

Credit Spread Interdependencies of European States and Banks during the Financial Crisis

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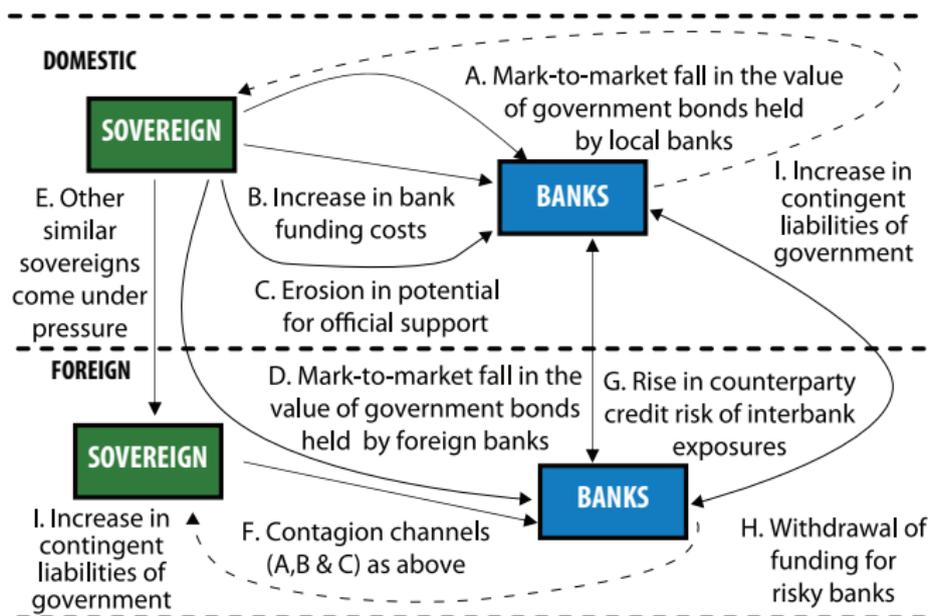
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Motivation

BIS (2009) : “The scope and magnitude of **the bank rescue packages** also meant that significant risks had been transferred onto government balance sheets. This was particularly apparent in **the market for CDS** referencing sovereigns involved either in large individual bank rescues or in broad-based support packages for the financial sector...”

- *Why should banks' and sovereign default risk be related?*
- *Was the impact of bank bailout programs homogeneous across European countries?*

Spillover Effects from the Sovereign to the Banks, and vice-versa. *Source: IMF (2010)*



- 1 Introduction
- 2 The Setup
- 3 The Results for Ireland
- 4 Cross-Country Analysis
- 5 Conclusions

Related Literature

- Acharya et al. (2011):
 - **In light of bank bailouts:** build a model that explains the interconnection between sovereign and financial sector credit risk \implies “two-way feedback effects”
 - **In equilibrium:** solve for optimal bailout and find the resulting sovereign CDS/bond spread
- Ejsing and Lemke (2011):
 - **Eurozone sovereigns and banks:** identify *the common risk factor* of the CDS spreads \implies **Cointegration Analysis**
- Dieckmann and Plank (2010):
 - **Private-to-public risk transfer:** magnitude depending on country's relative importance of financial system pre-crisis
 - **Eurozone countries** bear higher sensitivity to the health of the financial system

Hypotheses

Prior to Government Interventions

- 1) Changes in the default risk of banks impact on the default risk of European governments, **but not** vice-versa.

During/After Government Interventions

- 2a) Changes in the default risk of banks influence the default risk of states **stronger** than before.
- 2b) An increase/decrease in government's default risk affects the default risk of the domestic banks in the same direction.
- 3) The sensitivity of the bank to the government risk of default increases with *the perceived risk transferred* from the bank to the government.
- 4) Government rescue schemes across European countries influenced *heterogeneously* the interdependence between states' and banks' default risk.

