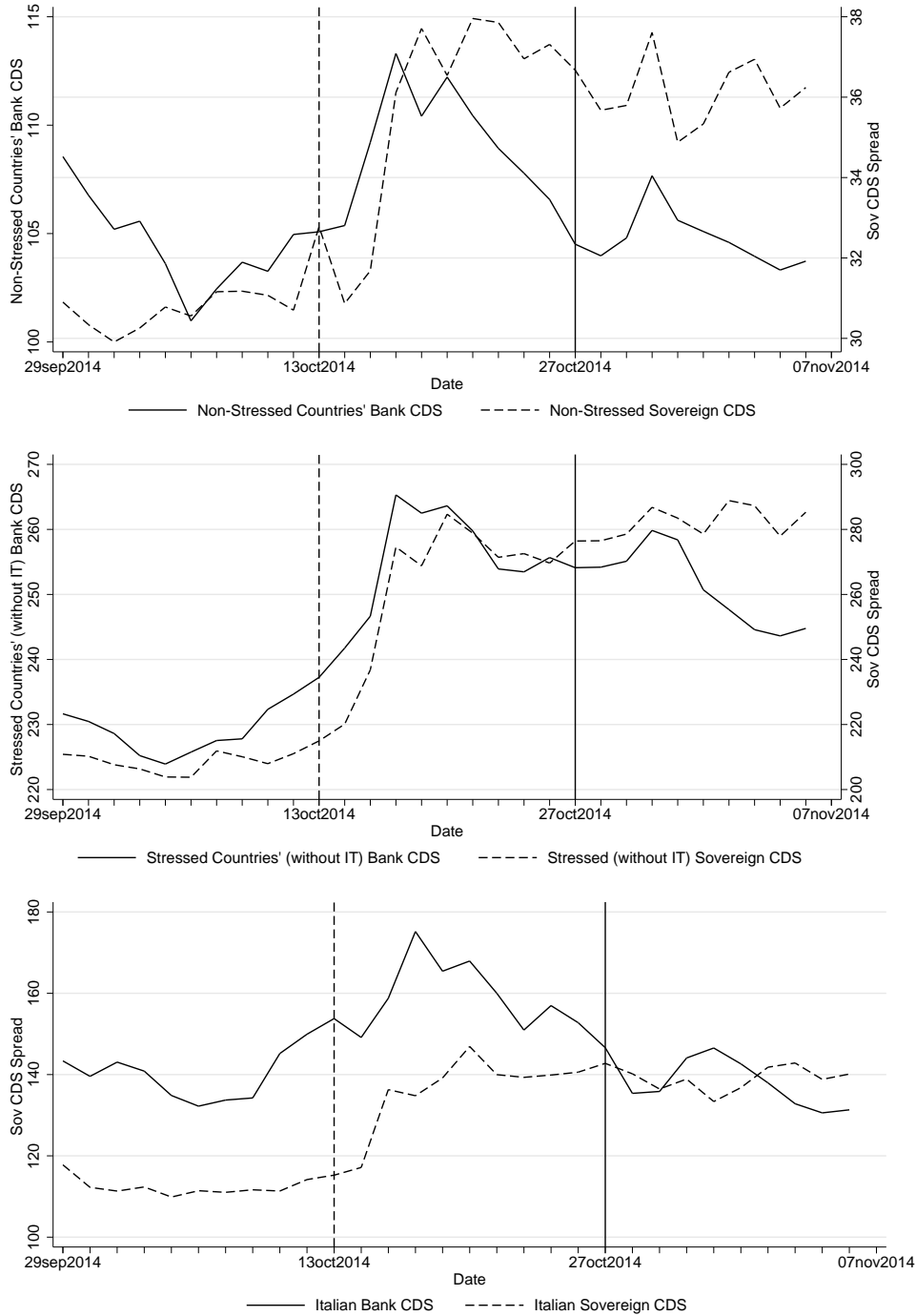


Figure B.2: Unweighted averages of bank and sovereign CDS spreads

Unweighted averages of CDS spreads for banks and sovereigns in the euro area from September 29, 2014 to November 7, 2014. Dashed vertical lines mark the start of the Soft Info period, while solid vertical lines mark the Monday close following the disclosure of the CA results. The top panel plots average CDS spread levels for non-stressed countries' banks (solid line, left scale) and sovereigns (dashed line, right scale). The middle and bottom panel refer to GIPS and IT data, respectively.



## Appendix C: Extended panel specification

Sovereign-bank risk dependence may not be the same across all stressed countries. For example, banks in Italy were somewhat more affected by the release of information on October 26, 2014. Again, nine out of 25 banks with a capital shortfall were located there. To understand the cross-sectional differences within stressed countries, we split the sample into non-stressed countries, stressed countries without Italy, and Italy.

Two cross-sectional dummies distinguish banks in Italy from banks located in other stressed countries. Table C.1 contains for one additional country-group difference, but is otherwise analogous to Table 2 in the main text. Again, we first consider country-group differences within each 10-day period in isolation (Pre-CA, Soft Info, and Post-CA; columns 1–6). We then report time differences in the country-group differences (columns 7–8).

