Bank/Sovereign Risk Spillovers during the European Debt Crisis

Valerie De Bruyckere, Maria Gerhardt, Glenn Schepens, Rudi Vander Vennet

National Bank of Belgium, 2012 Colloquium

October 11th
Motivation

1. Since the start of the financial crisis, **strong interconnection** between bank credit risk and sovereign credit risk
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- Large underlying heterogeneity
  Yearly correlation of a bank with its home country in our sample ranges between -0.35 and 0.68
- Cross-border crisis
  In contrast to previous sovereign debt and financial crises.
Motivation

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2. Four main risk **transmission channels** (BIS, 2011)
   - Asset holdings channel (see, e.g. Angeloni and Wolff, 2012)
   - Collateral channel
   - Guarantee channel (see, e.g. Demirguc-Kunt and Huizinga, 2011)
   - Rating channel (see, e.g., Arezki et al., 2011)
Motivation

- Collateral Channel
  - Sovereign exposure
  - Short term funding
- Asset Holdings Channel
  - Sovereign exposure
  - Capital buffer
- Capital buffer
  - Home country effect
- Guarantee Channel
- Ratings Channel
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3. Lively policy debate on how to reduce this interconnectedness (e.g. banking union)

4. However, limited theoretical and empirical evidence on credit risk spillovers between banks and sovereigns and how to explain them
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This paper

Investigates credit risk contagion between banks and sovereigns in Europe

1. Do we find evidence of credit risk spillovers?

2. Which characteristics influence the intensity of risk spillovers?
This paper

Investigates credit risk contagion between banks and sovereigns in Europe

1. Do we find evidence of credit risk spillovers?

2. Which characteristics influence the intensity of risk spillovers?
   - Home bias?
   - Bank-specific and country-specific determinants
   - Interplay between bank business models and sovereign risk
   - We exploit the fact that we have multiple observations for each bank/country at each point in time
Main Findings

- Significant evidence of **increased contagion** between banks and countries during the recent crisis

- Strong **home country bias** (guarantee channel)

- High **capital** buffers lead to less intense spillovers (asset holdings channel)
  - One standard deviation increase in Tier 1 ratio reduces the excess bank-country correlation from 17% to around 14%
  - One standard deviation increase in Tier 1 ratio reduces the impact of a standard deviation increase in sovereign credit risk on bank-country correlation with 35%

- Lower reliance on **short term funding** also decreases spillover intensity (collateral channel)

- Higher **debt-to-GDP ratios** increase the level of contagion

- Higher **sovereign debt holdings** lead to higher excess correlations (asset holdings channel)
Sample

- 15 European countries: Italy, Ireland, Spain, Germany, UK, Portugal, Greece, Belgium, Sweden, Norway, Denmark, Austria, the Netherlands, France, Switzerland
- 53 European banks
- Measure of credit risk: 5-year CDS spreads (Bloomberg, CMA)
- 2006 Q1 - 2011 Q3
- Quarterly bank balance sheet data from Worldscope
- Country-specific characteristics from various international sources (e.g. Eurostat, Oxford Economics)
- Sovereign exposure from the EBA stress tests (July 2010 and July 2011)
Measuring contagion

Bekaert et al. (2005)

“We define contagion as excess correlation, that is, correlation over and above what one would expect from economic fundamentals.”

Linear factor model for bank credit risk:

$$\Delta CDS_{b,t} = \beta_b F + \epsilon_{b,t}$$

Linear factor model for sovereign credit risk:

$$\Delta CDS_{c,t} = \beta_c F + \epsilon_{c,t}$$

Correlation between bank and sovereign credit risk:

$$E[\Delta CDS_{b,t} \Delta CDS'_{c,t}] = E[(\beta_b F' + \epsilon_b)(\beta_c F' + \epsilon_c)']$$

$$= \beta_b E[F' F] \beta_c' + E[\epsilon_b \epsilon'_c]$$
Common Factors

Three potential determinants of bank-sovereign correlations:

1. exposure to common factors
2. correlation between the common factors
3. correlation between unexplained CDS spread changes

\[ \Delta CDS_i(t) = c + \beta_1 \cdot Market_t + \beta_2 \cdot Itraxx_t + \beta_3 \cdot Vstoxx_t + \beta_4 \cdot Term_t + \epsilon_{i,t} \]
Common Factors

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   =”contagion”

\[ \Delta CDS_{i,t} = c + \beta_1 \cdot Market_t + \beta_2 \cdot Itraxx_t + \beta_3 \cdot Vstoxx_t + \beta_4 \cdot Term_t + \varepsilon_{i,t} \]
Common Factors