Data and Methodology

- **7 European countries:** France, Germany, Italy, Ireland, Netherlands, Portugal, and Spain
- CDS series of the country and two domestic banks respectively: 21 variables in total
- Time span: 1 June 2007 - 31 May 2010 (772 trading days)
- We analyze the linkages between bank's and sovereign CDS spreads in a **two sub-periods setup**:
 - 1 Before government interventions
 - 2 During and after government aid schemes

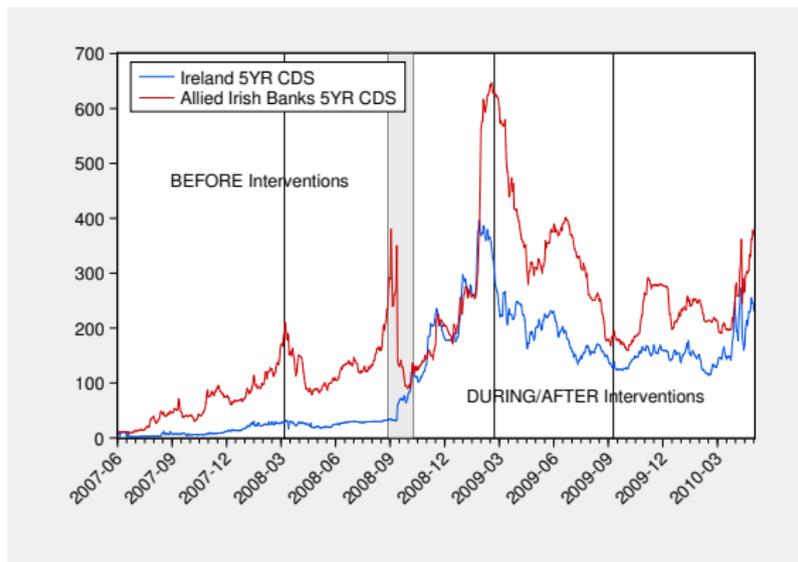
Econometrics

- **Granger-Causality (Short-Run Dynamics)** test on lag-augmented VAR
- **Vector Error Correction Models (Long-Run Dynamics):**

$$\begin{pmatrix} \Delta cds_{Sov,t} \\ \Delta cds_{Bk,t} \end{pmatrix} = \underbrace{\begin{pmatrix} \alpha_{Sov} \\ \alpha_{Bk} \end{pmatrix}}_{\text{Speed of adjustment}} \underbrace{(\beta_{Sov} cds_{Sov,t-1} + \beta_{Bk} cds_{Bk,t-1} + \beta_0)}_{\text{Cointegration relation}} + \sum_{i=1}^{p-1} \begin{bmatrix} \gamma_{SovSov,i} & \gamma_{SovBk,i} \\ \gamma_{BkSov,i} & \gamma_{BkBk,i} \end{bmatrix} \begin{pmatrix} \Delta cds_{Sov,t-i} \\ \Delta cds_{Bk,t-i} \end{pmatrix} + u_t,$$

- **Generalized Impulse Responses (entire dynamics)** that assumes no prior ordering of variables and allows for contemporaneous relations

CDS Markets: effects of Irish Bank Bailout for IR and AIB



- On 30 Sept 2008, Ireland announced that it guarantees all bank deposits
- Allied Irish Banks (AIB) - received/issued more than Eur 10 bn (i.e. in capital injection, gov. guaranteed debt)
- **TOTAL bill for Ireland:** aprox. Eur 600 bn (or 300% of GDP)

Ireland: Granger-Causality and Cointegration Analysis

Granger-Causality Tests

Before:

-

-

During/After:

AIB \xrightarrow{Gr} IrelandIreland \xrightarrow{Gr} AIB

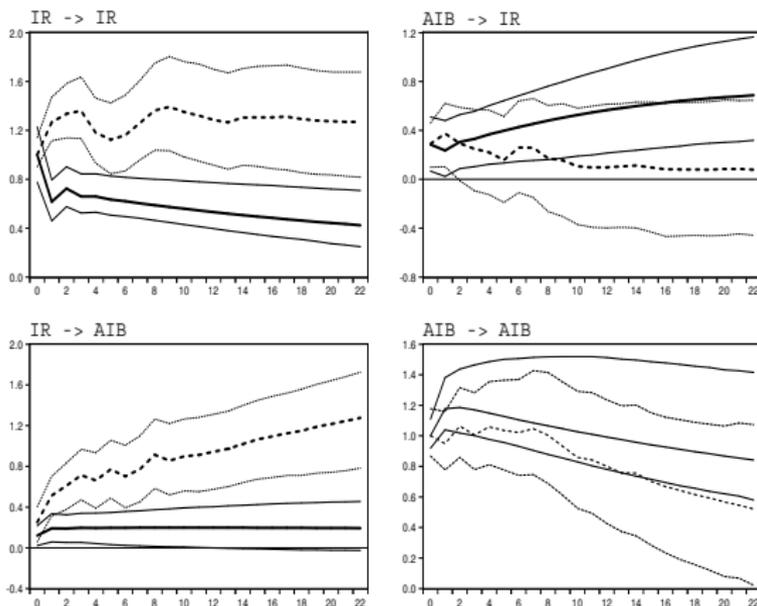
Cointegration Analysis

| Period | Sov - Bk | α_{Sov} | α_{Bk} | β_{Sov} | β_{Bk} | Const. |
|--------|---------------|--------------------|-------------------|---------------|--------------------|--------------------|
| Before | Ireland - AIB | -0.278 [-3.826] | 0.008 [0.171] | 1.000 - | -0.567 [-5.432] | -0.520 [-1.032] |
| After | Ireland - AIB | 0.014 [1.012] | 0.060 [4.582] | 1.000 - | -0.724 [-6.905] | -1.116 [-1.903] |

Note: β -coefficients describe the long-run relationship between banks and sovereign log-CDS spreads. α -coefficients measure *the speed of adjustment* to the long-run relationship. *t-statistics* reported in square brackets.

Ireland: The results from GIR analysis

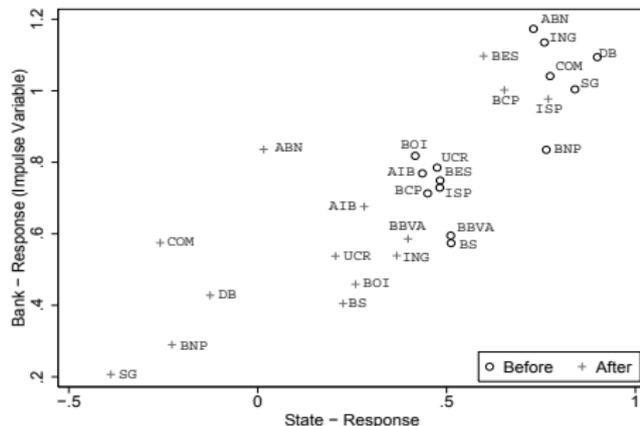
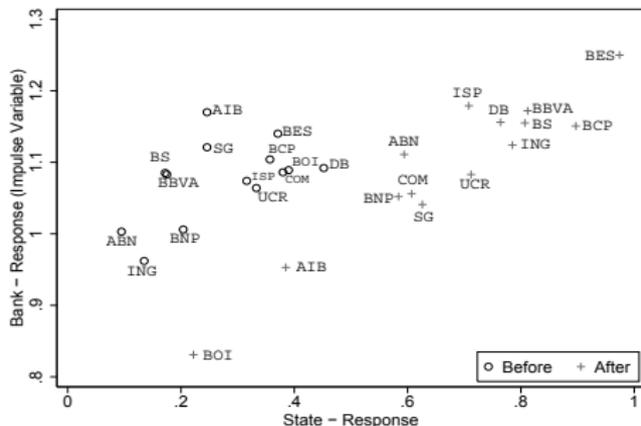
Before (solid) and During/After Government Interventions (dotted)



Note: X-axis: number of days (after the shock). Y-axis: impact relative to one standard deviation shock of the impulse variable. 95% confidence intervals (light).

Bank Shock (Cross-Country Analysis)

Responses at day 1 & 22 from a impulse (at day 0)

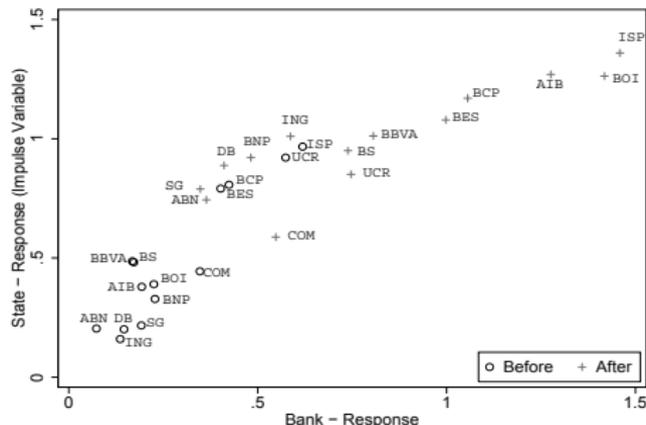
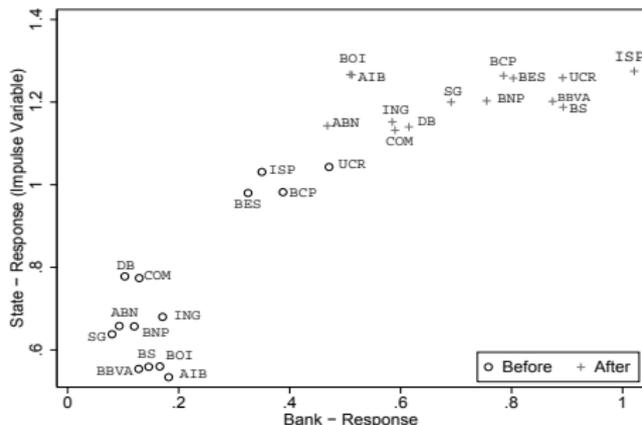