Italian sovereign-bank dependence is insignificant before (column 2 and 4, rows 6+7) and after the announcement of the CA results (column 6, rows 6+7). In the Post-CA period, the sovereign-bank dependence estimates for the GIPS group and Italy are both significantly different from the estimate for non-stressed countries (column 6, rows 7 and 8). The differential effect is more negative for Italian data (-0.35; column 8, row 1) than for the other four stressed countries (-0.20; column 8, row 2).



Table C.1: Changes in within-country risk dependence, extended

This table reports results from cross-sectional difference regressions and difference-in-differences regressions. Tests of cross-sectional differences for the Pre-CA, Soft Info, and Post-CA are separately shown in columns 1-2, 3-4, and 5-6, respectively. Columns 7 and 8 report difference-in-differences estimates of the following model:

$$\Delta \text{cds}_{j(i),t}^s = \alpha_0 + \alpha_1 \cdot \mathbf{S}_j \cdot \mathbf{P}_t \cdot \Delta \text{cds}_{i,t}^b + \alpha_2 \cdot \mathbf{S}_j \cdot \Delta \text{cds}_{i,t}^b + \alpha_3 \cdot \mathbf{P}_t \cdot \Delta \text{cds}_{i,t}^b + \alpha_4 \cdot \mathbf{S}_j \cdot \mathbf{P}_t + \alpha_5 \cdot \Delta \text{cds}_{i,t}^b + \delta_i + \gamma_t + \varepsilon_{i,t},$$

where  $\Delta \text{cds}_{j(i),t}^s$  is the daily log-change in CDS spread for sovereign  $j(i)$  in which bank  $i$  is located,  $\Delta \text{cds}_{i,t}^b$  is the daily log-change in CDS spread for bank  $i$  at time  $t$ ,  $\mathbf{P}_t$  distinguishes the Pre-CA, Soft Info, and Post-CA periods, and  $\mathbf{S}_j$  is a dummy variable that takes the value of one for stressed countries and zero for non-stressed countries. Bank fixed effects  $\delta_i$  eliminate the influence of unobserved bank- (or CDS contract-) specific characteristics (such as differences in market liquidity) on sovereign-bank risk dependence. Time fixed effects  $\gamma_t$  control for unobserved changes that are common to all sovereign CDS such as overall CDS market liquidity. Each column indicates whether the regression contains time (Time FE) and bank (Bank FE) fixed effects. Standard errors are bootstrapped.

Dep. Var.: $\Delta \text{cds}_{j(i),t}^s$	(1) Pre-CA	(2) Pre-CA	(3) Soft Info	(4) Soft Info	(5) Post-CA	(6) Post-CA	(7) Diff-Diff (4)-(2)	(8) Diff-Diff (6)-(2)
$\mathbf{S}_j^{IT} \cdot \mathbf{P}_t \cdot \Delta \text{cds}_{i,t}^b$							0.107 (0.181)	-0.345*** (0.113)
$\mathbf{S}_j^{GIPS} \cdot \mathbf{P}_t \cdot \Delta \text{cds}_{i,t}^b$							0.577*** (0.125)	-0.195* (0.117)
$\mathbf{P}_t \cdot \Delta \text{cds}_{i,t}^b$							-0.193 (0.119)	0.278** (0.113)
$\mathbf{S}_j^{IT} \cdot \mathbf{P}_t$							0.006 (0.009)	-0.002 (0.004)
$\mathbf{S}_j^{GIPS} \cdot \mathbf{P}_t$							-0.005 (0.006)	-0.003 (0.004)
$\Delta \text{cds}_{i,t}^b$	-0.092 (0.068)	-0.102 (0.066)	-0.159 (0.106)	-0.183* (0.109)	0.300*** (0.094)	0.292*** (0.099)	0.024 (0.030)	0.018 (0.030)
$\mathbf{S}_j^{IT} \cdot \Delta \text{cds}_{i,t}^b$	0.165** (0.072)	0.175** (0.073)	0.097 (0.157)	0.117 (0.157)	-0.348*** (0.096)	-0.340*** (0.099)		
$\mathbf{S}_j^{GIPS} \cdot \Delta \text{cds}_{i,t}^b$	0.161* (0.088)	0.159* (0.090)	0.559*** (0.130)	0.571*** (0.124)	-0.219** (0.106)	-0.204** (0.104)		
$\mathbf{S}_j^{IT}$	-0.000 (0.003)		0.006 (0.008)		-0.002 (0.003)			
$\mathbf{S}_j^{GIPS}$	0.007** (0.003)		0.003 (0.004)		0.005 (0.003)			
Observations	480	480	480	480	480	480	960	960
R-squared	0.2577	0.2733	0.4433	0.4548	0.5359	0.5510	0.4230	0.4472
-	-	-	-	-	-	-	-	-
Bank FE	NO	YES	NO	YES	NO	YES	YES	YES
daily 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