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\[ \Delta CDS_{i,t} = c + \beta_1 \cdot Market_t + \beta_2 \cdot Itraxx_t + \beta_3 \cdot Vstoxx_t + \beta_4 \cdot Term_t + \epsilon_{i,t} \]

<table>
<thead>
<tr>
<th>Year</th>
<th>MARKET</th>
<th>% Sign</th>
<th>ITRAXX</th>
<th>% Sign</th>
<th>VSTOXX</th>
<th>% Sign</th>
<th>TERM</th>
<th>% Sign</th>
<th># banks</th>
<th>adj. R</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>-0.0436</td>
<td>0.00%</td>
<td>0.0402</td>
<td>13.64%</td>
<td>-0.0065</td>
<td>0.00%</td>
<td>0.0217</td>
<td>4.55%</td>
<td>22</td>
<td>0%</td>
</tr>
<tr>
<td>2007</td>
<td>-0.2865</td>
<td>0.00%</td>
<td>0.7490</td>
<td>96.77%</td>
<td>-0.0784</td>
<td>0.00%</td>
<td>0.0485</td>
<td>6.45%</td>
<td>31</td>
<td>32%</td>
</tr>
<tr>
<td>2008</td>
<td>0.0669</td>
<td>6.52%</td>
<td>0.6365</td>
<td>91.30%</td>
<td>0.0705</td>
<td>8.70%</td>
<td>-0.0784</td>
<td>0.00%</td>
<td>46</td>
<td>33%</td>
</tr>
<tr>
<td>2009</td>
<td>-0.2347</td>
<td>0.00%</td>
<td>0.4010</td>
<td>86.27%</td>
<td>-0.0735</td>
<td>0.00%</td>
<td>0.0080</td>
<td>5.88%</td>
<td>51</td>
<td>18%</td>
</tr>
<tr>
<td>2010</td>
<td>-0.1503</td>
<td>0.00%</td>
<td>0.4400</td>
<td>92.45%</td>
<td>-0.0022</td>
<td>5.66%</td>
<td>0.0126</td>
<td>18.87%</td>
<td>53</td>
<td>32%</td>
</tr>
<tr>
<td>2011</td>
<td>-0.2918</td>
<td>0.00%</td>
<td>0.4772</td>
<td>84.91%</td>
<td>-0.0572</td>
<td>0.00%</td>
<td>0.0232</td>
<td>32.08%</td>
<td>53</td>
<td>29%</td>
</tr>
</tbody>
</table>
Measuring contagion

- Collateral Channel
  - Sovereign exposure
  - Short term funding

- Asset Holdings Channel
  - Sovereign exposure
  - Capital buffer

- Capital buffer
  - Home country effect

- Guarantee Channel

- Ratings Channel
Measuring contagion

Bank – Sovereign Correlations

Collateral Channel
- Sovereign bonds
- Short term funding

Global Common Factors

Asset Holdings Channel
- Sovereign bonds
- Capital buffer

Home country effect
- Bank size/TBTF
- Balance Sheet strength

Guarantee Channel

Ratings Channel
- Downgrades
- Short term funding
Common Factors

Excess Correlations

Factor Models

Collateral Channel
- Sovereign bonds
- Short term funding

Asset Holdings Channel
- Sovereign bonds
- Capital buffer

Ratings Channel
- Downgrades
- Short term funding

Guarantee Channel
- Home country effect
- Bank size/TBTF
- Balance sheet strength
Contagion - Results

<table>
<thead>
<tr>
<th>BASE YEAR: 2007</th>
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<tbody>
<tr>
<td>HOME</td>
</tr>
<tr>
<td>significant</td>
</tr>
<tr>
<td>2007 Base year</td>
</tr>
<tr>
<td>2008</td>
</tr>
<tr>
<td>2009</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2011</td>
</tr>
<tr>
<td>FOREIGN</td>
</tr>
<tr>
<td>significant</td>
</tr>
<tr>
<td>2007 Base year</td>
</tr>
<tr>
<td>2008</td>
</tr>
<tr>
<td>2009</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2011</td>
</tr>
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Explaining contagion

Three specific questions:

1. Is there a **home country bias**?
   - Bailout probability
   - Sovereign bond exposure
   - Fiscal consolidation
## Home-country effect