Before(o): at day 1 no significant effect of a shock on the sovereign CDS spreads in the case of BNP, SG, ING, BBVA, and BS. At day 22 all are significant.

After(+): at day 1 no significant effect of BOI on IR. At day 22 no significant effect on the sovereign from a shock in BNP, SG, COM, DB, AIB, BOI, UCR, ABN, and BS.

Country Shock (Cross-Country Analysis)

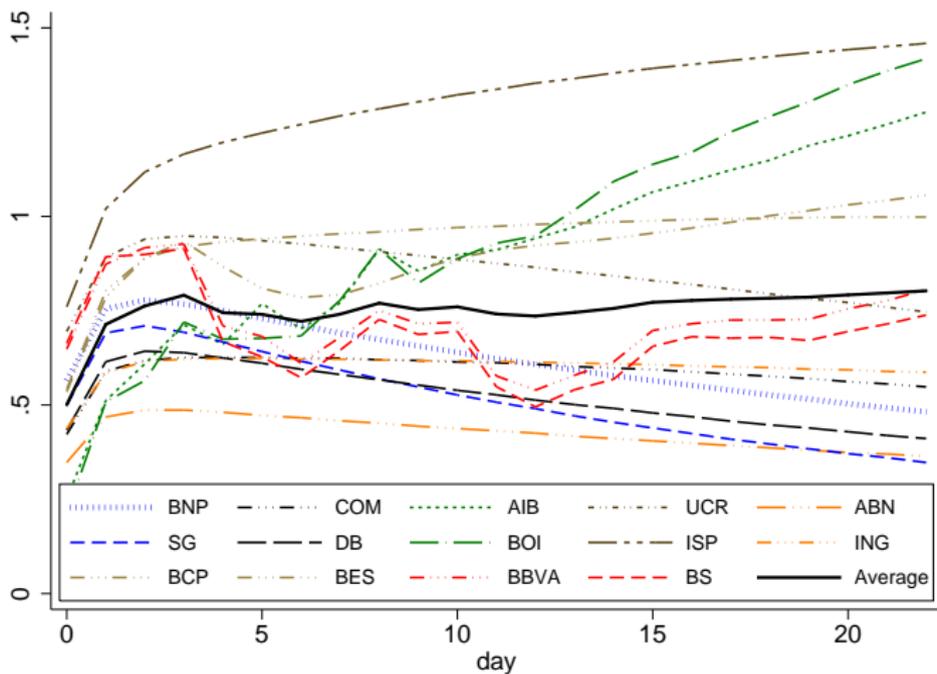
Responses at day 1 & 22 from an impulse (at day 0)



Before(o): at day 1 there is no significant impact of the sovereign shock on ISP, ABN, and BBVA. At day 22 there is no significant effect on DB, AIB, BOI, ABN, BBVA, and BS.

After(+): all shocks have significant effects in the short- and long-run.

Country Shock: Period DURING/AFTER



Conclusions

Before Interventions

Systemic financial crisis: sovereign credit risk sensitive to banking credit risk, but not vice-versa. (in Italy and Portugal only partially accepted)

During/After Interventions

- Changes in sovereign CDS spreads significantly contribute to the financial sector risk of default.
- Changes in banks' risk of default impact *stronger* sovereign CDS now than before. (in the short-run)
- Differences in dynamics of domestic banks and sovereign CDS spreads → can be related to differences in *the perceived risk transfer*.
- We suggest that *country specific characteristics* lead to *heterogeneous* outcomes of government interventions.

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