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Dummy</td>
<td>3.203*** (0.584)</td>
<td>2.407*** (0.815)</td>
<td>4.469*** (0.974)</td>
</tr>
<tr>
<td>Constant</td>
<td>15.51*** (0.188)</td>
<td>15.55*** (0.143)</td>
<td>15.97*** (0.0808)</td>
</tr>
<tr>
<td>Observations</td>
<td>7224</td>
<td>6997</td>
<td>2737</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.635</td>
<td>0.635</td>
<td>0.663</td>
</tr>
<tr>
<td>Bank-Time FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>cluster</td>
<td>bank</td>
<td>bank</td>
<td>bank</td>
</tr>
<tr>
<td></td>
<td>Robust standard errors in parentheses</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>*** p&lt;0.01, ** p&lt;0.05, * p&lt;0.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Correlation with home country is stronger than average correlation with other countries
Explaining contagion

Three specific questions:

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Three specific questions:

1. Is there a home country bias?
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2. Which bank characteristics matter for the intensity of contagion?
   - We analyze the impact of bank size, capital buffers, funding structure, asset structure, income diversification and sovereign bond holdings
# Bank Characteristics - country FE

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Excess Correl.</th>
<th>(2) Excess Correl.</th>
<th>(3) Excess Correl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>1.441** (0.632)</td>
<td>1.369** (0.650)</td>
<td>0.0384 (0.710)</td>
</tr>
<tr>
<td>Size x Home</td>
<td>0.926 (2.642)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tier 1 Ratio</td>
<td>-1.110* (0.604)</td>
<td>-1.230** (0.621)</td>
<td>-3.078*** (0.788)</td>
</tr>
<tr>
<td>Tier 1 x Home</td>
<td>1.108 (2.467)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loan to Assets ratio</td>
<td>-0.527 (0.622)</td>
<td>-0.491 (0.637)</td>
<td>-1.681** (0.840)</td>
</tr>
<tr>
<td>Loan to Assets ratio x Home</td>
<td></td>
<td>-0.531 (2.639)</td>
<td></td>
</tr>
<tr>
<td>Funding risk</td>
<td>1.802*** (0.405)</td>
<td>1.907*** (0.420)</td>
<td>1.841*** (0.547)</td>
</tr>
<tr>
<td>Funding risk x Home</td>
<td>-1.144 (1.547)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income diversification</td>
<td>0.109 (0.522)</td>
<td>0.152 (0.542)</td>
<td>1.291* (0.664)</td>
</tr>
<tr>
<td>Income diversification x Home</td>
<td></td>
<td>-0.576 (2.003)</td>
<td></td>
</tr>
<tr>
<td>EBA Country Exposures</td>
<td></td>
<td>0.652 (1.083)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>17.38*** (1.34e-07)</td>
<td>17.39*** (0.0242)</td>
<td>19.16*** (0.361)</td>
</tr>
<tr>
<td>Observations</td>
<td>3016</td>
<td>3016</td>
<td>1349</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.788</td>
<td>0.788</td>
<td>0.700</td>
</tr>
<tr>
<td>Home–Foreign–Time FE cluster</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Observations</td>
<td>3016</td>
<td>3016</td>
<td>1349</td>
</tr>
<tr>
<td>R-squared</td>
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<td>0.788</td>
<td>0.700</td>
</tr>
<tr>
<td>Home–Foreign–Time cluster</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
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</table>
Banks with larger capital buffers have lower excess correlations with sovereigns
  ▶ A one standard deviation increase of the Tier 1 ratio decreases excess correlations with 1.1-3.3 percentage points
  ▶ Similar impact when using alternative capital ratio

Banks with a low portion of short term debt exhibit lower correlations
  ▶ A one standard deviation decrease of the short term debt ratio lowers excess correlations with 1.8 percentage points

Retail orientation and income diversification become significant from 2010 onwards, change in risk perception

No difference in impact for home country compared to other countries
### Bank Characteristics - bank FE

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sovereign CDS spread</td>
<td>1.756**</td>
<td>1.471*</td>
<td>1.446*</td>
<td>1.952**</td>
<td>1.419*</td>
</tr>
<tr>
<td></td>
<td>(0.777)</td>
<td>(0.842)</td>
<td>(0.839)</td>
<td>(0.779)</td>
<td>(0.835)</td>
</tr>
<tr>
<td>Sovereign CDS spread Squared</td>
<td>-0.723***</td>
<td>-0.630***</td>
<td>-0.598***</td>
<td>-0.698***</td>
<td>-0.586***</td>
</tr>
<tr>
<td></td>
<td>(0.148)</td>
<td>(0.157)</td>
<td>(0.162)</td>
<td>(0.150)</td>
<td>(0.161)</td>
</tr>
<tr>
<td>EBA Country Exposures</td>
<td>1.478***</td>
<td>1.240***</td>
<td>1.243***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.323)</td>
<td>(0.351)</td>
<td>(0.356)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sovereign CDS x</td>
<td></td>
<td></td>
<td></td>
<td>-0.716**</td>
<td></td>
</tr>
<tr>
<td>Tier 1 ratio</td>
<td></td>
<td></td>
<td></td>
<td>(0.302)</td>
<td></td>
</tr>
<tr>
<td>Sovereign CDS x</td>
<td></td>
<td></td>
<td>-0.140</td>
<td>-0.211</td>
<td></td>
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<tr>
<td>Funding risk</td>
<td></td>
<td></td>
<td></td>
<td>(0.313)</td>
<td>(0.273)</td>
</tr>
<tr>
<td>Sovereign CDS x</td>
<td></td>
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<td>-0.178</td>
<td>0.493</td>
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</tr>
<tr>
<td>Loan to Assets ratio</td>
<td></td>
<td></td>
<td></td>
<td>(0.429)</td>
<td>(0.511)</td>
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<tr>
<td>Sovereign CDS x</td>
<td></td>
<td></td>
<td></td>
<td>-0.0429</td>
<td>0.0261</td>
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<td>Income Diversification</td>
<td></td>
<td></td>
<td></td>
<td>(0.393)</td>
<td>(0.494)</td>
</tr>
<tr>
<td>Sovereign CDS x</td>
<td></td>
<td></td>
<td>0.193</td>
<td>-0.341</td>
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</tr>
<tr>
<td>Size</td>
<td></td>
<td></td>
<td></td>
<td>(0.353)</td>
<td>(0.364)</td>
</tr>
<tr>
<td>Home dummy</td>
<td>2.750***</td>
<td></td>
<td>2.662***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.855)</td>
<td></td>
<td>(0.852)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sovereign CDS x x Home</td>
<td>5.488***</td>
<td></td>
<td>5.396***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.394)</td>
<td></td>
<td>(1.394)</td>
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<tr>
<td>(T1+T2) Capital ratio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.948**</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>(0.464)</td>
</tr>
<tr>
<td>Constant</td>
<td>17.91***</td>
<td>19.08***</td>
<td>19.01***</td>
<td>17.98***</td>
<td>19.00***</td>
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<tr>
<td></td>
<td>(0.167)</td>
<td>(0.111)</td>
<td>(0.130)</td>
<td>(0.171)</td>
<td>(0.128)</td>
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<tr>
<td>Observations</td>
<td>3016</td>
<td>1349</td>
<td>1349</td>
<td>3016</td>
<td>1349</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.677</td>
<td>0.577</td>
<td>0.579</td>
<td>0.678</td>
<td>0.581</td>
</tr>
<tr>
<td>Bank-time FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>cluster</td>
<td>Bank-time</td>
<td>Bank-time</td>
<td>Bank-time</td>
<td>Bank-time</td>
<td>Bank-time</td>
</tr>
</tbody>
</table>
Bank Characteristics - bank FE

- Excess correlations become stronger as sovereign spreads are higher
- Impact of a rise in CDS spreads is higher for home country banks
- A higher capital ratio can form a buffer for this effect
  - A bank with a Tier 1 ratio of one standard deviation above the average ratio gets a 1.23 percentage points higher excess correlation when the sovereign CDS spread increases by one standard deviation, whereas the excess correlation of a bank with an average Tier 1 ratio increases with 1.95 percentage points
- Higher bond portfolio exposures lead to a higher excess correlations
- Higher bond portfolio exposures lead to a stronger impact of an increase in CDS spreads
Explaining contagion

Three specific questions:

1. Is there a **home country bias**?
   ▶ Bailout probability
   ▶ Sovereign bond exposure
   ▶ Fiscal consolidation

2. Which **bank characteristics** matter for the intensity of contagion?
   ▶ We analyze the impact of bank size, capital buffers, funding structure, asset structure, income diversification and sovereign bond holdings

3. Which **country characteristics** matter for the intensity of contagion?
   ▶ We analyze the impact of a country‘s fiscal position and the stance of the business cycle
## Country Characteristics

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Excess Correl.</th>
<th>(2) Excess Correl.</th>
<th>(3) Excess Correl.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home dummy</td>
<td>2.884***</td>
<td>2.707***</td>
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</tr>
<tr>
<td></td>
<td>(0.897)</td>
<td>(0.939)</td>
<td></td>
</tr>
<tr>
<td>Debt to GDP</td>
<td>1.144***</td>
<td>0.953***</td>
<td>0.911***</td>
</tr>
<tr>
<td></td>
<td>(0.222)</td>
<td>(0.238)</td>
<td>(0.272)</td>
</tr>
<tr>
<td>Debt to GDP x Home dummy</td>
<td></td>
<td>2.245**</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.883)</td>
<td></td>
</tr>
<tr>
<td>Government Revenues</td>
<td>-0.159</td>
<td>-0.185</td>
<td>1.422***</td>
</tr>
<tr>
<td></td>
<td>(0.275)</td>
<td>(0.290)</td>
<td>(0.387)</td>
</tr>
<tr>
<td>Government Revenues x Home dummy</td>
<td>-0.679</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.895)</td>
<td></td>
<td></td>
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<tr>
<td>Bank sector size</td>
<td>-0.0174</td>
<td>-0.0169</td>
<td>0.442</td>
</tr>
<tr>
<td></td>
<td>(0.241)</td>
<td>(0.248)</td>
<td>(0.332)</td>
</tr>
<tr>
<td>Bank sector size x Home dummy</td>
<td>-0.270</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.011)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Sentiment</td>
<td>1.564***</td>
<td>1.458**</td>
<td>0.962</td>
</tr>
<tr>
<td></td>
<td>(0.568)</td>
<td>(0.568)</td>
<td>(0.662)</td>
</tr>
<tr>
<td>Economic Sentiment x Home dummy</td>
<td>0.965</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.111)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBA exposure</td>
<td></td>
<td></td>
<td>0.0934***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0179)</td>
</tr>
<tr>
<td>Constant</td>
<td>17.13***</td>
<td>17.12***</td>
<td>16.82***</td>
</tr>
<tr>
<td></td>
<td>(0.0755)</td>
<td>(0.0737)</td>
<td>(0.343)</td>
</tr>
<tr>
<td>Observations</td>
<td>3016</td>
<td>3016</td>
<td>1349</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.668</td>
<td>0.669</td>
<td>0.563</td>
</tr>
<tr>
<td>Bank-Time FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>cluster</td>
<td>Bank-Time</td>
<td>Bank-Time</td>
<td>Bank-Time</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Country Characteristics

- Banks are stronger correlated with countries with higher debt-to-GDP ratios
- Home-country bias still holds, even when controlling for a set of country-specific factors
- Higher debt-to-GDP ratios reinforce home-country bias
  - Excess correlation of a bank in a country with a debt-to-GDP ratio in the 90th percentile is twice as high as the excess correlation of a bank in a country with an average debt-to-GDP ratio
- Higher government revenues positively related to higher excess correlations from 2010 onwards
Conclusions

- Significant evidence of increased contagion between banks and countries during the recent crisis

- Strong home country bias

- High capital buffers lead to less intense spillovers
  - One standard deviation increase in Tier 1 ratio reduces the excess bank-country correlation from 17% to around 14%

- Lower reliance on short term funding also decreases spillover intensity

- Higher debt-to-GDP ratios increase the level of contagion

- Higher sovereign debt holdings lead to higher excess correlations
Conclusions

Bank – Sovereign Correlations

Collateral Channel
- Sovereign bonds
- Short term funding

Global Common Factors
- Home country effect
  - Bank size/TBTF
  - Balance Sheet strength

Asset Holdings Channel
- Sovereign bonds
  - Capital buffer

Guarantee Channel

Downgrades
- Short term funding

Ratings Channel
Conclusions

Excess Correlations

Factor Models

Global Common Factors

Collateral Channel
- Sovereign bonds
- Short term funding

Asset Holdings Channel
- Sovereign bonds
- Capital buffer

Ratings Channel
- Downgrades
- Short term funding

Guarantee Channel
- Home country effect
- Bank size/TBTF
- Balance sheet strength
Conclusions

- Collateral Channel
  - Sovereign exposure
  - Short term funding

- Asset Holdings Channel
  - Sovereign exposure
  - Capital buffer

- Excess Correlations

- Guarantee Channel
  - Capital buffer
  - Home country effect

- Ratings Channel
Bank/Sovereign Risk Spillovers during the European Debt Crisis

Valerie De Bruyckere, Maria Gerhardt, Glenn Schepens, Rudi Vander Vennet

National Bank of Belgium, 2012 Colloquium

October 11th